HOME SECURITY SYSTEMS FOR ELDERLY:

EXTENT OF UTILIZATION AND SATISFACTION

June, 2021 Poripurna Goswami

HOME SECURITY SYSTEMS FOR ELDERLY:

EXTENT OF UTILIZATION AND SATISFACTION

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INTRODUCTION

CHAPTER I

INTRODUCTION

India at present is considered as a leading nation in the world in terms of human power. The huge young population is considered as its strength and it enhances its potential for faster growth. However, the global demographic trend depicts that, with the passage of time, the countries have experienced aging of the population. The proportion of older persons in the population of a country has increased. Due to economic well-being, better health care system, good medicines, etc. there is a substantial reduction in mortality in society. Reduced mortality has led to a reduction in fertility too. These factors together have resulted in an increasing number of Elderly persons in the population. The phenomenon- population aging, is a dynamic demographic trend all over the world.

According to the report of Situation Analysis of the Elderly in India (2011), Elderly or old age consists of ages nearing or surpassing the average life span of human beings. The boundary of old age cannot be defined exactly because it does not have the same meaning in all societies. People can be considered old because of certain changes in their activities or social roles. Also, old people have limited regenerative abilities and are more prone to disease, syndromes, and sickness as compared to other adults. However, the Government of India adopted a National Policy on Elderly in January 1999, which defines 'senior citizen' or 'elderly' as a person who is of age 60 years or above (Central Statistics Office Ministry of Statistics & Programme Implementation Government of India, 2011).

Elderly people are an important and growing segment of the world population. The population aging started in the last century with developed countries, is now encompassing in developing countries too. India, by no means, is an exception to this phenomenon. Over the years, the structure of the population has changed and will further change in the time to come. The proportion of older persons in the population will increase.

This population ageing has profound social and economic implications for a country. The increasing number of older persons put a strain on health

care, social care, safety and security systems in the country. Old age comes with a lot of ailment. In case of a large number of Elderly in the population, the country needs more and more health and medical services, facilities and smart resources to ensure safety and security of the Elderly.

Elderly people, due to their reduced mobility and debilitating disabilities, need other people to do things for them. With the increasing trend of nuclear families in society and with fewer children in the family, the care of older persons in the families gets increasingly difficult. The trend clearly reveals that ageing emerges as a major social challenge in the future and vast resources are required towards the support, service, care, safety and security of the Elderly.

The Problems Faced by the Elderly

Conventionally, in India, the Elderly has always been treated with great respect and occupied a prominent position in the family. While the younger generation felt duty-bound to serve them. In rural India, the joint family system is still prevalent, but in search of jobs, there are increasing migrations of the younger generation from rural to urban localities leaving the Elderly in their homes all alone (Goswami & Bhattacharjee, 2017). The problem increases when there is nobody to take care of them in the home. Rural India still lacks a facility to hire a caretaker, who would take care of the Elderly people living alone. There are not enough old age homes, especially in Indian villages, where the old man or woman could spend his or her last days of life in peace, with someone to take care of them. Hence, it is the left alone Elderly population, who has to live alone and take care of their own selves until they die (Datta, 2017).

On the other hand, the cases of crimes against the Elderly are on the rise across the country. Today, Elderly living at home are victims of grievous hurt, murder and abuse and isolated by neighbors, family members and domestic servants. According to the National Crime Records Bureau's report (2010), 32,496 Elderly have been murdered and 5,836 cases of not amounting to murder and kidnapping have been reported all over India from 2001 to 2010. Statistics released in 2017 revealed that 188 senior citizens were murdered in

Tamil Nadu, followed by 152 in Maharashtra and 127 in Uttar Pradesh. As many as 62 senior citizens were victims of attempt-to-murder cases in Tamil Nadu, which is the second-highest in the country after Maharashtra that reported 66 such cases (NCRBR, 2017).

The major types of crimes faced by the Elderly are burglary, molestations and criminal acts like; a crime against the body (murder, attempt to murder, hurt and kidnapping etc.), a crime against the property (dacoity, robbery, burglary and theft) and economic crime (cheating, criminal breach of trust etc.). Study also identified different types of crimes such as murder, rape, burglary, theft, robbery which were committed in the victim's own house due to which there is a perceptible increase in fear of crime among the Elderly. (Mishra & Patel, 2013).

Significance of Home Security Systems for the Elderly

Frail older adults prefer living independently and self-managing in their own home which promotes the feelings of competency and reduces the vulnerability to depression. Ageing in Place, the option to grow old in one's home instead of institutional healthcare facilities, is increasingly recognized as a preferred strategy for supporting the Elderly who may be less independent than they were previously. If care-giving, safety and security resources can be brought into the home, the burdens of Elderly care could be greatly reduced (Kenner, 2008).

In fact, from the economic point of view also, the cost of living at home with Home Security Monitoring Devices and intelligent appliances is less expensive and more beneficial than attending medical centers and being supervised by nurses. Rather, the implementation of Home Security Systems with remote monitor controls and health care capabilities will reduce the expense of personal aid assistance at home. These technologies may allow the Elderly to age in place without direct, 24-hour supervision by formal or informal caregivers (Ghazal and Al-Khatib, 2015).

However, Elderly people don't show much enthusiasm for technology, but when it comes to their safety, security and independence; modern technology has proven to be quite useful in ensuring their peace of mind. The

Elderly has unique needs, concerns and the risks associated with living alone. Considering the most cases of assault, robbery, and other crimes against the Elderly, typically happen in or near their home, installing a comprehensive Home Security Systems can help to ensure the safety and wellbeing of the loved ones. (Molin, et. al., 2007). [3]

Common reasons to have Home Security Systems at residence

1. **Protects Valuables**: In a home where the family is residing, have electronics, jewellery or other high-value items or are an irreplaceable family heirloom. These are lost due to a home invasion. Therefore, a Home Security Systems which is equipped with an alarm will be beneficial for them, as it can scares off burglars and can notify the local authorities if someone does attempt a break-in.
2. **Deters Crime**: As the number of Home Security Systems increased in a residential area, the number of residential robberies decreased in that area, even for people who didn't have their own security systems. Having a security system not only protects one's family but helps the neighborhood be a safer place for everyone.
3. **Allows Remote Access to Home:** Modern security systems allow the owner to remotely monitor what's happening in the home. A person can monitor the area via cameras installed throughout the home, as well as control the thermostat, door locks, lights, and other devices in the home.
4. **Notifies Fire or Gas Problems in a House**: A person receives notifications if smoke or carbon monoxide alarms goes off when the owner is away from home. Depending on the provider, a person can even set it up so authorities are instantly notified of these emergencies.
5. **Help Keep Tabs on Family Members**: A person at work can use the mobile app to watch what's happening in the home via cameras, if automatic door locks are installed, one can even remotely, lock or unlock them for safety purpose.
6. **Improves Electricity Management:** Many Home Security Systems offer smart thermostats and outlets. If one has forgotten to change thermostat before leaving on a trip, these gadgets allow controlling the

thermostat on any web-enabled device. Likewise, if any electric device is left on, one can turn it off right from their devices. This works as a great tool to turn lights on and off while the family are on vacation to help give the home the appearance that someone is there.

7. **Makes Room for Peace of Mind**: The sense of security and peace a family can gain with an alarm system is perhaps the greatest benefit of all. Next to being safe, the confidence of feeling safe will help family members be a more productive, healthy, and focused person.
8. **Reduce Accidents:** The major purpose of Home Security Systems is to improve comfort, dealing with medical rehabilitation, monitor mobility and physiological parameters, reduce accidents by anticipating risky situations and to deliver therapy through wearable biomedical sensors. These systems maintain a certain level of independence, thus provide a better quality of life for elderly people. Family and caregivers can monitor elderly people remotely with the help of monitoring devices when they are outside the home, although relatives can receive alerts when there is any problem. This gives them peace of mind.
9. **Inform the User if there are Any Unusual Events**: Home Security Systems helps to inform the user if there are any unusual events in the house. From intrusions by burglars to smoke and fire, to frozen pipes and water leaks, there are many different types of Home Alarm Systems that can be integrated with each other to protect the Elderly in his house from every threat possible.
10. **Medical Assistance:** Wearable medical assistance devices connected to the Home Security Systems can be helpful during emergencies by making panic buttons easily accessible to alert authorities immediately. Elderly user can test and assess their blood pressure, pulse, and stool at home. The medical information is selectively sent to the relevant personnel. The Home Security Systems allows Elderly people to live more independently, as they can monitor different elements from one corner of the house.
11. **Reduce Fear of Falling**: As people are getting older, their home can become dangerous places, especially if the person lives alone or have health problems. Fear of falling or being unable to carry out daily routines

safely are often driving factors behind a decision to move out of a much-loved home and into an assisted living facility. Smart Home Security Systems, connected sensors, and a multitude of other smart home devices can address many common challenges of ageing, helping seniors stay safer and healthier in their homes for longer.[6]

Justification Of the Study

The concept of Home Security Systems is very much known to all but not used on a large scale as is observed. The Home Security Systems provide security and safety to the Household, assets as well as the people inside it. In today's world security is an important aspect in the smart home applications. The new arising technologies related to smart Home Security provides a comfortable and safe environment for users.

Elderly people are very much prone to danger because of their declination of physical and mental abilities. The cases of crimes against the Elderly are rising faster in rate across the country. These cases have certainly affected the way of life and sense of well-being of the elderly to a large extent in the family as well as in the society. A rapid increase in the percentage of the vulnerability of the Elderly over the past few years has been a cause of serious concern among the research fraternity worldwide. Active research is being carried out to leverage the benefits of information and communication technologies that enable them to live independently and promote a sense of overall well-being.

Home Security Systems are often employed to assist Elderly group of people. There is a need to spread the importance, uses and benefits of installing a Home Security Systems for the comfort and safety of the Elderly at their residence. There is also a need to access the utilization pattern and satisfaction of the users who have already installed the Home Security Systems. Hence the study was undertaken to find out the commonly installed Home Security Systems which is helpful to Elderly people and know their utilization pattern and satisfaction by the Elderly user of Home Security Systems.

Many Elderly need the assistance of other person or healthcare personal for their day-to-day life to provide security to them and also to provide help in their routine work. But with the help of different security devices available in the market, they can assist and provide them with safety inside the House. Various devices are also available in the market which provides help during the elderly person's medical emergencies by calling the monitoring person or the medical staff.

The finding of the study would be beneficial to the manufacturer and retailer of the different Home Security Systems for Elderly. On the basis of the feedback of the study, they can make improvement in their products, if needed. The extent of utilization and satisfaction experienced regarding Home Security System for Elderly by the residents will help to make any necessary changes if any dissatisfaction is observed in the study. It is also beneficial to the buyer those who want to buy a Home Security Systems for their house which is beneficial for the Elderly or Senior love one. User can know which system is required to fulfil their need and also, they can estimate the approximate cost of that system from this study. It is also beneficial for the old age homes where Elderly persons live.

As the field of FCRM has Interior Design as specialization subject and diploma course on Hotel Interior, the information collected in the study, such as types of Home Security Systems for elderly, there uses and benefit, source from where it can be installed and the product which are available in the market in present time for the security of elderly person etc. can incorporate in the curriculum. Information based on Market survey will provide more clear and real information to the reader.

Many types of research on the field of Home Security and safety systems have been conducted in India and Abroad viz. Gupte N. (2014), Paraskumar D.K., Pandey A., Kumar D., Kumar P. and Javale D. (2014), Yu L. (2015), Mishra B.H. (2015), Kaur S., Singh R., Khairwal N.and Jain P. (2016), Kaur S., Singh R., Khairwal N.and Jain P. (2016), Pal D., Funilkul S., Vanijja V., and Papasratorn B. (2018), Uddin M. Z., Khaksar W. and Torresen J. (2018), etc.

In Maharaja Sayajirao University, Under the department of FCRM also conducted research paper on Home Automation, their utilization and satisfaction of the user of the Vadodara city in 2014, But there it was not specified which type of security devices are useful for Elderly people.

During the review of literature, the researcher has come across various studies conducted in this era but much information could not be found for the state Assam and only a few researches were being conducted on Home Security Systems for the Elderly at the residential place. Therefore, the researcher was interested in taking up the study with the following objectives;

Statement of problem

The research study aims to assess the extent of utilization and satisfaction experienced regarding Home Security Systems for Elderly by the respondents from the selected districts of Upper Assam.

Objectives of the study

1. To conduct a market survey of Home Security Systems for Elderly available in the market of selected districts of Upper Assam.
2. To assess the extent of utilization of Home Security Systems for Elderly by the residents from the selected districts of Upper Assam.
3. To assess the extent of satisfaction experienced regarding Home Security Systems for Elderly by the residents from the selected districts of Upper Assam.
4. To prepare a working drawing and give cost estimation for one of the respondent's house according to the needs and requirements for house specification and Home Security Systems for Elderly.

Delimitation of the study

1. The present study was limited to the selected districts of Upper Assam namely Jorhat, Dibrugarh, Golaghat, Lakhimpur, Sivasagar, Majuli, Dhemaji Charaideo and Tinsukia.

2. The present study was limited to 120 households from the selected districts of Upper Assam where at least one elderly family member resides in the house.
3. The present study was limited to those households where at least one Home Security System for Elderly was installed and was being used since minimum past one year from the time of data collection.

Hypothesis of the study

1. There exists a variation in the extent of utilization of Home Security Systems for Elderly with the selected personal variables (Age, Occupation and Family Monthly Income) and situational variable (Living Arrangement) of the Elderly residents from the selected districts of Upper Assam.

CHAPTER TWO

REVIEW OF LITERATURE

CHAPTER II

REVIEW OF LITERATURE

A literature review is an objective, thorough summary and critical analysis of the relevant available research and non-research literature on the topic being studied (Hart, 1998; Cronin, et al., 2008).

Its goal is to bring the reader up-to-date with current literature on a topic and form the basis for another goal, such as the justification for future research in the area. A good literature review gathers information about a particular subject from many sources. It is well written and contains few if any personal biases. It should contain a clear search and selection strategy (Carnwell and Daly, 2001; Cronin, et al., 2008). [1]

Good structuring is essential to enhance the flow and readability of the review (Colling, 2003).

Therefore, for the present study, literature was thoroughly reviewed for the better understanding on the selected topic and the studies on the topic of Home Security Systems for Elderly are reported here under two headings:

2.1. Theoretical orientation:

The various subheadings under theoretical orientation are as follows:

2.1.1. About the Home Security Systems for Elderly

2.1.2. Importance of Home Security Systems for Elderly in relation to Indian context

2.1.3. Home Security Systems Available for Elderly

2.2. Related research studies:

2.2.1. Research studies conducted Abroad

2.2.2. Research studies conducted in India

2.3. Conclusion of Review of Literature

2.1. Theoretical orientation:

2.1.1. About the Home Security Systems for Elderly

A security system for Elderly is defined as to detect intrusion, unauthorized entry into a building or residential area and deny such unauthorized access to protect the Elderly personnel from any harm.

Home Security Systems is a device that is capable of securing homes by using different methods. The most known methods are the GSM technology-based Home Security Systems, Bluetooth based Home Security Systems, Arduino and ZigBee based Home Security Systems, Sensor and IoT based Home Security Systems, Raspberry PI based Home Security Systems, etc. [2]

Home Security Systems for Elderly perform a whole host of critical functions, including:

- Protecting against property damage and guarding against intruders
- Monitoring the traffic in and around the home
- Calling for help in medical emergencies
- Deterring criminals from breaking in
- Keeping track of Elderly personal

Now a days, Home Security and Surveillance System are an essential part of any modern automated home. The basic design of a security system begins with analyzing the needs of the inhabitants, surveying existing technology and hardware, reviewing the system costs, considering monitoring choices and finally planning the installation.

Non-Automated security systems were found non-reliable. Doors were fitted with lock and key system which can be opened easily. Even the presence of a security guard may not be entirely reliable. Every previous system has been found to be extremely vulnerable. Home is a place where security is a must to keep Elderly love one safe, where he or she passes most of his day-to-day time. It can give peace of mind to the other persons of that family and give them confidence to step out of the house with the feeling that nothing can happen to the Elderly as well as their home. This feel will only arise when the home is

equipped with a reliable Home Security Systems. (Hossain, M.K.; Biswas, P. et.al., 2014).[3]

In this days and age, technology provides powerful protection for the Elderly at home. There are two basic types of Home Security Systems are on the market; i.e.; Wireless Home Security Systems and Wired Home Security Systems.

- **Wired security systems**: These systems use existing electric and telephone lines to connect each piece of the security system.
- **Wireless security systems**: These are the next generation of security equipment depend on broadband/ Wi-fi, Bluetooth or cellular network. They offer comprehensive protection, portable and hassle-free installation with lower installation costs and easy upgrades. It comprised of alarms, sensors, cameras and various detectors and lastly all are connected to a main control panel via radio signals.

History of Home Security Systems:

The concept of the Home Security Systems was started very earlier. An intrusion door alarm was invented in the early 1700s. Much like today's security systems, it alerted homeowners of potential intruders. It was invented by Tyldesley, an English inventor who linked a set of chimes mechanically to a door lock. There were other early inventions, but home security was nowhere near as advanced as today's smart home systems. Some important names in the evolution of home security alarm systems include:

Augustus Russel Pope: In 1853, Pope developed a prototype electro-magnetic alarm system in Boston. The battery-operated system activated when an electrical circuit was closed as a result of a door or window opening. A flow of current would cause the system's magnets to vibrate and cause a hammer to strike a brass bell. Additional components kept the bell ringing even if a window or door was closed after the alarm was activated.

Edwin Holmes: Holmes founded the first electrical alarm system company. He was also a master at advertising, targeting a general public that was skeptical

about electricity in the 19th. He even connected his customers' alarm systems to a central control station using the New York City telephone network.

Edward A. Calahan: Calahan further developed this concept and helped form the American District Telegraph (ADT) in 1871. It divided New York City into districts connected to a central monitoring station. This was the first alarm system that could alert homeowners of burglary and notify police and fire services simultaneously.

After that, Video Surveillance and Fire Safety Emerge. While video surveillance technology existed in the 1940s, it didn't become mainstream until the 1970s. The images were grainy at first, but users could see images of visitors on a television monitor. An early advancement was made in 1966, when nurse Marie Van Brittan Brown invented the first home video security system. It was the first time a remote control could be used to open a door.

During this same era, fire alarm technology evolved. Canadian researchers conducted a study in 1962 to examine the life-saving potential of heat and smoke detectors. They found that fatalities from residential fires could be reduced by 8% using heat detectors and 41% with smoke detectors. Between 1975 and 1998, smoke alarms attributed to a 50% drop in fire deaths in the U.S. (Staniland, L,2020).[4]

Later, these security systems started using in residential, commercial, industrial and military properties to detect intrusion, unauthorized entry into it, which can protect against burglary (theft) or property damage, as well as personal protection against intruders. Now, with the increasing rates of urbanization and higher levels of foreign investments have prompted higher standards of living among the people, which has boosted the use of security systems in every possible place to maximize safety and security.

2.1.2. Importance of Home Security Systems for Elderly in relation to Indian context:

India, the world's second-most populous country, has experienced a dramatic demographic transition in the past 50 years, entailing almost a tripling of the population over the age of 60 years (i.e., the elderly) (Government of

India, 2011). This pattern is poised to continue. It is projected that the proportion of Indians aged 60 and older will rise from 7.5% in 2010 to 11.1% in 2025 (United Nations Department of Economic and Social Affairs [UNDESA], 2008). This is a small percentage point increase, but a remarkable figure in absolute terms. According to UNDESA data on projected age structure of the population (2008), India had more than 91.6 million Elderly in 2010 with an annual addition of 2.5 million elderly between 2005 and 2010. The number of Elderly in India is projected to reach 158.7 million in 2025 (United Nations Department of Economic and Social Affairs, 2008).

A few important characteristics of the elderly population in India are noteworthy. Of the 7.5% of the population who are elderly, two-thirds live in villages and nearly half are of poor socioeconomic status (SES) (Lena et al., 2009). Half of the Indian elderly are dependents, often due to widowhood, divorce or separation and a majority of the elderly are women (70%) (Rajan, 2001). Of the minority (2.4%) of the elderly living alone, more are women (3.49%) than men (1.42%) (Rajan and Kumar, 2003). Thus, the majority of elderly reside in rural areas, belong to low SES and are dependent upon their families.

Most of the elderly people have health related problem due to their aging. The Indian elderly are more likely to suffer from chronic than acute illness. There is a rise in NCDs (Non-Communicable Disease), particularly cardiovascular, metabolic and degenerative disorders, as well as communicable diseases (Ingle and Nath, 2008). While cardiovascular disease is the leading cause of death among the elderly (Jha et al., 2006), multiple chronic diseases afflict them: chronic bronchitis, anemia, high blood pressure, chest pain, kidney problems, digestive disorders, vision problems, diabetes, rheumatism and depression (Angra et al., 1997; Kumari, 2001; Raju, 2000; Roy, 1994; Shah and Prabhakar, 1997). Many Elderly require home-based care, a need arising from illness-related confinement following an age gradient. Elderly confinement to the home is consistent in both rural and urban areas (Aliyar and Rajan, 2008).[6]

As a solution to all these problems, there have introduced many security systems in the market which can not only provide protection to the house and the elderly but can help and support the user by minimizing their fear and related to their safety.

2.1.3. Home Security Systems Available for Elderly:

To protect the Elderly at home, there are several Home Security Systems available for the Elderly which are listed below. The information is collected through surveying the Market of Upper Assam and also from the Internet.

1. **Motion Detector:** Motion Detector or Sensor is an electrical device that utilizes a sensor to detect nearby motion. Such a device is often integrated as a component of a system that automatically performs a task or alerts the user if detects any motion in the area. They form a vital component of security, automated lighting control and other useful systems. The motion sensor light triggers lights to turn on when someone enters so that there is no need to fumble for light switches and less risk of tripping and falling in the dark.
(Plate-1)

Plate-1: Motion Sensor Light [13]

2. **Door or window Sensor alarm:** Door sensors or Anti-Wandering Dementia Door Alarm placed on entry-ways to detect the elderly's movements with alerting systems that offered messages to relatives informing the elderly's location. It is also termed as burglar alarm or siren. These systems can be wired or wireless and can provide the elderly with complete protection against burglary (theft) or property damage, as well as personal protection against intruders by placing this sensor alarm system near the entry point to the home. A siren will often go off with the alarms to scare the intruder away or to alert neighbours. (Daniel et al. 2009.) (Plate-2 & 3)

Plate-2: Siren [14]

Plate-3: Door and Window Sensor Alarm [15]

3. **Security Camera:** These are Closed-circuit television cameras (CCTV) that transmit a video and audio signal to a wireless receiver through a radio band. It is a video surveillance system hook up to Wi-Fi so the user can live stream footage remotely as well as receive notifications when the camera detects movement, people, packages, and more. Security cameras are available in many variations, i.e.; Bullet Camera (suitable for outdoor surveillance), Dome Camera (suitable for indoor surveillance), C-mount camera (suitable to cover distance ranging 40 feet and more), PTZ camera (moves vertically, horizontally with zoom in and out features) and 360^0 cameras (cover the entire area). Along with the Security Camera, a DVR (Digital Video Recorder) device was used with a hard disk for storage of footage covered by the cameras. DVR are available with 4 port, 8 port, 16 port and 32 port capacity. (Plate-4)

Plate-4: Security Camera [16]

4. **Video Door Camera:** The smart front door was activated by the doorbell equipped with a camera. The camera projected the visitors' image onto the screens once the doorbell rang. It enables the person indoors to identify the visitor and, if they wish, engage in conversation and/or open the door to allow access to the person calling. This provided the elderly with an option of opening the door either manually or via voice activation (Daniel et al. 2009.) (Plate-5)

Plate-5: Video Door Phone [17]

5. **Pressure Sensor for bed:** Pressure sensors were placed under mattresses of the bed. These sensors turned on bedsides lights whenever the individual woke up from the bed. Furthermore, it was programmed to activate the alarm in case of delay to return to bed after a period of time, otherwise send notification to the family member or care giver that the elderly was not on the bed for too long. (Plate-6)

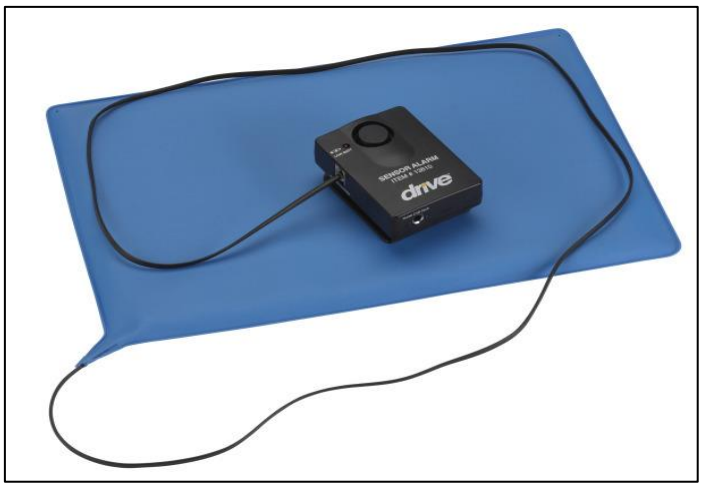


Plate-6: Pressure-Sensitive Chair and Bed Patient Alarm [18]

6. **Smart Door Locks:** It provide Hassle-Free Keyless entry to a home by using the security number, person's fingerprint, hand, iris scanning, voice print, facial recognition or hand writing system. It consists of a scanner for entry to the house. The device then scans and unlocks the door. As no two individuals have the same fingerprints, it's impossible to gain illegal entry to the home. (Plate-7)

Plate-7: Smart Door Lock [19]

7. **Glass Break Sensor:** Sometimes instead of opening windows, intruders will simply break them open to avoid setting off the entry sensors. However, a glass break sensor will also detect the sound of glass breaking so that people of that house can be alerted via mobile notification. (Plate-8)

Plate-8: Glass Break Sensor [20]

8. **Fire and smoke detector alarm:** A fire alarm is a unit made of several devices, which uses visual and audio signalization to warn people about a possible fire, smoke, or carbon monoxide occurrence in the area of coverage. Fire alarms are usually set-in fire alarm systems to provide zonal coverage for

the buildings. The warning signal is either a loud siren/bell or a flashing light, or it can include both. Some fire alarm systems use additional warnings, such as sending a voice message or making a phone call. (Plate-9)

Plate-9: Fire and Smoke Detector Alarm [21]

9. **Burner alert for stove top:** When a stove is on and the user forgot to turn it off, this device attaches to the stove knobs will remind and alert the user by emitting audio and visual alert. (Plate-10)

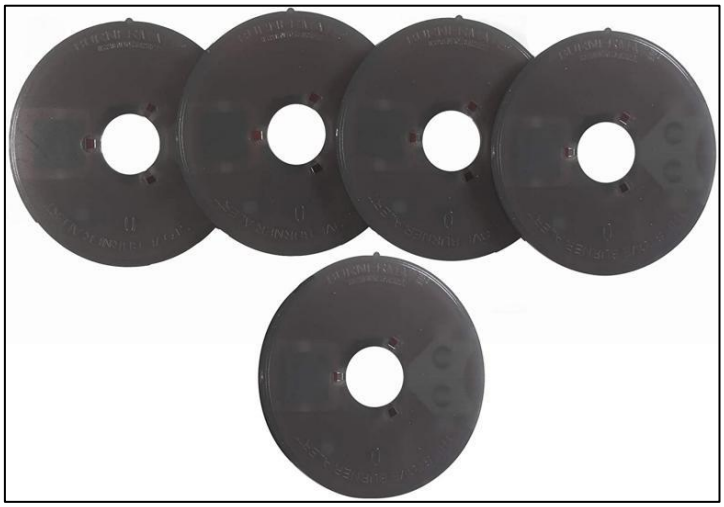


Plate-10: Burner Alert Stove Reminder Disc [22]

10. **Medical Security Device:** Medical Security Device, also known as Personal Emergency Response Systems (PERS) or Panic Button/Alarm offer a fast and easy way for the elderly, people with health issues and those who live alone, to get help during an emergency, whether it be a medical issue, a

fall, a fire, or any event that requires an immediate response. In a nutshell, these systems or Panic button contain a help button that dials up an emergency response center and connects you to a live agent. The portable panic button can be worn as a pendant necklace or on wrist like a watch. (Plate-11)

Plate-11: Panic Alarm [23]

11. **Smart Pill Dispenser System:** For independently living of an elderly person, it is an automatic monitored locked medication dispenser device dispense the medicine at the right time. [19] (Plate-12)

Plate-12: Smart Pill Dispenser [24]

12. **Control panel or hub:** This is the heart of a security system. It uses radio signals to communicate with your security sensors, you, and the monitoring center. Most feature a built-in keypad or another way to manually arm and disarm the system. (Plate-13)

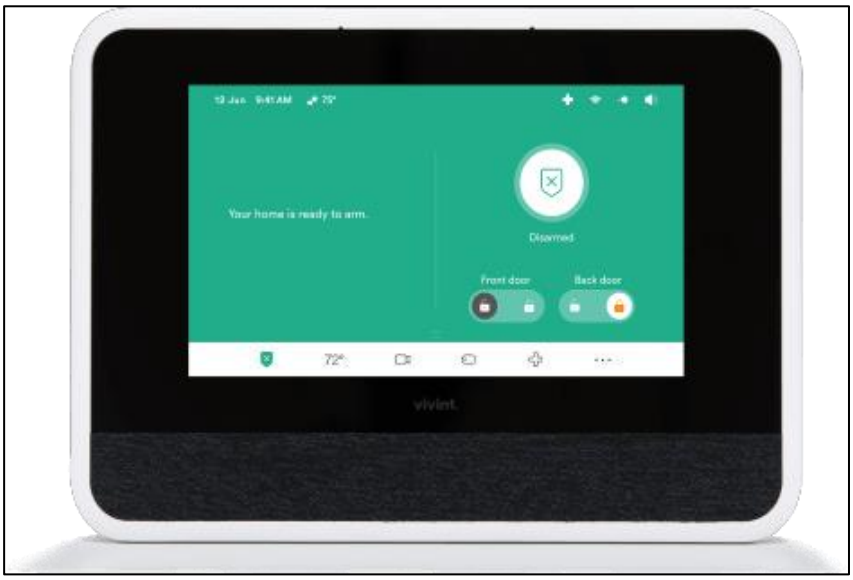


Plate-13: Control Panel [25]

2.2. Related research studies:

The reviewed literature of related researches contains studies conducted Abroad and in India. The research studies on the topic Home Security Systems for Elderly are reported here;

2.2.1. Research studies conducted Abroad

Bendary et.al. (2013); conducted a study on Fall Detection and Prevention for the Elderly: A Review of Trend and Challenges in Canada. This study brings the concept of elderly fall detection and prevention to the light via presenting the recent research directions and trends in monitoring and responding to detecting movements of elderly people. For that purpose, 17 fall detection research work was conducted. Study also reviews the state-of-the-art research work done in the field of early detection and prevention of elderly falls and the already available in market solutions and products for monitoring, detecting, controlling and preventing falls for elderly people. Finding of the study shows that, most of current systems are unable to discriminate between a real fall incident and an event when a person is lying or sitting down abruptly. Also,

existent fall detection systems tend to deal with restricted movement patterns and fall incidents to be detected, whereas in real indoor environments various normal/abnormal motions occur.

Yang et.al. (2014); conducted a research to develop A home mobile healthcare system for wheelchair users. The goal of this research was to exploit the aforementioned IoT capabilities and to build an intelligent system with real-time monitor and interaction for personalized healthcare of wheelchair users at home. As a result of the study, a home mobile healthcare (mHealth) system for wheelchair users with proposed system architecture, based on the emerging IoT technologies was developed in Wuhan, China. It system contains wireless heart rate and ECG sensors, wireless pressure detecting cushion, home environment sensing nodes and control actuators. It can indirectly monitor the status of wheelchair and living environment and it is used to realize the dangerous status of the wheelchair users. The newly built system can also detect smoke, IR, humidity, temperature, light and air conditions with wireless relay nodes.

Hossain et.al. (2014); conducted a study on the Design and Implementation of Smart Home Security Systems. For that purpose, they have conducted a survey in Bangladesh with an objective to design a security system through which maximum security will be maintained in home. Researcher found that, most of the burglaries occurred in residential area, office as well as bank. Therefore, A security system has been developed which utilized a tag card, password from the keypad, motion by PIR sensor used as input. Output of this project is LCD display, Buzzer alarm, servo motor that uses sensors to detect any security violation and sends out the alert signal by high intensity Buzzer without any basic error.

Yu (2015); in Birmingham, United Kingdom conducted a research on Smart Home for Elderly. The study aimed to research the smart home suitable for the elderly based on the investigation and analysis of the elderly in our country combined with the development of cutting-edge technology in the smart home. By analyzing the significance of new technologies for older people, this report concludes that "older people need new technologies, but have higher demands

on the way technologies are presented". This report compares domestic and international developments of smart home security technologies. It was predicted that the further development of smart home requires the integrated design of artificial intelligence, sensor technology, wireless charging technology and RFID-based positioning technology. This report explores the future of smart homes that meet the needs of the elderly, have the features of streamlining, high reliability, data security, standardization, easy installation and user-friendly design.

Mishra (2015); conducted a literature review on Attitude of senior citizens towards smart home technologies in Finland, Europe. The aim was to study the attitude of senior citizens towards smart home technologies and their citizen's attitude towards existing smart home technologies. A Literature review of 10 different studies conducted to study attitude and perceptions towards smart home technologies and a total of 379 articles were reviewed. The study suggested a positive response towards smart home devices and that smart home technology were willingly accepted by elderly. The key issues challenging in adoption of smart home technologies were privacy, trust, stigma, usability, training suitable for elderly people and affordability.

Stokke (2016); had conducted a review in Norway on The Personal Emergency Response System (PERS) as a Technology Innovation in Primary Health Care Services: An Integrative Review. This integrative review examines how research literature describes the use of the PERS focusing on the users' perspective, thus exploring how different actors experience the technology in use and how it affects the complex interactions between multiple actors in caring practices. The search resulted in 33 included studies describing the PERS, its contribution to safety and independent living for users of the alarm, but there are also unforeseen consequences and possible improvements in the device and the integrated service.

Miguel et.al. (2017); researched on Personal emergency alarms: do health outcomes differ for purchasers and non-purchasers? The objective of this study was to assess whether purchasing a personal alarm service makes a difference in a range of health outcomes for community dwelling older adults.

The prospective study involved 295 individuals for whom data on emergencies experienced at home were collected over a period of 12 months through interview schedule method. Finding of the study reveals that, personal alarms have many positive impacts on the lives of older people. Purchasers of alarms, compared to non-purchasers, benefited in terms of feeling more safe and secure and being more active around their home. Outcomes experienced after an emergency was similar for both groups with no differences found in terms of time spent on the floor, or hospitalizations.

Majumder et.al. (2017); have done a Review on Smart Homes for Elderly Healthcare-Recent Advances and Research Challenges in Canada. The study included 15 Smart Home System and have presented a comprehensive review on the state-of-the-art research and development in smart home-based remote healthcare technologies. The study was conducted to review the current state of research and development in smart homes with a primary focus on remote healthcare services. As a finding of the study, it was stated as most of the standalone products which are available in the market are developed for one or a few specific tasks or functionalities. Although these systems use standard communication protocols, they are mostly not compatible with, or interoperable with similar systems from other manufacturers, thus leaving the consumers with few alternatives.

Tseloni et.al. (2017); conducted a study on the effectiveness of burglary security devices in UK. This study measures the effectiveness of anti-burglary security devices, both individually and in combination. Data for 2008–2012 from the Crime Survey of England and Wales were analyzed via the Security Impact Assessment Tool to estimate Security Protection Factors (SPFs). SPFs indicate the level of security conferred relative to the absence of security devices. Data revealed that, for individual devices, external lights and door double locks or deadlocks, are most effective but, counter-intuitively, burglar alarms and dummy alarms confer less protection than no security. Combinations of devices generate positive interaction effects that increase protection more than additively.

Uddin et.al. (2018); conducted a survey in Oslo, Norway on Ambient Sensors for Elderly Care and Independent Living. The survey on ambient assisted living works has been carried out with an aim to support the elderly in living independent lives, mostly based on ambient sensors. It could also be helpful in supporting caregivers, friends, and family and in avoiding unexpected harm to the elderly. Findings from this survey indicates that most of the frameworks on ambient assistive living primarily focuses on monitoring basic daily activities and falls, while mostly overlooking the opportunities of long-term care.

Pal et.al. (2018); conducted a research on Analyzing the Elderly Users' Adoption of Smart-home Services in Thailand, Asia. The study aims to know the real-life use-cases of various smart-home services usage by the elderly population and to know the underlying theoretical framework that explains the intention to use the smart-home services by the elderly people. An online questionnaire survey was conducted for this purpose, the results of which are analyzed using the Partial least squares Structural Equation Modelling approach on data collected from the subjects. A total of 239 elderly people were kept as a sample in this study. The finding revealed that, elderly people do not perceive smart-homes to be a source of enjoyment. Their satisfaction is found to be the strongest predictor of behavioural intention.

Philip et.al. (2018); conducted a research work on Design and Implementation of a Smart Home (Smoke, Fire, Gas and Motion Detector) in Rivers State, Nigeria, Africa. This project was aimed to Design a Gas, smoke, fire and motion detector with SMS alarm for house, office, and shop security utilizing an uninvolved derived pyroelectric (PIR) movement locator either the owner is at home or not. The study concluded that, the newly designed smart detector can give an alert when there is any leakage of Gas, detection of smoke, fire and motion (intrusion) via SMS. It helps to enhance safety.

Al-khafajiy et.al. (2019); conducted a research to develop a technology for remote health monitoring of elderly through wearable sensors in the United Kingdom. The technology outlined in the research focuses on the ability to track a person's physiological data to detect specific disorders which can aid in Early Intervention Practices. The finding revealed that the proposed system

can improve clinical decision supports while facilitating Early Intervention Practices. The extensive simulation results indicate superior performance of the proposed system: low latency (96% of the packets are received with less than 1 millisecond) and low packets-lost (only 2.2% of total packets are dropped). Thus, the system runs efficiently and is cost-effective in terms of data acquisition and manipulation.

Sarhan (2020); conducted a Systematic Survey on Smart Home Safety and Security Systems using the Arduino Platform in Iraq. In this study, 63 research papers that examined smart home safety and security systems using the Arduino platform from popular literature databases were thoroughly surveyed to extract useful data. Then, the extracted data were analyzed to answer many research questions concerning state-of the-art applications of these systems, their architectures, their enabling technologies, their components, etc. Studies show that the applications of Arduino-based safety and security systems in smart homes can be categorized into three main areas: ‘‘Intrusion detection’’, ‘‘Fire detection’’, and ‘‘Gas detection’’. 41, 25, and 23 relevant published papers, respectively.

Ma et.al (2020); conducted a research on Home Security Alarm System for Middle aged people living alone in China. They designed a smart security device suitable for middle-aged and elderly users. They select STM32 and CC2530 as a master controller for the device, which is equipped with a camera module, GSM/GPRS module, smoke sensors, flame sensors, and infrared sensors. The experimental results show that the proposed system has low power dissipation, convenient operation and high stability.

2.2.2. Research studies conducted in India

Mishra et.al. (2013); conducted a study on Crimes against the Elderly in India: A Content Analysis on Factors causing Fear of Crime. This study identified different types of crimes such as murder, rape, burglary, theft, robbery. This study also has discussed causes and consequences of crime and abuse against the elderly which indirectly reveal fear of crime. The study included six areas, namely; Delhi, Kanpur, Lucknow, Meerut, Roorkee and Unnao for analysis of crime against elderly and for that author collected newspaper

reports of 170 incidents of crimes against the elderly from these areas. As a result, they found that 73 (42.94%) cases of crime have been committed by unknown persons and criminals. Moreover, 25 (14.71%) incidents of crime have occurred as accidents. The findings of the study showed that, there are various factors such as residential location, previous victimization experience, vulnerability, defensibility and incivility that cause fear of crime in the minds of the elders in India. This study has also claimed that the level of fear of crime is low among the middle-class communities than the higher class.

Paraskumar et.al. (2014); conducted a study on Home Security Systems in Pune, Maharastra. In the study, researcher proposed a Home Security System which focuses on monitoring home space to detect intruders and the visitors that are visiting the home. Based on ZIGBEE and GPRS technology a wireless remote and smart Home Security System has developed. Study concluded that, wireless remote systems for smart home application is developed to analyse and detect the status of home equipment. Through this newly developed device, the user can monitor the home status using the android phone even when the user is not at home.

Gupte (2014); conducted a research study on Home Automation: utilization and satisfaction of the users. The study aimed to study utilization and satisfaction of the users of home automation products in Vadodara city, Gujarat. 90 households are taken as a sample in this research study. Finding of the study shows that a greater number of people did not use Home Automation devices because of their high cost. But those who used these items for last one year, they are highly satisfied.

Kaur et.al (2016); conducted a research on Home Automation and Security System in New Delhi, India. This research emphasizes the detailed information on Home Automation and Security System using Arduino, GSM and how one can control home appliances using Android application. The study concluded that; Arduino, GSM and Android based home automation techniques are mostly been implemented in order to provide ease to the people to control their home appliances. Application of these implies that whenever a person tries to enter into the house, then an SMS will be sent to the house owner’s mobile

indicating the presence of some person inside the house and the house owner can take some preventive measure to protect his house from the burglar.

Chitnis et.al. (2016); has conducted an investigative study for Smart Home Security: Issues, Challenges and Countermeasures. The study was conducted in Pune, India with an aim to develop a socially intelligent robot (SIR) that will classify and recognize the human robot interaction (HRI) in real time for the smart home system and enhance the home security to the next level. The investigative study was done by conducting a survey to get the inputs from different people from diverse backgrounds. The findings of the study reflected that, the cases of having kids and aged person at home or location of home contribute significantly to the need for advanced Home Security Systems. The proposed model gave proper expected response using intelligent remote monitoring and proven to be more effective and applicable in real time situations.

Sankpal et.al. (2018); had done a Review on Home Security Systems in Sangli, India. This literature survey paper deal with discussion of different intelligent home automation systems and technologies e.g., Zigbee, Raspberry-pi, siri, cloud based, GSM/GPRS, Human tracking. The researchers concluded that due to use of these systems, home automation system will become so easy and also daily life will become so easier and energy is also saved. The main attraction of any automated system is reducing human labor, effort, time and errors due to human negligence.

2.3. Conclusion of Review of Literature:

The review of literature reflects the meaning, usability, benefits and features of various Home Security Systems and different needs of Home Security to the Elderly people. Most of the researches has given more focus on the development of different Home Security Systems to protect Elderly at Home. But only a few research studies have been found concerning the extent of utilization and satisfaction experience by the Elderly regarding Home Security Systems for Elderly installed at their residence, hence this need was being taken into consideration by the investigator in the present study.

CHAPTER THREE

METHODOLOGY

CHAPTER III

METHODOLOGY

The purpose of the research is to know the extent of utilization and satisfaction experience by the respondents regarding Home Security Systems for Elderly installed at their residence.

The research design, operational definition of different terms used in the study, tools used for data collection, sampling technique used are precisely explained in this chapter.

In order to facilitate systematic presentation, it is divided into various sections which are explicitly described here:

3.1. Research design

3.2. Operational definitions

3.3. Conceptual framework of the study

3.4. Locale of the study

3.5. Unit of inquiry

3.6. Sample size and sampling procedure

3.7. Construction and description of the tool

3.8. Establishment of content validity of tool

3.9. Data collection

3.10. Data analysis

3.11. Schedule of working drawing

3.1. Research design

A research is an arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy purpose. It consists of the specification of method for inquiry and the information needed. A descriptive study determined and reports the way the things are (Kothari, 2008).

Descriptive research design is concerned with conditions or relationships that exits, opinion that are held, processes that are going on, effects that are evident or trends that are developing (Best and Khan, 2009).

The present investigation aims to find out the availability of Home Security Systems for Elderly in the market of Upper Assam and to assess the extent of utilization and satisfaction experienced regarding Home Security Systems for Elderly by the respondents from the selected districts of Upper Assam. Therefore, the descriptive research design was considered for the present study.

3.2. Operational Definitions

3.2.1 Elderly: For the present study, the person aged above 60 years were considered as Elderly member.

3.2.2 Home Security Systems for Elderly: For the present study, the Home Security Systems were those systems which provides a comfortable, safe and secure environment for the Elderly. It includes-notification mechanisms such as burglar alarm, smoke and fire detector alarm, burner alert for stove top; surveillance mechanisms such as security camera; video door phone with biometric recognition, voice or face recognition; sensors like- motion sensor, glass break sensors for the detection of an intruder to a habitat; medical security device for the elderly, etc.

3.2.3 The extent of utilization of Home Security Systems for Elderly: For the present study, the extent of utilization of Home Security Systems for Elderly was operationally defined as the extent to which the Home Security Systems for Elderly were being used by the respondents in the

residence of selected district of upper Assam and it was measured on 3-point continuum i.e.; “Always, Sometimes and Never” and 3,2 and 1 scores were assigned for the responses. Higher scores indicated high extent of utilization.

3.2.4 The extent of satisfaction experienced regarding Home Security Systems for Elderly: For the present study, the extent of satisfaction experienced regarding Home Security Systems for Elderly by the residents is operationally defined as the extent to which the respondents were satisfied with the services of Home Security Systems for Elderly installed in their residence. The extent of satisfaction was measured on 3-point continuum i.e.; “Satisfied, Undecided and Not satisfied” and 3,2 and 1 score were assigned for the responses.

3.3. Conceptual framework of the study

Variables under the study

A variable is a symbol to which numerals of values are assigned (Kerlinger, 1973). Variables are the conditions or the characteristics that the experimenter manipulates, controls or observes. The variable that is antecedent to the dependent variable is termed as “Independent Variable”. Accordingly, variable that depends upon or is a consequence of the other variable is termed as “Dependent Variable” (Kothari, 2012).

For the present study the independent and dependent variables identified are described as follows:

I. Independent Variables

The independent variables are the conditions or characteristics that the experimenter manipulates or controls in his or her attempt to ascertain their relationship to observed phenomena (Kahn 2008).

For the present study the independent variables were categorized under the two subheads viz. Personal Variables and Situational Variables of the respondent.

1. **Personal Variables** -

    1) Age
    2) Occupation
    3) Family Monthly Income

2. **Situational Variable** -

    1) Living arrangement of the Elderly

II. Dependent Variables

The dependent variables are the conditions or characteristics that appear, disappear, or change as the experimenter introduces, removes, or changes interdependent variables (Kahn 2008).

Dependent variables for the present study-

1) The extent of utilization and satisfaction experienced regarding Home Security Systems for Elderly by the respondents

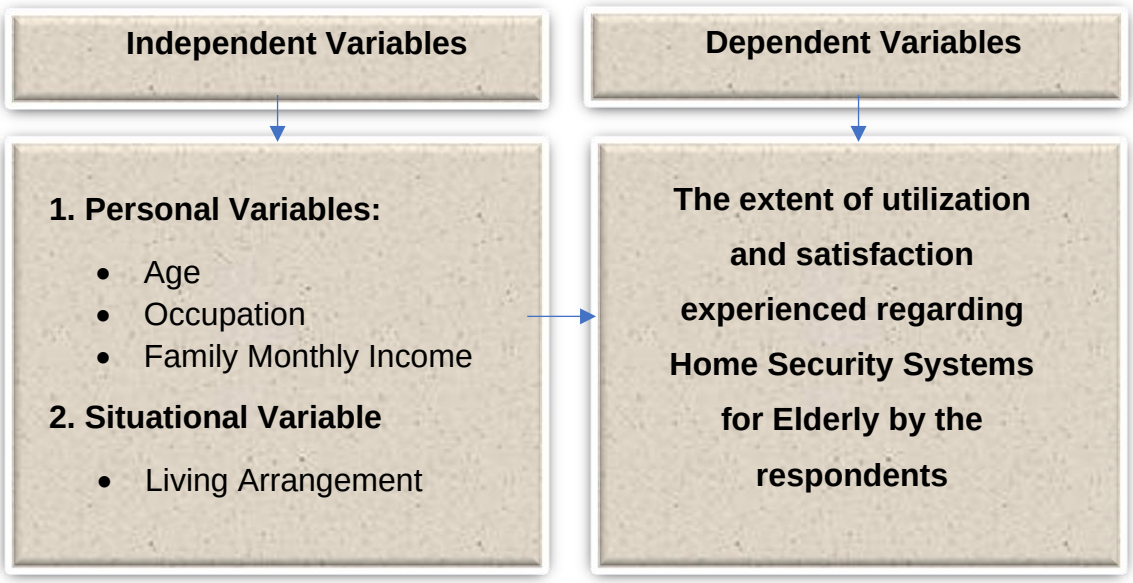


Figure 1: Schematic diagram showing the hypothetical relationship between the variables selected for the study

3.4. Locale of the study

The present study was conducted in the districts of upper Assam, India namely Jorhat, Dibrugarh, Golaghat, Lakhimpur, Sivasagar, Majuli, Dhemaji, Charaideo and Tinsukia.

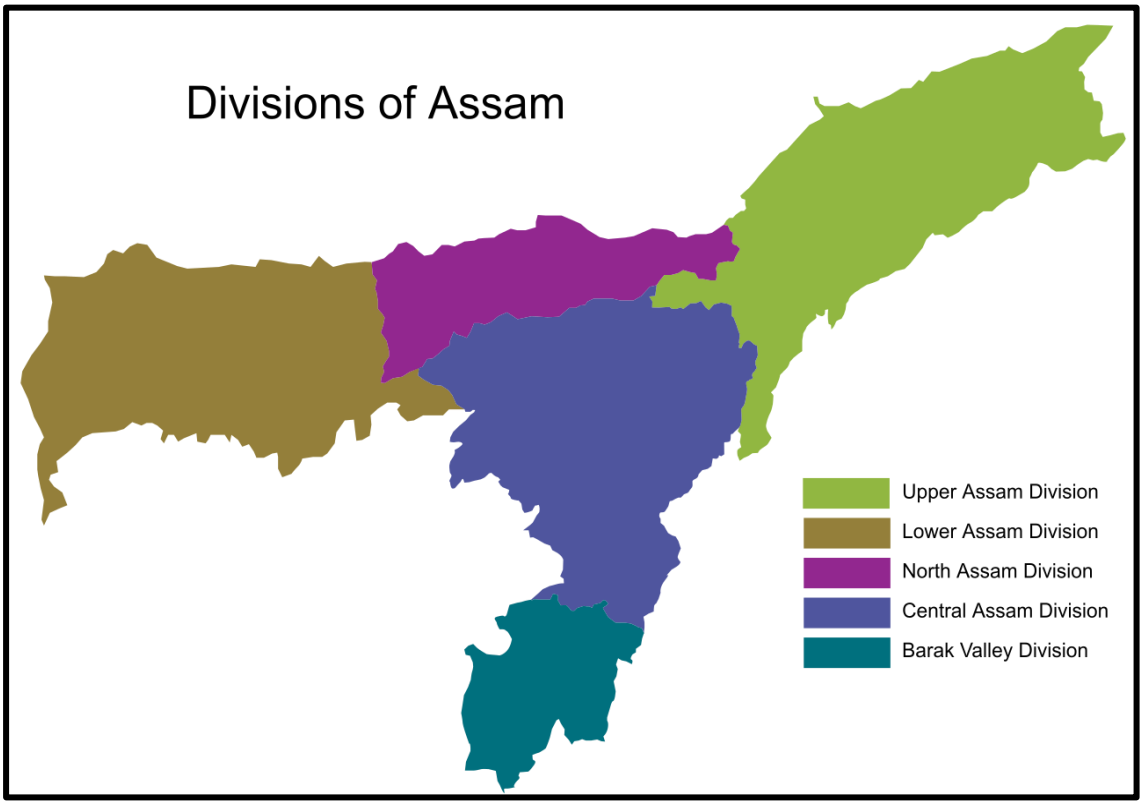


Figure 2: Map of State Assam

Source: https://en.wikipedia.org/wiki/Administrative_divisions_of_Assam#/media/

3.5. Unit of inquiry

For the present study, the unit of inquiry were the Elderly residents aged above 60 years residing in the districts of Upper Assam, have installed and used minimum one Home Security System for Elderly from minimum past one year from the date of data collection.

3.6. Sample size and sampling procedure

3.6.1. Sample selection criteria

For the present study the criteria set for selection of the households for data collection were as follow:

1. The selected households should be residing in the districts of Upper Assam.
2. The selected households should have at least one elderly family member above 60 years of age residing with them.
3. The selected households should have installed at least one Home Security System for Elderly and is being used since minimum past one year from the time of data collection. i.e.; August, 2020.

3.6.2. Sample size

The sample size of the present study comprised of 120 elderly residents of the selected districts of Upper Assam where at least one elderly family member resides in the house.

3.6.3. Sampling procedure

For the present study, purposive sampling technique was used for selection of the household. For the selection of household purposively those households were selected from the district of Upper Assam where at least one Elderly family member above 60 years of age resides in the house, at least one Home Security System for Elderly was installed and was being used since minimum past one year from the time of data collection i.e.; August,2020 and households were willing to participate in the research study.

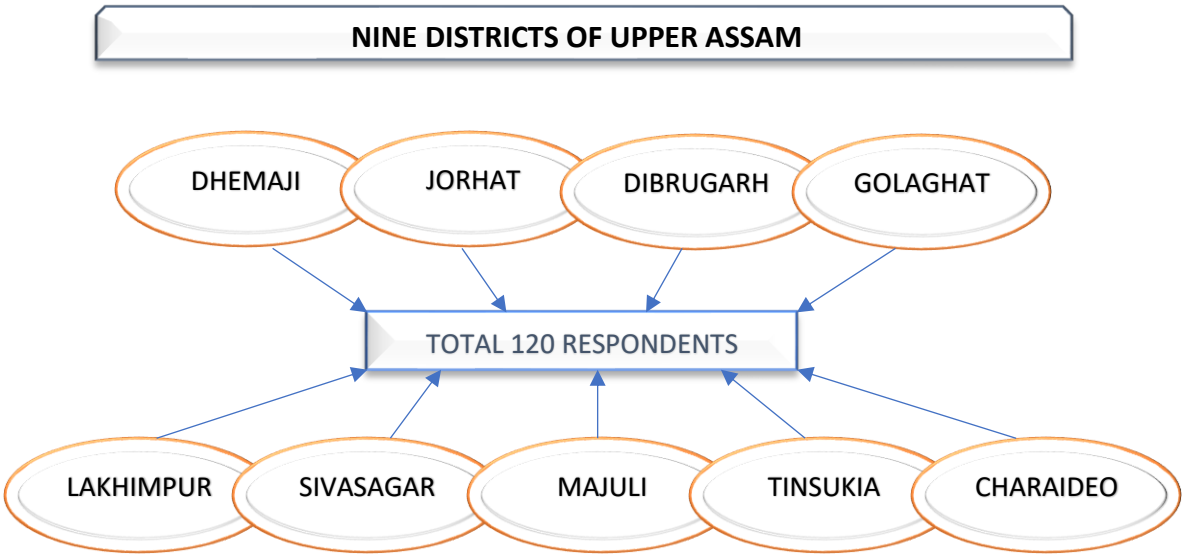


Figure 3: Schematic Diagram Showing the Sampling Procedure adopted for the Present Study

3.7. Construction and description of the tool

The exhaustive review of literature survey helped the researcher to select and prepare the required tool to facilitate data collection for the present study.

3.7.1. Selection of data collection tool

For the present study, three data collection tools were used:

1) **Market Survey**: Market survey was done to find out the availability of Home Security Systems for Elderly in the market of districts of Upper Assam.
2) **Questionnaire**: A questionnaire in the form of Google form was used to assess the extent of utilization and satisfaction of the respondents regarding Home Security Systems for Elderly installed at their residence.
3) **Interview Schedule**: An interview schedule was used to get details about the needs and requirements of the client regarding installation of Home Security Systems for Elderly and its placement in the house.

3.7.2. Development and description of the tool

The tool was constructed in compliance with the objectives of the study.

1) Market survey of Home Security Systems for Elderly available in the market of Upper Assam

A tool for conducting market survey regarding availability of the Home Security Systems for Elderly in the market of upper Assam comprised of information viz.

1) Name of the Shop:
2) Address:
3) Contact person:
4) Contact number:
5) Details of Home Security Systems for Elderly (HSSE) available in the market of Upper Assam:
6) Specification (if any):

2) Questionnaire for the respondents

Section I: Background information of the respondents

This section contained questions regarding the background information of the elderly respondents like name, address, age, occupation, family monthly income, information regarding living arrangement and health status of the respondents.

Section II: The extant of utilization of Home Security Systems for Elderly

This section inquired about the information regarding the extent of utilization of Home Security Systems for Elderly installed in the residence of the respondents and the frequency of its use. The responses were recorded on 3-point continuum scale i.e.; Always, Sometimes and Never.

Section III: The extent of satisfaction experienced regarding Home Security Systems for Elderly by the respondents

This section comprised of the information regarding the extent of satisfaction experienced by the respondents while using the Home Security Systems for Elderly installed at their residence. The responses were recorded on 3-point continuum scale i.e.; Satisfied, Un-decided and Not-Satisfied.

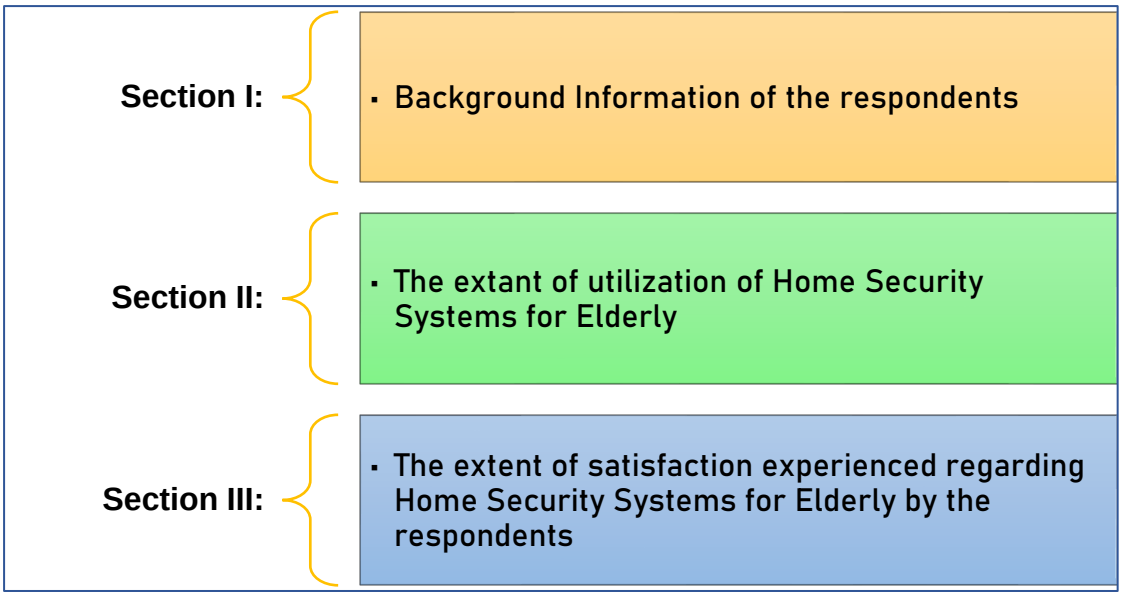


Figure 4: Description of Questionnaire

3) **Interview schedule for the client (one of the respondent for whom the working drawings were prepared based on required Home Security Systems for Elderly)**

Section I: Background Information of the client:

This section contained questions regarding the background information like name, address, age, family monthly income of the client, who was considered in the study.

Section II: House specification and Home Security Systems for Elderly to be installed as required by the client

This section inquired about the information related to the requirements of the client and the family members regarding house specifications viz. number of rooms, electrical fixtures required, types of ceiling, types of Home Security Systems for Elderly to be installed, reasons for installation, budget for electrical work and budget for buying Home Security Systems.

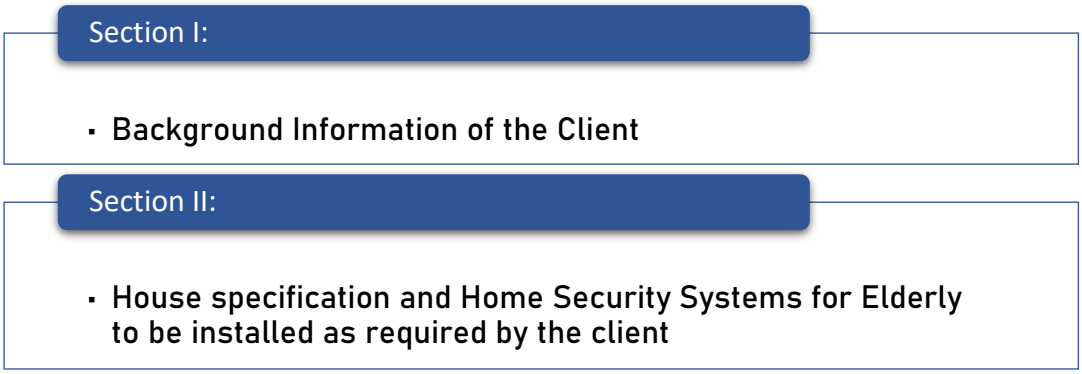


Figure 5: Description of Interview Schedule

3.8. Establishment of content validity of tool

To establish the content validity, the developed tools were given to the panel of judges comprising experts from Family and Community Resource Management and Interior Designers. The judges were requested to give the suggestions for the developed tool. The valuable suggestions given by the experts were incorporated and the tool were modified and finalized for the data collection. Further, the developed tool questionnaire was administered on 30 non-respondents to see the feasibility and clarity of the developed data collection tool.

3.9. Data collection

A Market Survey was conducted by the researcher to gather the information regarding the availability of the Home Security Systems for Elderly in the market of Upper Assam.

A questionnaire was administered in the form of online Google Form to collect the data from the selected 120 respondents to know the extent of utilization and satisfaction regarding Home Security Systems for Elderly installed in their respondents.

An interview was conducted by the researcher to know the requirements of the client and the family members regarding house specifications viz. number of rooms, electrical fixtures required, types of ceiling, types of Home Security Systems for Elderly to be installed, reasons for installation, budget for electrical work and budget for buying Home Security Systems.

3.10. Data analysis

The data analyzing procedure comprised of categorization of data, coding, tabulation and statistical analysis.

3.10.1. Categorization of data

- **For the Questionnaire**

Section I: Background information of the respondent

A. Background information

1) Age (in years):
    - 60 – 70
    - 71 – 81
    - 82 - 92
2) Occupation:
    - Employed
    - Self-employed
    - Un- employed

3) Family Monthly Income (in ₹):
    - Less than ₹25,000
    - ₹25,000-₹50,000
    - Greater than ₹50,000

B. Information regarding living arrangement and health status

4) Living arrangement:
    - With family member
    - With relatives
    - With servants
    - With family member and relatives
    - With family member and servant
    - With relative and servant
5) Health related problem:
    - Impaired vision
    - Impaired hearing
    - Difficulties in walking
    - Blood pressure problem
    - Kidney and bladder problems
    - Cardiovascular or heart disease
    - Dementia
    - Any other
    - None

C. Information regarding the House

6) Type of house:
    - Apartment
    - Tenement
    - Row House
    - Bungalow
    - Other Type of House
7) Designing of the house:
    - Builder designed house
    - Self-designed house

D. Information regarding installation of Home Security Systems for Elderly

8) Decision maker for installation of Home Security Systems for Elderly:
    - Respondent themselves
    - Family member
9) Reason for installation of Home Security Systems for Elderly:
    - Protection from intruder
    - Monitor the house area
    - Security
    - Assistance

Section II: The extent of utilization of Home Security Systems for Elderly by the respondents

This section deals with the frequency and percentage distribution of the respondents based on pattern of utilization of the respondents who have installed the Home Security Systems for Elderly in their residences. The extent of utilization of Home Security Systems for Elderly was measured on 3-point continuum scale i.e.; “Always, Sometimes and Never” and 3,2 and 1 score were ascribed for the responses. Higher scores indicated high extent of utilization.

Section III: The extent of satisfaction experienced regarding Home Security Systems for Elderly by the respondents

This section deals with the frequency and percentage distribution of the respondents based on the extent of satisfaction experienced by the respondents regarding Home Security Systems for Elderly installed in their residence. The extent of satisfaction was measured on 3-point continuum i.e.; “Satisfied, Undecided and Not satisfied” and 3,2 and 1 score were assigned for the responses. Higher scores indicated high extent of satisfaction.

3.10.2. Tabulation

The data was organized in a tabulation form to present frequency, percentage and weighted mean for the collected responses.

3.10.3. Statistical analysis

The data was analyzed through the Statistical Package for Social Sciences (SPSS). For the descriptive Statistics, the data was distributed according to frequencies, percentage and weighted mean and to test the hypothesis postulated for the study, the relational statistical analysis was carried out.

Independent Variables	Dependent Variables	Relational Statistics Applied
Personal Variables		
Age	The extent of utilization of Home Security Systems for Elderly	**ANOVA**
Occupation		
Family Monthly Income		
Situational Variable		
Living Arrangement	The extent of utilization of Home Security Systems for Elderly	**ANOVA**

3.11. Schedule of working drawing

The proposed set of working drawing based on the client needs and requirements for the house specification and installation of Home Security Systems for Elderly was prepared on AutoCAD 2017 software by the researcher. Along with the working drawing, the cost estimation for the electrical works and installation of Home Security Systems for Elderly was proposed in the study.

Sr. no.	Proposed working drawing of the Client's residence
1	Floor plan of the House with HSSE (option – 1)
2	Floor plan of the House with HSSE (option – 2)
3	Floor plan of the House with HSSE (option – 3)

4	Selected Floor plan of the House with dimension
5	Proposed Furniture layout of the House
6	Proposed False Ceiling layout of the House
7	Proposed Electrical layout of the House
8	Proposed layout of the House with Installation of Home Security Systems for Elderly
N.B. HSSE (Home Security Systems for Elderly)	

CHAPTER FOUR

FINDINGS AND DISCUSSION

CHAPTER IV

FINDING AND DISCUSSION

The present chapter deals with the findings of the study which was obtained from the data collected during the research. The findings are presented in form of frequency and percentage distribution followed with interpretation and discussion. In order to make systematic presentation, this chapter has been divided into following sections;

4.1. Section I: Market Survey: Details of Home Security Systems for Elderly available in the market of Upper Assam

4.2. Section II: Background information of the respondents

4.3. Section III: The extent of utilization of Home Security Systems for Elderly by the respondents

4.4. Section IV: The extent of satisfaction experienced regarding Home Security Systems for Elderly by the respondents

4.5. Section V: Testing of Hypothesis

4.6. Section VI: Proposed working drawings with cost estimation of a respondent's house according to the needs and requirements for house specification and Home Security Systems for Elderly

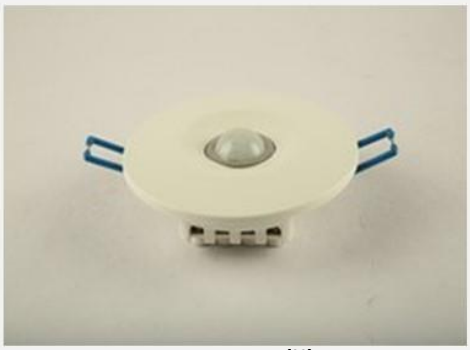
4.1. Section I: Market Survey: Details of Home Security Systems for Elderly available in the market of Upper Assam

In order to know the extent of utilization and satisfaction of Home Security Systems for Elderly, it was essential to know the availability of the Home Security Systems for Elderly in the market of Upper Assam. From the market survey conducted in the month of **August, 2020**, it was found that altogether seven Home Security Systems for Elderly were available in the market of Upper Assam, described as follows;

1) Name of the device: **Motion Sensor Light**

MI [27]

QUICK SENCE [28]



HALONIX [29]

Plate 14: Various brand of Motion Sensor Light

Brand name	Price (in ₹)	Shop Name and Address
1. Halonix	530.00	• Karnany Light House, Gar-ali, Jorhat • Electrical Enterprise, HS Road, Dibrugarh • Saikia Enterprise, Tinsukia

2. Quick Sense	650.00	• Swagat Electrical, Gar-ali, Jorhat • Mahabir Electrical Plus, Dibrugarh • Electrical Enterprise, HS Road, Dibrugarh • Purbanchal Hardware & Electrical, BG Road, Sivsagar • MS Chiranjib Traders, Dhemaji near LP School Road.
3. Mi	600.00	• Mi Store, Gar-ali, Jorhat • Mi Store, HS Road, Dibrugarh • Mi Store, Daily Bazar Road, North Lakhimpur • Mi Store, Near IDBI Bank, Sivasagar • Mi Store, Suraj Enterprise, Main Road, Dhemaji • Mi Store, Chirwapatty Road, Tinsukia

2) Name of the device: **Burglar Alarm**

JENIX BURGLAR ALARM [30] QUICK SENCE BURGLAR ALARM [31]

Plate 15: Various brand of Burglar Alarm

Brand name	Price (in ₹)	Shop Name and Address
1. Jenix	1,500.00	• Triangle Enterprise, Na-Ali, Jorhat • Guard 1 Security Service, Amolapotty, Dibrugarh • MS Chiranjib Traders, Dhemaji near LP School Road
2. Quick Sense	1,300.00	

3) Name of the device: **Security Camera**

MI [32]

DAHUA[33]

HIKVISION [34]

CP PLUS [35]

BLUE EYE [36]

Plate 16: Various brand of Security Camera

Brand name	Price (in ₹) (up to 8 camera set)	Shop Name and Address)
1. Mi	21,000.00	• Triangle Enterprise, Na-Ali, Jorhat • Sadhana Stores, Gar-Ali, Jorhat • Guard 1 Security Service, Amolapotty, Dibrugarh • The Advanced Technology, Swagatam Complex, Thana Chariali, Dibrugarh • Eeshwar Systems, GF Road, Golaghat • Sage Business Solutions, North Lakhimpur • Ld Technologies, Station Chariali, Sivsagar • MS Chiranjib Traders, Dhemaji near LP School Road • Om Sai Vision, Sripuris PO, Tinsukia
2. Dahua	20,000.00	
3. HIKVISION	17,000.00	
4. CP PLUS	18,800.00	
5. Blue eye	15,000.00	

4) Name of the device: **Video Door Phone/ Video Intercom**

GODREJ [37]

HIKVISION [38]

PANASONIC [39]

Plate 17: Various brand of Video Door Phone

Brand name	Price (in ₹)	Shop Name and Address
1. Godrej	20,000.00	• Triangle Enterprise, Na-Ali, Jorhat • Lifestyle Home Collection, Na-Ali, Jorhat • Sage Business Solutions, North Lakhimpur • Lifestyle Home Collection, BG Rd, Sivsagar • Ld Technologies, Station Chariali, Sivsagar • Om Sai Vision, Sripuris PO, Tinsukia
2. HIKVISION	17,000.00	
3. Panasonic	19,500.00	

5) Name of the device: **Smart Door Lock**

GODREJ [40]

VALENCIA [41]

PANASONIC [42]

Plate 18: Various brand of Smart Door Lock

Brand name	Price (in ₹)	Shop Name and Address
1. Godrej	31,000.00	• Triangle Enterprise, Na-Ali, Jorhat • Lifestyle Home Collection, Na-Ali, Jorhat • Sage Business Solutions, North Lakhimpur • Lifestyle Home Collection, BG Rd, Sivsagar • Ld Technologies, Station Chariali, Sivsagar • Om Sai Vision, Sripuris PO, Tinsukia
2. Valencia	20,000.00	
3. Panasonic	25,000.00	

6) Name of the device: **Medical Security System (Panic Button)**

PEAK PLUS [43]

SIMPLISAFE [44]

Plate 19: Various brand of Medical Security System/ Panic Button

Brand name	Price (in ₹)	Shop Name and Address
1. Peak Plus	1,100.00	• Sadhana Stores, Gar-Ali, Jorhat • The Advanced Technology, Swagatam Complex, Thana Chariali, Dibrugarh • Ld Technologies, Station Chariali, Sivsagar
2. SIMPLISAFE	1,700.00	

7) Name of the device: **Automatic Pill Dispenser**

MAHI ENTERPRISE[45]

MEDREADY[46]

PHILIPS[47]

Plate 20: Various brand of Automatic Pill Dispenser

Brand name	Price (in ₹)	Shop Name and Address
1. Mahi Enterprise	700.00	• Sadhana Stores, Gar-Ali, Jorhat • The Advanced Technology, Swagatam Complex, Thana Chariali, Dibrugarh • Divya Battery & Inventor House, Aira Road, Lakhimpur • Ld Technologies, Station Chariali, Sivsagar
2. MEDREADY	1,100.00	
3. PHILIPS	1,500.00	

4.2. Section II: Background Information of the respondents

This section deals with the demographic information of the respondents, like personal and situational variables of the respondents which includes: - Personal variables: age, occupation, family monthly income, locale of the residence, type of the house and Situational variables: locale, living arrangement, health related problem of the respondents.

4.2.1 Age of the respondents

Since the present study aims to know the extent of utilization and satisfaction of Home Security Systems for Elderly, the respondents selected for the present study were senior citizen above 60 years. Table-1 depicts the frequency and percentage distribution of the respondents into three categories.

Table-1: Frequency and percentage distribution of the respondents according to their age in years

Sr. No.	Age (in years)	Respondents (n=120)	
		f	**%**
1	60-70	94	78.33
2	71-81	18	15.00
3	82-92	08	6.67
	Total	**120**	**100**
		Mean	**68.12**
		S.D.	**6.41**

From the table-1, it was found that more than three-fourth (78.33%) of the respondents belonged to the age group of 60 to 70 years. More than one-tenth (15%) of the respondents belonged to the age group of 71 to 81 years. Whereas, slightly less than one-tenth (6.67%) of the respondents belonged to the 82 to 92 years of age group.

Therefore, it can be concluded that majority of the respondents (78.33%) belong to the age group of 60 to 70 years with the Mean age of the respondents 68.12 years.

4.2.2. Occupation of the respondents

The Occupation of the respondents were classified into three categories. respondents were asked to state their occupational status, whether they were Employed, Self-employed or unemployed. The data from the table-2 cleared that, slightly less than one-third (29.17%) of the respondents were Employed amongst which 21 were professor and teachers in academic institutions, others were doctors among which 9 were serving in Government hospital and 5 were in private hospital. More than one-fourth (27.50%) of the respondents were Self-employed having business and less than half (43.33%) of the total respondents were Unemployed.

Table-2: Frequency and percentage distribution of the respondents according to their occupation

Sr. No.	Occupation	Respondents (n=120)	
		f	**%**
1	Employed	35	29.17
2	Self-employed	33	27.50
3	Unemployed	52	43.33
	Total	**120**	**100**

Therefore, it can be concluded that majority of the respondents (43.33%) were un-employed and hence they spent their maximum time at home.

4.2.3. Family Monthly Income of the respondents

Table-3 depicts the Family Monthly Income of the respondents which is divided into three categories i.e.; below ₹25,000, between ₹25,000 to ₹50,000 and more than ₹50,000. It can be observed that, more than half (57.50%) of the respondents were having Family Monthly Income more than ₹50,000, more than one-third (35.83%) of the respondents belong to the group having Family Monthly Income between ₹25,000 to ₹50,000 and less than one-tenth (6.67%) of the respondents had Family Monthly Income less than ₹25,000.

Table-3: Frequency and percentage distribution of the respondents according to their Family Monthly Income			
Sr. No.	**Family Monthly Income (in ₹)**	**Respondents (n=120)**	
		f	**%**
1	<₹25,000	08	6.67
2	₹25,000 - ₹50,000	43	35.83
3	> ₹50,000	69	57.50
	Total	**120**	**100**

Therefore, it can be concluded that majority of the respondents (57.50%) had their Family Monthly Income more than ₹50,000.

4.2.4. Living Arrangement of the respondents

The respondents were categorized into the type of living arrangement they had in their house viz with whom they live.

Table-4: Frequency and percentage distribution of the respondents according to their Living Arrangement in the house			
Sr. No.	**Living arrangement with**	**Respondents (n=120)**	
		f	**%**
1	With family member	75	62.50
2	With relatives	1	0.83
3	With servant	4	3.33
4	Family member and relatives	9	7.50
5	Family member and servant	27	22.50
6	Relative and servant	4	3.33
	Total	**120**	**100**

The data of table-4 showcase that, more than half (62.50%) of the respondents were living only with their family members i.e.; with their spouse (41.33%),

Daughter and son (8.00%), Son and Daughter in law (22.67%), spouse and son (18.67%) and Son, Daughter in law and grand-children (9.33%) with no other assistance. One-fifth (22.50%) of the respondents were living with their family members and were assisted by the servant as well, slightly less than one-tenth (7.50%) of the respondents were living with their family members and relatives, less than one-tenth (3.33%) of the respondents were living with relatives and one-third (3.33%) of the respondents lived with servants without family members or relatives in their house.

Therefore, it can be concluded that majority of the respondents (62.50%) lived with their family members.

4.2.5. Health Related Problem of the respondents

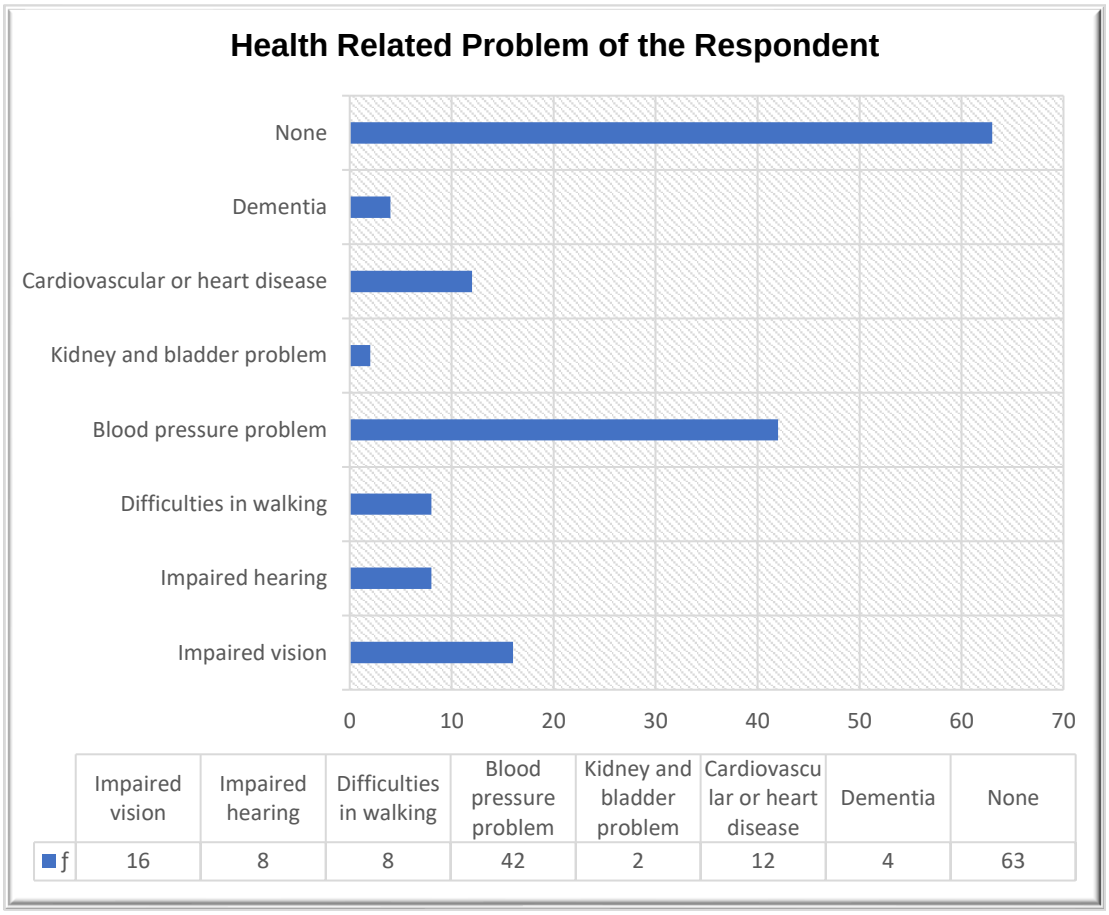
Health related problem face by the respondents were recorded during the data collection as described in Table-5.

Table-5: Frequency and percentage distribution of the respondents according to their Health Problems

Sr. No.	Health problem	*f*	%
1	Impaired vision	16	13.33
2	Impaired hearing	08	6.67
3	Difficulties in walking	08	6.67
4	Blood pressure problem	42	35.00
5	Kidney and bladder problem	02	1.67
6	Cardiovascular or heart disease	12	10.00
7	Dementia	04	3.33
8	None	63	52.50

NB: Total exceeds due to multiple responses.

Figure-6: Distribution of the respondents according to their Health-Related Problems



	Impaired vision	Impaired hearing	Difficulties in walking	Blood pressure problem	Kidney and bladder problem	Cardiovascular or heart disease	Dementia	None
f	16	8	8	42	2	12	4	63

The data from table-5 exposed that, more than one-tenth (13.33%) of the respondents were suffering from vision related problems, less than one-tenth (6.67%) of the respondents were having difficulties in walking and impaired hearing problems respectively. One-third (35%) of the respondents were suffering from Blood Pressure problem, only two (1.67%) respondents were suffering from kidney and bladder related problem, one-tenth (10%) of the respondents was suffering from heart disease, four (3.33%) of the respondents were having Dementia. However, slightly more than half (52.50%) of the respondents were having no any health-related problems.

Therefore, it can be concluded that, more than half of the respondents (52.50%) were having no any health-related issues.

4.2.6. Type of House of the respondents

Type of House of the respondents were classified into five categories viz. Apartment, Tenement, Row House, Bungalow and Other Type of House.

Table-6: Frequency and percentage distribution of the respondents according to the Type of their House

Sr. No.	Type of House	Respondents (n=120)	
		f	**%**
1	Apartment	21	17.50
2	Tenement	13	10.83
3	Row House	04	3.33
4	Bungalow	20	16.67
5	Other Type of House	62	51.67
	Total	**120**	**100**

The data of the table-6 depicts that, slightly more than half (51.67%) of the total respondents were living in Other Type of House named as Assam-Type House. Assam-Type Houses are commonly found in the northeastern states of India. It is a single-storey house; however, two-storey houses are also found at some places. This construction type is mainly use for multi-family housing. These are generally single dwelling units and do not have common walls with adjacent buildings. The house is made largely using wood-based materials and it has the structural strengths which influence earthquake safety of the house.

Slightly less than one-fifth (17.50%) of the respondents were living in Apartments, less than one-fifth (16.67%) of the respondents lived in Bungalows, one-tenth (10.83%) of the respondents were living in Tenements and only 3.33 per cent of the respondents lived in the Row House.

Therefore, it can be concluded that more than half of the total respondents (51.67%) were living in Other Type of House i.e.; Assam-type house.

4.2.7. Respondents House designed by

The designing of respondent's house was classified into two categories viz. Ready-made schemed house and designed by the respondent.

Table-7: Frequency and percentage distribution of the respondents according to designing of the House

Sr. No.	Designing of House	Respondents (n=120)	
		f	%
1	Builder designed house	65	54.17
2	Self-designed house	55	45.83
	Total	**120**	**100**

The data of table-7 depicts that, more than half (54.17%) of the respondents were living in Builder designed house and slightly less than half (45.83%) of the respondents were living in the Self-designed house.

4.2.8. Decision Maker of the Family for Installation of Home Security Systems for Elderly in their residence

Table-8 describe the information regarding decision makers for installing the Home Security Systems for Elderly in their residence. Responses received from the respondents were categorized into two subheads viz. respondent themselves and other family member.

Table-8: Frequency and percentage distribution of the respondents according to the Decision Maker of the Family for Installation of Home Security Systems

Sr. No.	Decision maker	Respondents (n=120)	
		f	%
1	Respondent	69	57.50
2	Family member	51	42.50
	Total	**120**	**100**

The data from table-8 revealed that, more than half (57.50%) of the respondents themselves took the decision for installation of Home Security Systems in their residence. Whereas, slightly less than half (42.50%) of the respondents reported that the decision for installation of Home Security Systems in their residence was taken by their family member.

4.2.9. Reasons for the Installation of Home Security Systems for Elderly

Regarding the reasons for installation of Home Security Systems for Elderly in the residence, majority of the respondent reported that the Home Security Systems for Elderly was installed to monitor the house (56.67%) and to get protection from intruder (53.33%) respectively. Whereas, more than one-third of the respondent stated that the Home Security Systems were installed to get security (40.83%) and to get assistance (38.33%) respectively. (Table-9)

Table-9: Frequency and percentage distribution of the respondents according to the Reasons for which they Install the Home Security Systems for Elderly at their residence

Sr. No.	Reasons for installation	*f*	%
1	To get protection from intruder	64	53.33
2	To monitor the house area	68	56.67
3	To get security	49	40.83
4	To get assistance	46	38.33

NB: Total exceeds due to multiple responses.

Therefore, it can be concluded that majority of the respondent (56.67%) had installed the Home Security Systems for Elderly to monitor the house.

4.2.10. Locale of the residence of the respondents

The nine districts of upper Assam viz. Jorhat, Dibrugarh, Golaghat, Lakhimpur, Sivasagar, Majuli, Dhemaji, Charaideo and Tinsukia was selected for data collection.

Table-10: Frequency and percentage distribution of the respondents according to their locale			
Sr. No.	**District**	**Respondents (n=120)**	
		f	**%**
1	Jorhat	23	19.17
2	Lakhimpur	17	14.17
3	Sivasagar	14	11.67
4	Dibrugarh	13	10.83
5	Golaghat	13	10.83
6	Majuli	12	10.00
7	Tinsukia	12	10.00
8	Dhemaji	10	8.33
9	Charaideo	06	5.00
	Total	**120**	**100**

The data from the table-10 shows that one-fifth (19.17%) of the total respondents were from Jorhat district, more than one-tenth (11.67%) of the respondents were from Sivasagar, slightly more one-tenth of the respondents were from Dibrugarh (10.83%), Golaghat (10.83%), Majuli (10%) and Tinsukia (10%) district respectively. Slightly less than one-tenth (8.33%) of the respondents were from Dhemaji and less than one-tenth (5%) were from Charaideo district of Assam.

4.3. Section III: The extent of utilization of Home Security Systems for Elderly by the respondents

This section deals with the extent of utilization of Home Security Systems for Elderly by the respondents. The data was presented in the form of frequency and percentage distribution of the responses.

4.3.1. Types of Home Security Systems for Elderly installed by the respondents

The table-11 depicts the frequency and percentage distribution of the respondents according to the Home Security Systems for Elderly installed by the elderly at their residence. A list of Home Security Systems for Elderly available in the market of Upper Assam was provided to the respondents to reveal which device they have installed in their residence.

From the data given in table-12, it is observed that, slightly less than three-fourth of the respondents use Security camera (72.50%), one-fifth of the respondents use Medical Security Device (20.83%) i.e.; panic button. Again, one-fifth of the respondents use Motion Sensor Lights (16.67%), less than one-fifth of the respondents use Smart Door Lock (14.17%), more than one-tenth of the respondents use Automatic Pill Dispenser (13.33%). Less than one-tenth of the respondents use Video Door Phone (5.83%) and 2.50 per cent of the respondents used Burglar Alarm at their residence.

Table-11: Frequency and percentage distribution of the respondents according to Home Security Systems for Elderly installed

Device No.	Types of Home Security Systems for Elderly	*f*	%
Device 1	Motion Sensor Light	20	16.67
Device 2	Burglar Alarm	03	2.50
Device 3	Security Camera	87	72.50

Device 4	Video Door Phone/ Video Intercom	07	5.83
Device 5	Smart Door Lock	17	14.17
Device 6	Medical Security Devices	25	20.83
Device 7	Automatic Pill Dispenser	16	13.33
NB: Total exceeds due to multiple responses.			

4.3.2. Frequency of Utilization of Home Security Systems for Elderly installed by the respondents

The table-12 depicts the frequency and percentage distribution of the Elderly according to the frequency to which the user usage the Home Security Systems for Elderly at the residence. Responses were recorded on the basis of usability of the Home Security Systems for Elderly in Always, Sometimes or Never by the respondent.

For Motion Sensor Light it was found that amongst the 20 respondents, more than one-fourth of the respondent had used it always (85%), less than one-fifth of the respondents had used it sometimes (15%).

For Burglar Alarm it was found that amongst 3 respondents, more than half of the respondents had used in sometimes (66.67%) basis and more one-third of the respondents had used it in always (33.33%) basis.

For Security camera it was found that amongst the 87 respondents, more than three-fourth of the respondents had used it always (80.46%), a slightly less than one-fifth of the respondents had used it sometimes (18.39%) and a little of the respondents had never (1.15%) used the device till the date of data collection.

For Video Door Phone it was found that amongst 7 respondents, slightly less than three-fourth of the respondent had used in always (71.43%) basis and more than one-fourth of the respondents had used sometimes (28.57%) when needed.

The data showed that, all the respondents who had installed Smart Door Lock, they had used it in always basis.

For Medical Security Devices it was found that amongst 25 respondents, three-fifth of the respondents had used it sometimes (64%) and two-fifth of the respondents had used it always (36%) basis.

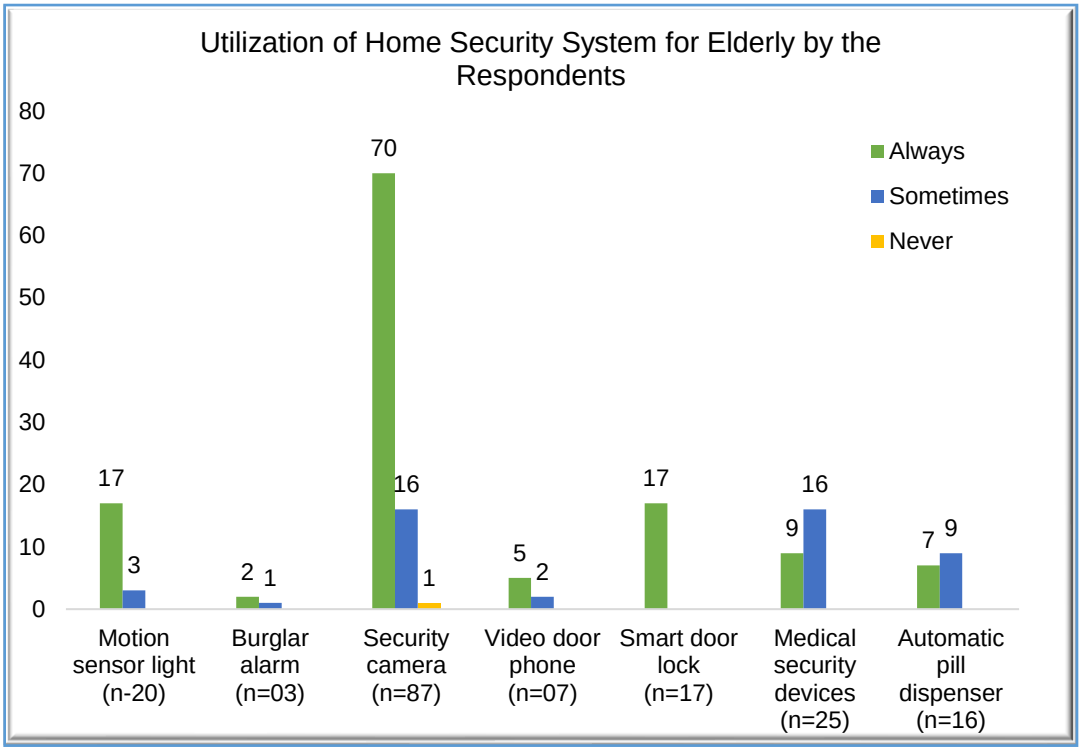
For Automatic Pill Dispenser it was found that amongst 16 respondents, more than half of the respondents had used sometimes (56.25%) and slightly less than half of the respondents had used it in always (43.75%) basis.

Table-12: Frequency and percentage distribution of the respondents according to Utilization of Home Security Systems for Elderly by the respondent

Sr. No	Home Security Systems for Elderly	Respondent (N=120)	Frequency of use						Wt. Mean Score 3-1
			Always		Sometimes		Never		
			f	%	*f*	%	*f*	%	
1	Motion Sensor Light	n = 20	17	85.00	3	15.00	0	0.00	2.85
2	Burglar Alarm	n = 03	2	33.33	1	66.67	0	0.00	2.67
3	Security Camera	n = 87	70	80.46	16	18.39	1	1.15	2.79
4	Video Door Phone	n = 07	5	71.43	2	28.57	0	0.00	2.71
5	Smart Door Lock	n = 17	17	100.00	0	0.00	0	0.00	3.00
6	Medical Security Devices	n = 25	9	36.00	16	64.00	0	0.00	2.36
7	Automatic Pill Dispenser	n = 16	7	43.75	9	56.25	0	0.00	2.44

NB: Total exceeds due to multiple responses.

Figure-7: Distribution of the respondents according to the Frequency of Utilization of Home Security Systems for Elderly installed by the respondent



Therefore, it can be concluded that, majority of the respondent had utilized the Smart Door Lock, Motion Sensor Lights, Security Camera and Video Door Phone in regular basis in their house.

4.3.3. Duration of usage of Home Security Systems for Elderly by the respondents

The table-13 reveals the frequency and percentage distribution of respondents according to the duration of usage of Home Security Systems for Elderly at their residence.

For the device Motion Sensor Light, the data clearly depict that, amongst 120 respondents only 20 elderlies were using Motion Sensor Light. Wherein more than half (55%) of the respondents were using this device for more than 2 years, one-third (35%) of the respondents were using it from last 1 year and one-tenth (10%) of the respondents were using the device from last 2 years.

For the device Burglar Alarm, it was found that amongst 120 respondents only 3 elderlies were using Burglar Alarm, wherein, only 2 (66.67%) elderly were using it from last 1 year and only 1 (3.33%) elderly were using it for more than 2 years.

For the device Security Camera, it was found that amongst 120 respondents only 87 elderlies were using Security Camera, more than one-third (39.08%) of the respondents were using it from more than 2 years, more than one-third of the respondents were using it for last 2 years and one-fourth (26.44%) of the respondents were using it from last 1 year.

For the device Video Door Phone, it was found that amongst 120 respondents only 7 elderlies were using the Door Video Phone. Wherein, more than half (57.14%) of the respondents were using this device from past 2 years, slightly less than one-third (28.58%) of the respondents were using it for more than 2 years and only 1 (14.28%) respondent were using it from last 1year.

For the device Smart Door Lock, it was found that amongst 120 respondents only 17 elderlies were using the Smart Door Lock. Wherein, less than half (41.18%) of the respondents were using this device for last 2 years and more than 2 years respectively and slightly less than one-fifth (17.65%) of the respondents were using it for last 1 year.

For the device Medical Security System, it was found that amongst 120 respondents only 25 elderlies were using Medical Security Devices, two-fifth (40%) of the respondents were using this device from last 1 year, a slightly less than two-fourth (36%) of the respondents were using this device from last 2 years and one fourth (24%) of them were using this device from more than last 2 years.

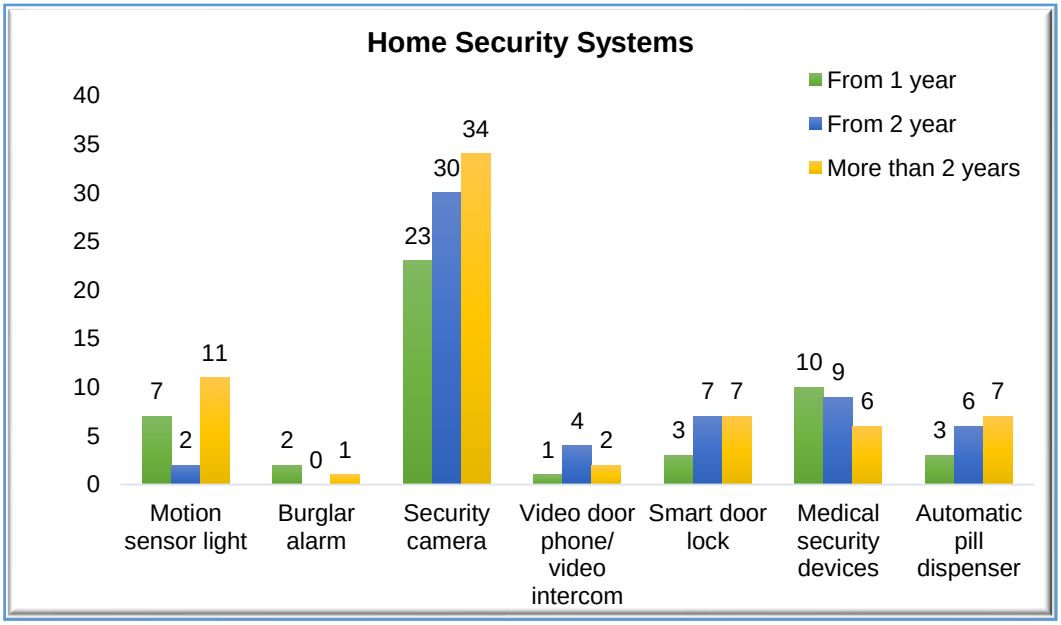
For the device Automatic Pill Dispenser, it was found that amongst 120 respondents only 16 elderlies were using Automatic Pill Dispenser device, less than half (43.75%) of the respondents were using this device from more than 2 years, more than one-third (37.50%) of the respondents were using it for last 2 years from the date of data collection for this research study.

Table-13: Frequency and percentage distribution of the respondents according to the duration of usage of the Home Security Systems for Elderly

Sr. No	Home Security Systems for Elderly	Respondent (N=120)	From 1 year		From 2 years		More than 2 years	
			f	%	*f*	%	*f*	%
1	Motion Sensor Light	n = 20	7	35.00	2	10.00	11	55.00
2	Burglar Alarm	n = 03	2	66.67	0	0.00	1	3.33
3	Security Camera	n = 87	23	26.44	30	34.48	34	39.08
4	Video Door Phone	n = 07	1	14.28	4	57.14	2	28.58
5	Smart Door Lock	n = 17	3	17.65	7	41.18	7	41.18
6	Medical Security Devices	n = 25	10	40.00	9	36.00	6	24.00
7	Automatic Pill Dispenser	n = 16	3	18.75	6	37.50	7	43.75

NB: Total exceeds due to multiple responses.

Figure-8: Distribution of the respondents according to the use period of Home Security Systems for Elderly installed by the respondents



Therefore, it can be concluded that among the 120 respondents, majority of them were using Security Camera and are using it for more than 2 years.

4.3.4. Utilization of Home Security Systems for Elderly by the different Age group of respondents

The table-14 reveals the frequency and percentage distribution of the respondents regarding utilization of Home Security Systems for Elderly according to their age group.

It can be observed that amongst the 60 to 70 years age group of the respondents, majority of the respondents were using Security Camera (72.34%), slightly less than one-fifth of the respondents were using Motion Sensor Lights (18.08%), less than one-fifth of the respondents were using Smart Door Lock (15.96%) and Medical Security Devices respectively and one-tenth of the respondents were using Automatic Pill Dispenser System (11.70%).

For the respondents belonging to the age group of 71 to 81 years, it was observed that, slightly less than three-fourth of the respondents were using Security Camera (72.22%), more than one-fourth of the respondents were using Medical Security Devices (27.78%), less than one-fifth of the respondents were using Automatic Pill Dispenser system (16.67%), one-tenth of the respondents were using Smart Door Lock (11.11%) and less than one-tenth of the respondents were using Motion Sensor Light (5.56%) and Video Door Phone (5.55%) respectively.

Whereas, the respondents belonging to the age group of 82 to 92 years, it was found that, three-fourth of the respondents were using Security Camera (75%), more than half of the respondents were using Medical Security Devices (62.50%), one-fourth (25%) of the respondents were using Automatic Pill Dispenser and Motion Sensor Lights respectively. While more than one-tenth of the respondents were using Video Door Phone (12.50%) at their residence.

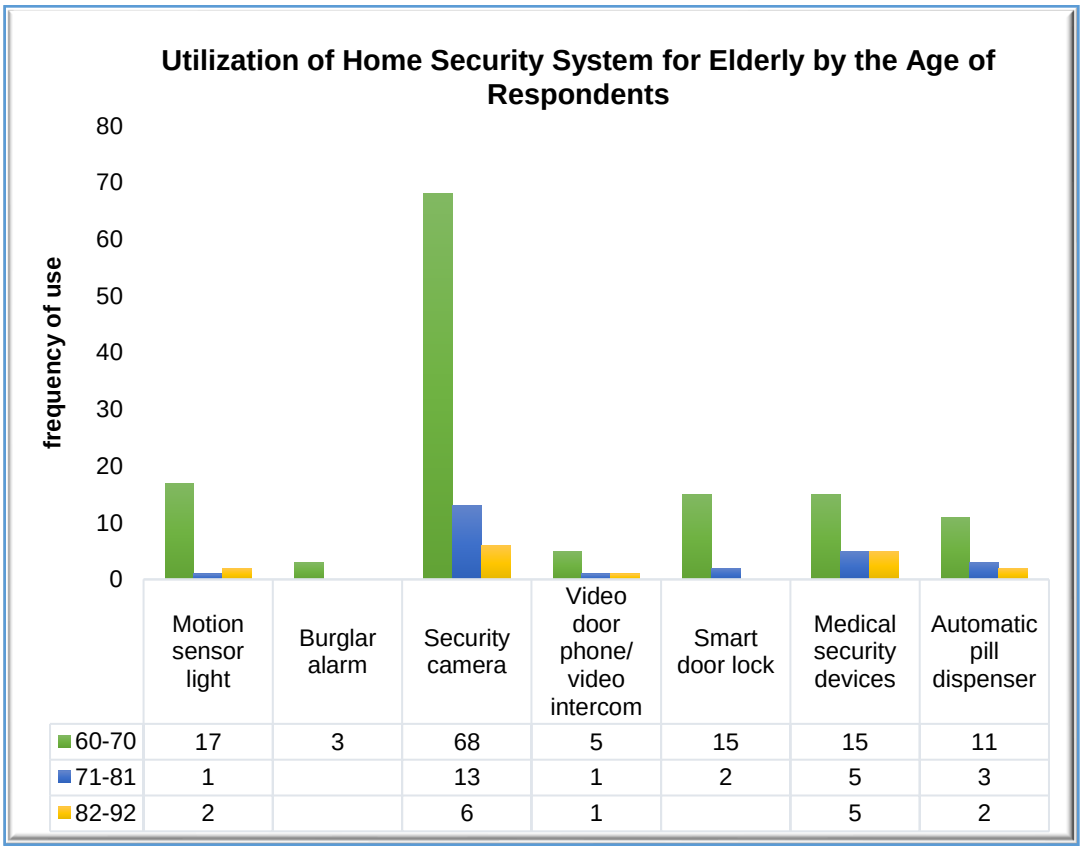
Therefore, it can be concluded that, the elderly belonging to the age group of 60-70 years and 71-81 years were utilizing Security Camera at their priority. Whereas, elderly belonging to the age group of 82 to 92 years highly utilized Security Camera as well as Medical Security Devices at their residence.

Table-14: Frequency and percentage distribution of the respondents according to their Age and used Home Security Systems for Elderly

Sr No	Age (in years)	Respondent (N=120)	Home Security Systems for Elderly													
			Motion Sensor Light		Burglar Alarm		Security Camera		Video Door Phone		Smart Door Lock		Medical Security Devices		Automatic Pill Dispenser	
			ƒ	%	*ƒ*	%	*ƒ*	%	*ƒ*	%	*ƒ*	%	*ƒ*	%	*ƒ*	%
1	60-70	n = 94	17	18.08	3	3.19	68	72.34	5	5.32	15	15.96	15	15.96	11	11.70
2	71-81	n = 18	1	5.56	0	0.00	13	72.22	1	5.55	2	11.11	5	27.78	3	16.67
3	82-92	n = 08	2	25.00	0	0.00	6	75.00	1	12.50	0	0.00	5	62.50	2	25.00

NB: Total exceeds due to multiple responses.

Figure-9: Distribution of the respondents according to their Age and used Home Security Systems for Elderly



	Motion sensor light	Burglar alarm	Security camera	Video door phone/ video intercom	Smart door lock	Medical security devices	Automatic pill dispenser
60-70	17	3	68	5	15	15	11
71-81	1		13	1	2	5	3
82-92	2		6	1		5	2

4.3.5. Utilization of Home Security Systems for Elderly by the respondents according to their Occupation

Table-15 reveals the frequency and percentage distribution of the respondents regarding their utilization of Home Security Systems for Elderly according to their occupation.

It can be observed that, amongst the group of employed respondents, more than three-fourth of the elderly were using Security Camera (77.14%), slightly more than one-fifth of the respondents were using Motion Sensor Lights (22.86%). Less than one-tenth of the respondents were using Smart Door Lock (5.71%). While only 1 (2.86%) respondent were using Automatic Pill Dispenser, Video Door Phone and Burglar Alarm respectively.

Amongst the group of self-employed respondents, it was observed that slightly less than three-fourth of the respondents were using Security Camera (72.73%), one-fifth of the respondents were using Smart Door Lock (21.21%), more than one-tenth (15.15%) of the respondents were using Automatic Pill Dispenser, Medical Security Device and Motion Sensor Lights respectively.

Amongst the group of un-employed respondents, more than half of the respondents were using Security Camera (6.23%), less than one-third of the respondents were using Medical Security System (28.85%), one-fifth of the respondents were using Automatic Pill Dispenser system (19.23%), less than one-tenth of the respondents were using Smart Door Lock (15.38%) and slightly more than one-tenth of the respondents were using Motion Sensor Lights (13.46%) at their residence.

Therefore, it can be concluded that, majority of them used Security Camera at their residence.

Figure-10: Distribution of the respondents according to their Occupation and used Home Security Systems for Elderly

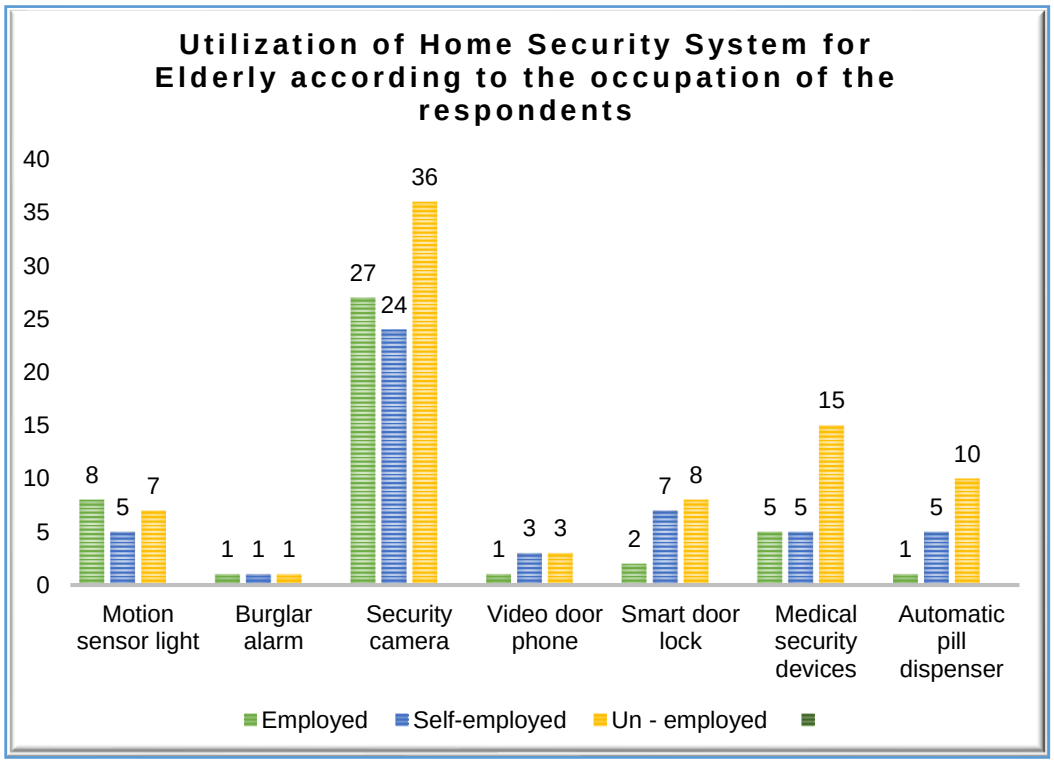


Table-15: Frequency and percentage distribution according to respondent's occupation and used Home Security Systems for Elderly

Sr No	Occupation	Respondent (N=120)	Home Security Systems for Elderly													
			Motion Sensor Light		Burglar Alarm		Security Camera		Video Door Phone		Smart Door Lock		Medical Security Devices		Automatic Pill Dispenser	
			ƒ	%	*ƒ*	%	*ƒ*	%	*ƒ*	%	*ƒ*	%	*ƒ*	%	*ƒ*	%
1	Employed	n = 35	8	22.86	1	2.86	27	77.14	1	2.86	2	5.71	5	14.29	1	2.86
2	Self-employed	n = 33	5	15.15	1	3.03	24	72.73	3	9.10	7	21.21	5	15.15	5	15.15
3	Unemployed	n = 52	7	13.46	1	1.92	36	69.23	3	5.77	8	15.38	15	28.85	10	19.23

NB: Total exceeds due to multiple responses.

4.3.6. Utilization of Home Security Systems for Elderly by the respondents according to their Family Monthly Income

Table-16: Frequency and percentage distribution of respondents according to the utilization and Family Monthly Income

Sr No	Family Monthly Income (in ₹)	Respondent (N=120)	Home Security Systems for Elderly													
			Motion Sensor Light		Burglar Alarm		Security Camera		Video Door Phone		Smart Door Lock		Medical Security Device		Automatic Pill Dispenser	
			f	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
1	<25,000	n = 08	0	0.00	1	12.50	3	37.50	0	0.00	0	0.00	4	50.00	0	0.00
2	25,000 - 50,000	n = 43	7	16.28	0	0.00	29	67.44	5	11.63	5	11.63	11	25.59	5	11.63
3	>50,000	n = 69	13	18.84	2	2.90	55	79.71	2	2.90	12	17.39	10	14.49	11	15.94

NB: Total exceeds due to multiple responses.

Figure-11: Distribution of the respondents according to their Family Monthly Income and used Home Security Systems for Elderly

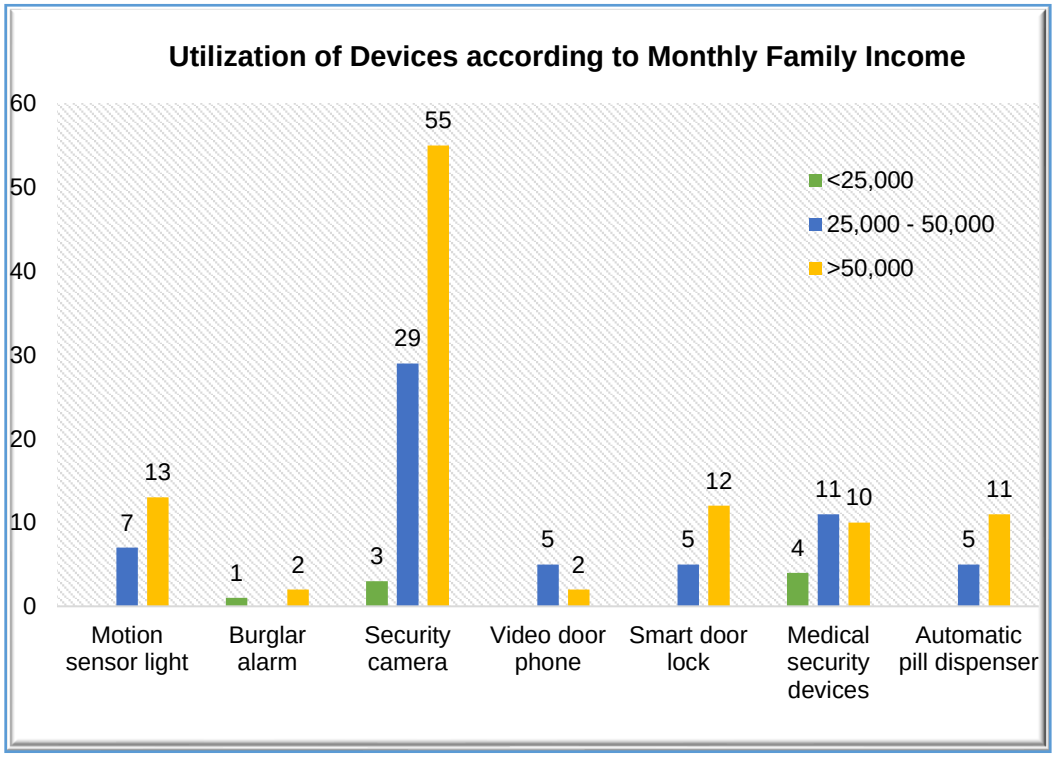


Table-16 reveals the frequency and percentage distribution of the respondents regarding their utilization of Home Security Systems for Elderly according to their Family Monthly Income.

It can be observed that, amongst the respondents having their Family Monthly Income less than ₹25,000 had installed Medical Security Devices (50%), more than one-third of the respondents had installed Security Camera (37.50%) and more than one-tenth had installed Burglar Alarm (12.50%).

Regarding the respondents belonging to the group of ₹25,000 to ₹50,000 Family Monthly Income, it was observed that, more than half of the respondent had installed Security Camera (67.44%), one-fourth of the elderly had installed Medical Security Devices (25.59%), less than one-fifth used Motion Sensor Light (16.28%) and slightly more than one-tenth (11.63%) of the respondents had installed Automatic Pill Dispenser and Smart Door Lock respectively.

Whereas, amongst the respondents having Family Monthly Income more than ₹50,000 it was found that majority of the respondents had installed Security Camera (79.7%), less than one-fifth of the respondents had installed Motion Sensor Light (18.84%), Smart Door Lock (17.39%), Automatic Pill Dispenser (15.94%) and Medical Security Devices (14.49%) respectively.

Therefore, it can be concluded that, the respondents having less than ₹25,000 Family Monthly Income had installed Medical Security Devices. It may be because these respondents belonged to the age group of 82 to 92 years (table-14). Whereas, the respondents belonging to the group of having Family Monthly Income between ₹25,000 to ₹50,000 and more than ₹50,000 had installed Security Camera at their residences.

4.3.7. Utilization of Home Security Systems for Elderly by the respondents according to their Living Arrangement

Table-17 described the frequency and percentage distribution of the respondents regarding their utilization of Home Security Systems for Elderly according to their Living Arrangement.

It can be observed that, amongst the respondents who were living with their family members, more than half of the respondents were using Security Camera (70.67%), one-fourth of the respondents were using Medical Security System (25.33%), one-fifth of the respondents were using Motion Sensor Light (20%).

Among the 120 respondents only 1 respondent was living with relatives and was using only Security Camera at the residence.

For the 4 respondents who were living with servants, it was found that the 3 respondents were using Security Camera (75%) and only one respondent using Smart Door Lock (25%) at their Home.

Similarly, for the respondents living with their family member and relatives both, all of them were using Security Camera, more than one-fifth (22.22%) of the respondents were using Motion Sensor Light and Smart Door Lock along with Security Camera and slightly more than one-tenth (11.11%) of the

respondents were using Automatic Pill Dispenser and Video Door Phone along with Security Camera.

Whereas, the respondents living with their family members and were assisted by servants as well, it was observed that, more than half of the respondents were using Security Camera (66.67%), one-third of the respondents were using Smart Door Lock (33.33%), less than one-fifth of the respondents were using Medical Security Devices (18.52%) and slightly more than one-tenth (11.11%) of the respondents were using Motion Sensor Light and Video Door Phone respectively.

While respondents who were staying with their relatives and were assisted by the servants as well had installed Security Camera at their residence.

It can be concluded that, majority of the respondents had installed the Security Camera in all category of their living arrangements.

Figure-12: Distribution of the respondents according to their Living Arrangement and used Home Security Systems for Elderly

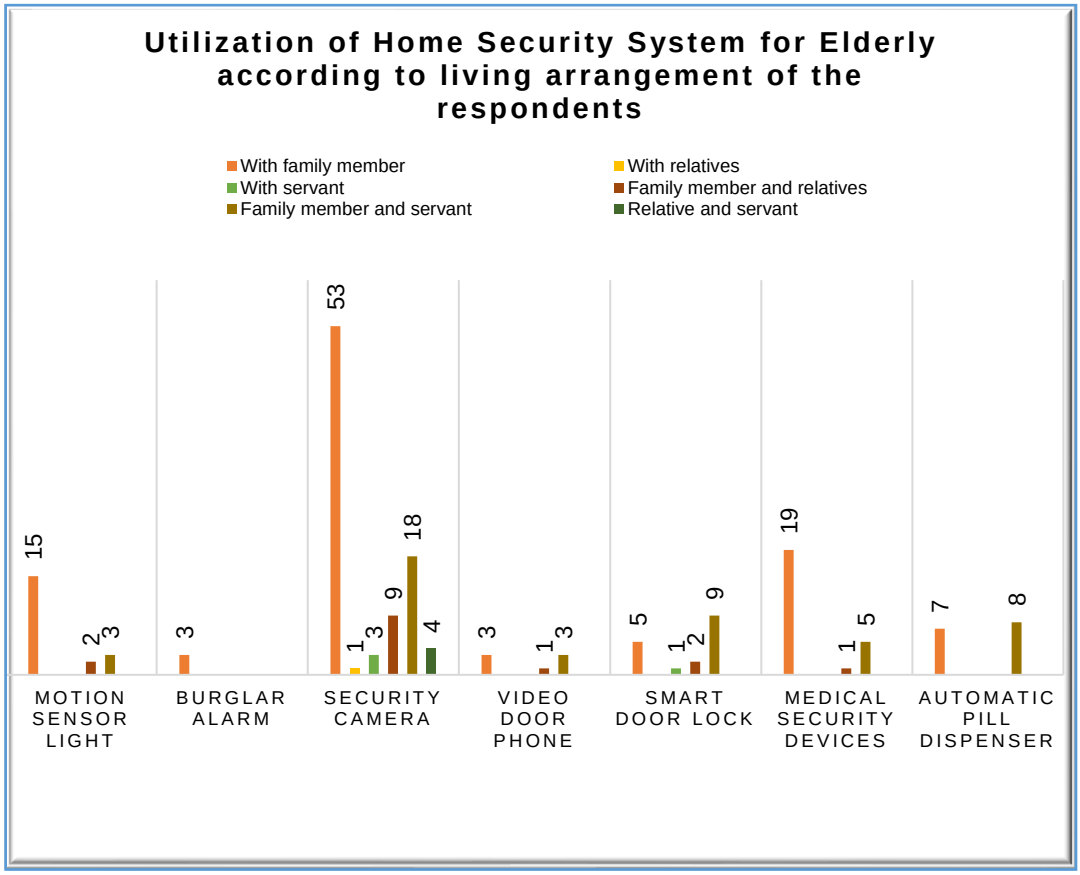


Table-17: Frequency and percentage distribution of the respondents according to their Living Arrangement and used Home Security Systems for Elderly

Sr No	Living Arrangement	Respondent (N=120)	Home Security Systems for Elderly													
			Motion Sensor Light		Burglar Alarm		Security Camera		Video Door Phone		Smart Door Lock		Medical Security Devices		Automatic Pill Dispenser	
			ƒ	%	ƒ	%	ƒ	%	ƒ	%	ƒ	%	ƒ	%	ƒ	%
1	With family	n = 75	15	20.00	3	4.00	53	70.67	3	4.00	5	6.67	19	25.33	7	9.33
2	With relatives	n = 1	0	0.00	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00	0	0.00
3	With servant	n = 4	0	0.00	0	0.00	3	75.00	0	0.00	1	25.00	0	0.00	0	0.00
4	Family and relatives	n = 9	2	22.22	0	0.00	9	100.00	1	11.11	2	22.22	1	11.11	0	0.00
5	Family and servant	n = 27	3	11.11	0	0.00	18	66.67	3	11.11	9	33.33	5	18.52	8	29.63
6	Relative and servant	n = 4	0	0.00	0	0.00	4	100.00	0	0.00	0	0.00	0	0.00	0	0.00

NB: Total exceeds due to multiple responses.

4.3.8. Utilization of Home Security Systems for Elderly according to Health-Related Problem of the respondents

Table-18 described the frequency and percentage distribution of the respondents regarding their utilization of Home Security Systems for Elderly according to their Health-Related Problem.

It can be observed that, amongst the respondents who were suffering from vision related problem, more than nine-tenth of the respondents had installed Security Camera (93.75%) and less than one-tenth (6.25%) of the respondents had installed Motion Sensor Light, Burglar Alarm, Video Door Phone and Medical Security Camera.

Amongst the respondents who were suffering from hearing related problem, one-fourth (25%) of the respondents had installed Security Camera, Smart Door Lock, Medical Security Camera and Automatic Pill Dispenser System.

Amongst the respondents who felt difficulty in walking, more than four-fifth of the respondents used Security Camera (87.50%), one-fourth of the respondents used Medical Security Devices (25%), more than one-tenth (12.50%) of the respondents used Burglar Alarm, Video Door Phone, Smart Door Lock and Automatic Pill Dispenser device.

Amongst the respondents who had blood pressure related problem, slightly less than three-fourth of the respondents used Security Camera (73.81%), more than one-third of the respondents used Medical Security System (33.33%), more than one-fourth were used Automatic Pill Dispenser (28.57%).

Amongst the respondents who had Kidney and Bladder related problem, half (50%) of the respondents used Security Camera, Smart Door Lock and Automatic Pill Dispenser system.

Amongst the respondents who had heart related problem, more than three-fourth of the respondents used Security Camera (83.33%), one-third of the respondents used Automatic Pill Dispenser (33.33%), one-fourth of the respondents used Medical Security System (25%) at their houses.

Amongst the respondents who had Dementia problem, one-fourth (25%) of the respondents used Security Camera, Smart Door Lock, Medical Security Device and Automatic Pill Dispenser.

Amongst the respondents who had no any health-related issue, more than half of the respondents used Security Camera (66.67%), less than one-fourth of the respondents used Motion Sensor Light (23.81%), more than one-tenth (15.87%) of the respondents used Smart Door Lock and Medical Security Devices respectively at their residences.

It can be concluded that, all the respondents were highly utilizing the Security camera. Those respondents, who had hearing related problem and dementia, they mostly utilized Smart Door Lock, Medical Security Camera and Automatic Pill Dispenser at their house.

Figure-13: Distribution of the respondents according to their Health-Related Problem and used Home Security Systems for Elderly

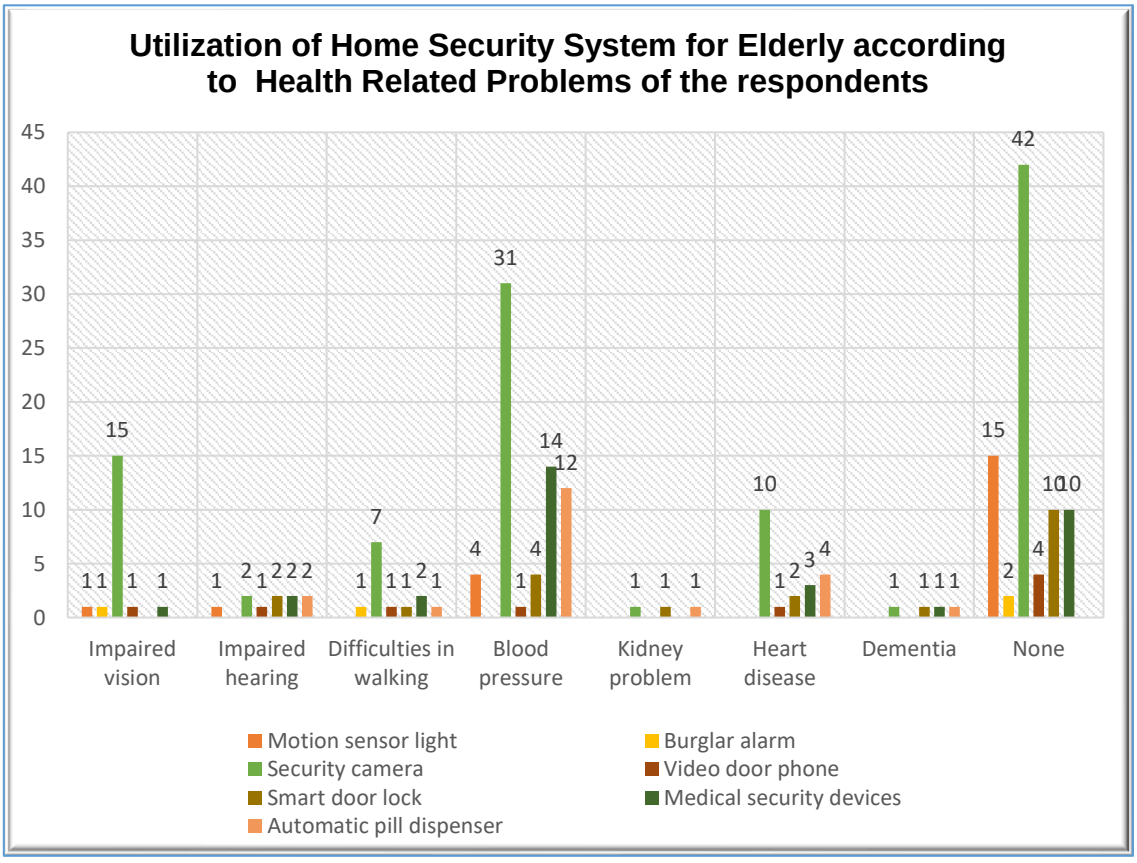


Table-18: Frequency and percentage distribution of the respondents according to their Health-Related Problem and used Home Security Systems for Elderly

Sr No	Health Related Problem	Respondent (N=120)	Home Security Systems for Elderly													
			Motion Sensor Light		Burglar Alarm		Security Camera		Video Door Phone		Smart Door Lock		Medical Security Devices		Automatic Pill Dispenser	
			f	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
1	Impaired vision	n = 16	1	6.25	1	6.25	15	93.75	1	6.25	0	0.00	1	6.25	0	0.00
2	Impaired hearing	n = 08	1	12.50	0	0.00	2	25.00	1	12.50	2	25.00	2	25.00	2	25.00
3	Difficulties in walking	n = 08	0	0.00	1	12.50	7	87.50	1	12.50	1	12.50	2	25.00	1	12.50
4	Blood pressure problem	n = 42	4	9.52	0	0.00	31	73.81	1	2.38	4	9.52	14	33.33	12	28.57
5	Kidney and bladder problem	n = 02	0	0.00	0	0.00	1	50.00	0	0.00	1	50.00	0	0.00	1	50.00
6	Heart disease	n = 12	0	0.00	0	0.00	10	83.33	1	8.33	2	16.67	3	25.00	4	33.33
7	Dementia	n = 04	0	0.00	0	0.00	1	25.00	0	0.00	1	25.00	1	25.00	1	25.00
8	None	n = 63	15	23.81	2	3.17	42	66.67	4	6.35	10	15.87	10	15.87	0	0.00

NB: Total exceeds due to multiple responses.

4.3.9. Utilization of Home Security Systems for Elderly by the respondents according to their Type of House where they reside

Table-19: Frequency and percentage distribution of the respondents according to their Type of House and used Home Security Systems for Elderly

Sr No	Type of House	Respondent (N=120)	Home Security Systems for Elderly													
			Motion Sensor Light		Burglar Alarm		Security Camera		Video Door Phone		Smart Door Lock		Medical Security Devices		Automatic Pill Dispenser	
			f	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
1	Apartment	n = 21	7	33.33	1	4.76	13	61.90	1	4.76	4	19.05	4	19.05	4	19.05
2	Tenement	n = 13	4	30.77	1	7.69	10	76.92	0	76.92	1	7.69	5	38.46	1	7.69
3	Row House	n = 04	0	0.00	1	25.00	2	50.00	1	25.00	0	0.00	1	25.00	0	0.00
4	Bungalow	n = 20	0	0.00	0	0.00	15	75.00	1	5.00	2	10.00	4	20.00	1	5.00
5	Other Type of House	n = 62	9	14.52	0	0.00	47	75.81	4	6.45	10	16.13	11	17.74	10	16.13

NB: Total exceeds due to multiple responses.

Figure-14: Distribution of the respondents according to their Type of House where they reside and used Home Security Systems for Elderly

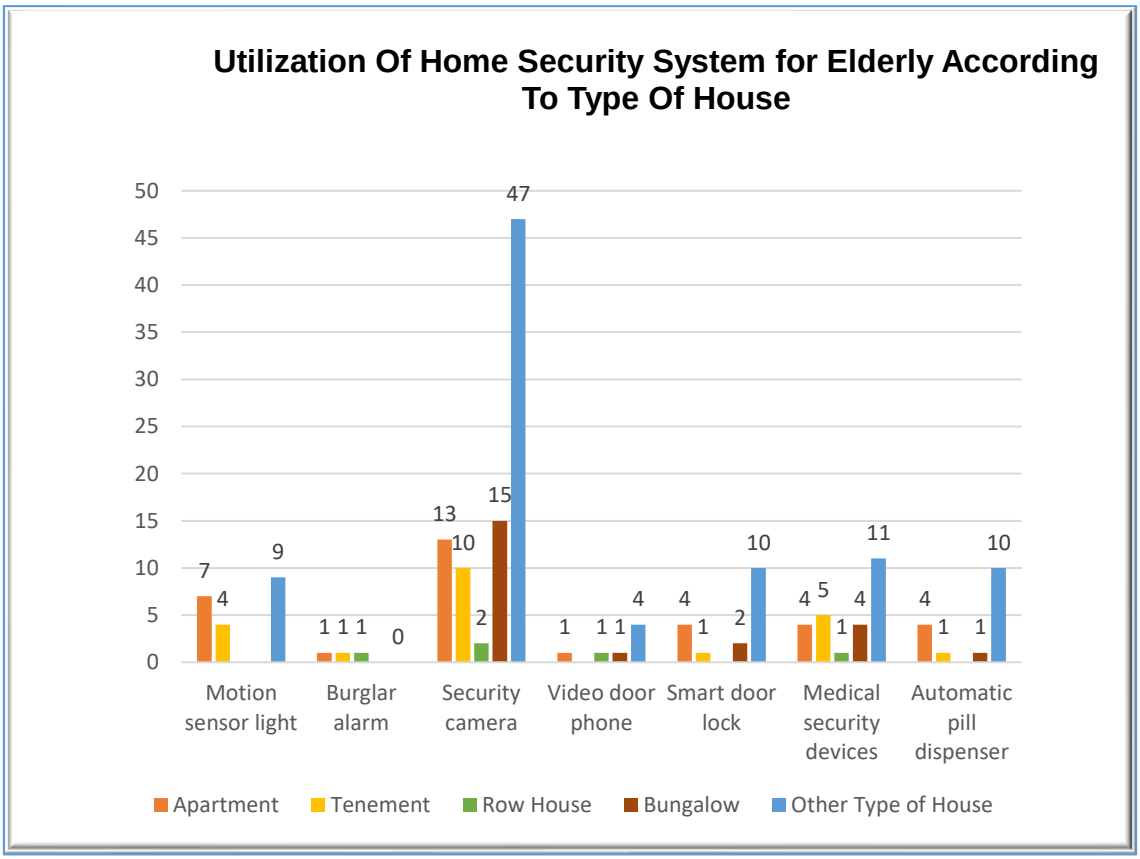


Table-19 described the frequency and percentage distribution of the respondents regarding their utilization of Home Security Systems for Elderly according to their Type of House.

It can be observed that, amongst the respondents who were lived in Apartments, more than half (61.90%) of the respondents were using Security Camera, one-third of the respondents were using Motion Sensor Lights (33.33%), one-fifth (19.05%) of the respondents were using Smart Door Lock, Medical Security Devices and Automatic Pill Dispensers respectively.

Among the respondents who were lived in Tenements, more than three-fourth (76.92%) of the respondents were using Security Camera and Video Door Phone respectively, more than one-third of the respondents were using Medical Security Devices (38.46%) and less than one-third of the respondents were using the Motion Sensor Lights (30.77%) on their premises.

Among the respondents who were lived in Row Houses, half of the respondents were using Security Camera (50%) and one-fourth (25%) of the respondents were using the Burglar Alarm, Video Door Phone and Medical Security Systems.

Among the respondents who were lived in Bungalow, three-fourth of the respondents were using Security Camera (75%), one-fifth of the respondents were using Medical Security Devices (20%).

Among the respondents who were lived in the Other Type of House i.e.; Assam-Type House, three-fourth of the respondents were using Security Camera (75.81%), less than one-fifth of the respondents were using Medical Security Devices (17.74%), Smart Door Lock (16.13%), Automatic Pill Dispensers (16.13%) and Motion Sensor Lights (14.52%) respectively.

It can be concluded that, majority of the respondents were using Security Camera at their residence in all category of the Type of House of the respondents.

4.3.10. Utilization of Home Security Systems for Elderly by the respondents according to Design of the House

Table-20 described the frequency and percentage distribution of the respondents regarding their utilization of Home Security Systems for Elderly according to the Designing of the House.

For the respondents who were living in ready-made schemed house designed by builders, it was observed that, slightly less than four-fifth of the respondents were using Security Camera (78.46%), one-fifth of the respondents were using Medical Security Devices (20%), more than one-tenth of the respondents were using Motion Sensor Lights (12.31%) and Automatic Pill Dispensers (10.77%) respectively.

Whereas, the respondents who were living in the house designed by themselves or by their family member, the revealed that more than half of the respondents were using Security Camera (64.45%), less than half of the

respondents were using Motion Sensor Lights (40%), less than one-fifth of the respondents were using Smart Door Lock (18.18%) and Automatic Pill Dispensers (16.36%) respectively. Whereas, slightly less than one-tenth of the respondents were using Video Door Phone (7.27%) at their residence.

Thus, it can be concluded that, majority of the respondent living in ready-made schemed house or own designed house had installed Security Camera. While the respondent who were living in their own designed house also installed Motion Sensor Lights at their residence.

Figure-15: Distribution of the respondents according to Design of the House and used Home Security Systems for Elderly

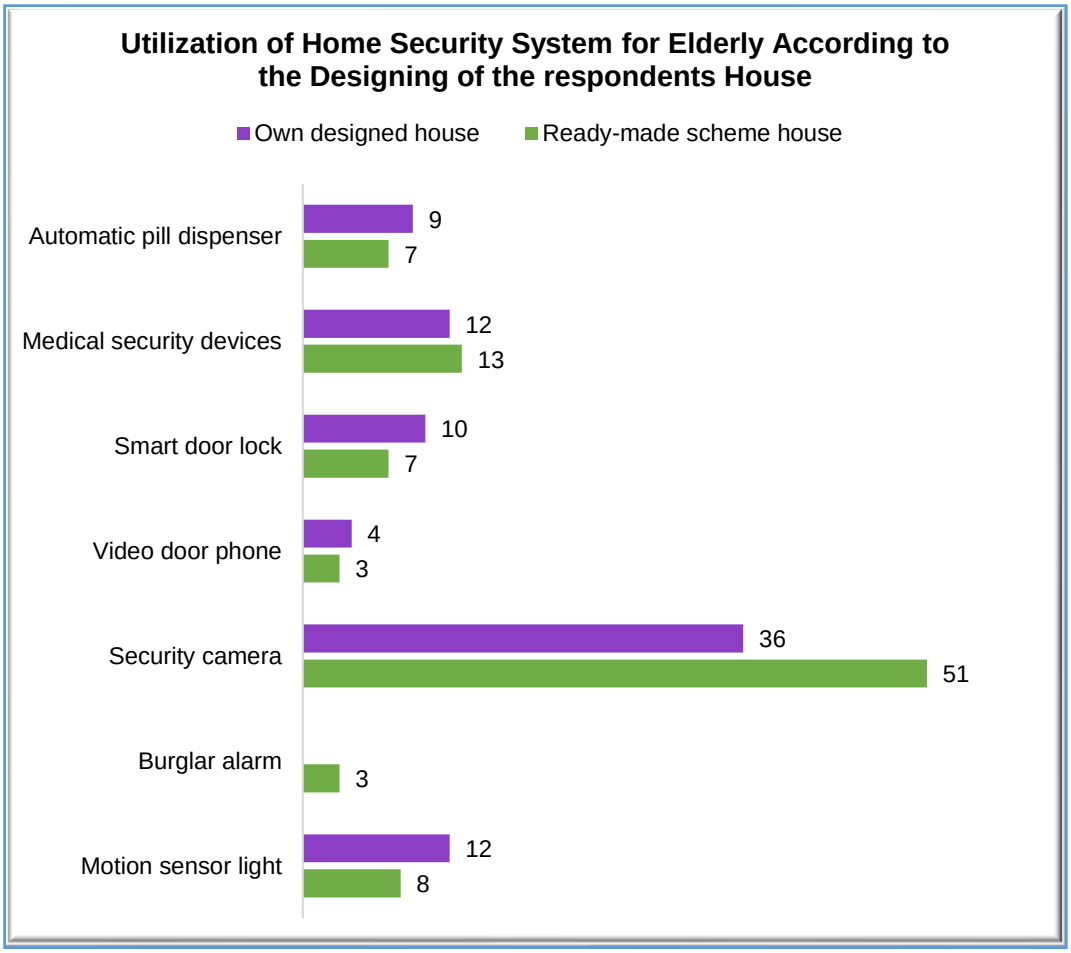


Table-20: Frequency and percentage distribution of the respondents according to the Design of the House and used Home Security Systems for Elderly

Sr No	Designing of the House	Respondent (N=120)	Home Security Systems for Elderly													
			Motion Sensor Light		Burglar Alarm		Security Camera		Video Door Phone		Smart Door Lock		Medical Security Devices		Automatic Pill Dispenser	
			f	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
1	Builder designed	n = 65	8	12.31	3	4.62	51	78.46	3	4.62	7	10.77	13	20.00	7	10.77
2	Self-designed	n = 55	12	40.00	0	0.00	36	65.45	4	7.27	10	18.18	12	21.82	9	16.36

NB: Total exceeds due to multiple responses.

4.3.11. Utilization of Home Security Systems for Elderly by the respondents according to the Decision Maker for installing the Home Security Systems for Elderly in the House

Table-21: Frequency and percentage distribution of the respondents according to decision maker for installing the Home Security Systems in the house of the respondent and used Home Security Systems for Elderly

Sr No	Decision Maker	Respondent (N=120)	Home Security Systems for Elderly													
			Motion Sensor Light		Burglar Alarm		Security Camera		Video Door Phone		Smart Door Lock		Medical Security Devices		Automatic Pill Dispenser	
			f	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
1	Respondent	n = 69	15	21.74	2	2.90	48	69.57	4	5.80	7	10.14	13	18.84	6	8.70
2	Family member	n = 51	5	9.80	1	1.96	39	76.47	3	5.88	10	19.61	12	23.53	10	19.61

NB: Total exceeds due to multiple responses.

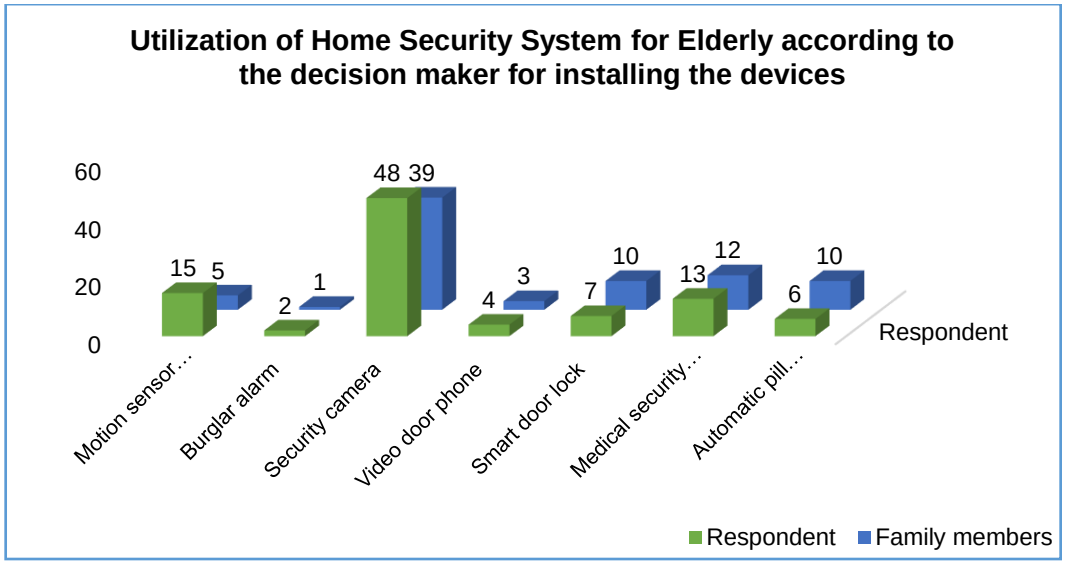
Table-21 described the frequency and percentage distribution of the respondents according to the decision maker of the family for installation of Home Security Systems for Elderly at their residence.

It can be observed that, amongst the respondents who had taken the decision of installing the Home Security Systems by themselves, more than half of the respondents had installed Security Camera (69.57%), more than one-fifth of the respondents had installed Motion Sensor Lights (21.74%), slightly less than one-fifth of the respondents had installed Medical Security Systems (18.84%). While less than one-tenth of the respondents had installed Automatic Pill Dispenser (8.70%), Video Door Phone (5.80%) and Burglar Alarm (2.90%).

Whereas, amongst the respondents whose family member had taken the decision for installing the Home Security Systems for Elderly in their house, more than two-third of the respondents had installed Security Camera (76.47%), more than one-fifth of the respondents had installed Medical Security System (23.53%), a slightly less than one-fifth (19.61%) of the respondents had installed Automatic Pill Dispenser and Smart Door Lock respectively.

Therefore, it can be concluded that, amongst the respondents who had themselves taken decision or family member had taken the decision for installation of Home Security Systems for Elderly, majority of them had installed Security Camera at their residence.

Figure-16: Distribution of respondents according to the Decision Maker for installing the Home Security Systems for Elderly



Conclusion

It can be concluded that, amongst the available seven Home Security Systems for Elderly in the market, majority of the respondents belonging to the age 60 to 81 years were using Security cameras at their residence and they were using it since past 2 years. Whereas, respondents belonging to the age group of 82 to 92 years were highly utilizing Security Camera along with the Medical Security Device.

With reference to the Family Monthly Income, respondents having less than ₹25,000 Family Monthly Income, majority of them had installed Medical Security Devices. While, the respondents having Family Monthly Income between ₹25,000 to ₹50,000 and more than ₹50,000 had installed Security Camera at their residences.

Amongst the various Health Related Problems faced by the respondents namely; impaired vision, impaired hearing, difficulties in walking, Blood Pressure related problem, Kidney problem, Heart disease and Dementia; the respondents having vision related problem, difficulties in walking, Blood Pressure related problem, Kidney problem, Heart disease were highly utilizing Security Systems at their residence. Whereas, those respondents, who had hearing related problem and dementia, they mostly utilized Smart Door Lock, Medical Security Camera and Automatic Pill Dispenser at their residence.

4.4. Section IV: The extent of satisfaction experienced regarding Home Security Systems for Elderly by the respondents

This section describes the frequency and percentage distribution of the respondents according to the extent of satisfaction experienced regarding by them while using the Home Security Systems for Elderly installed in their residence.

The extent of satisfaction experienced regarding Home Security Systems for Elderly by the respondents was measured on 3-point continuum i.e.; “Satisfied, Undecided and Not Satisfied” and the ascribed score were 3, 2 and 1 respectively for the positive statements and vice-versa for negative statements. Further, a weighted mean score was calculated to find out the extent of satisfaction experience regarding various aspects of Home Security Systems for Elderly by the respondents. The range of continuum for weighted mean was from 1-3, which was categorized as i) Least Satisfied (1.00 – 1.59), ii) Moderately Satisfied (1.60 – 2.59) and iii) Highly Satisfied (2.60 – 3.00).

4.4.1. The extent of satisfaction experienced by the respondents regarding various aspects of Motion Sensor Light

Table-22 gives a clear representation on respondent’s extent of satisfaction regarding various aspects of Motion Sensor Light.

It was observed that, all the respondents were satisfied with the functioning of Motion Sensor Light and the comfortability of using the device with the weighted mean score 3.00.

Nearly cent percent of the respondents were satisfied with the design and the accuracy of the devices (95%) with the weighted mean score 2.95, the frequency of responses (95%) given by the device with the weighted mean score 2.00 and the material of the device (90%) with the weighted mean score 2.85.

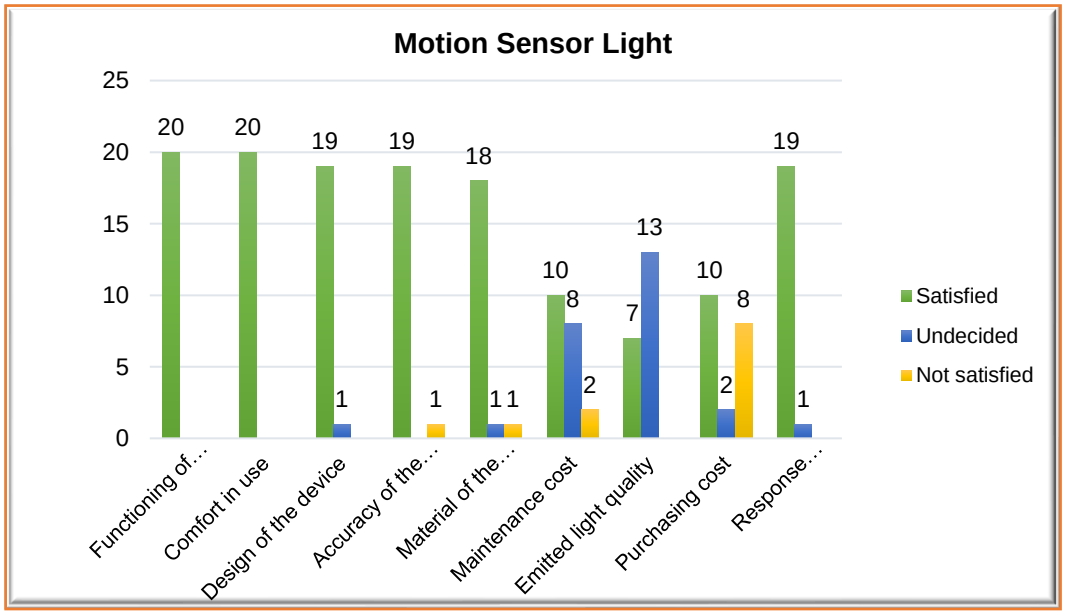
Further, it was observed that half (50%) of the respondents were satisfied with the maintenance cost of the device with the weighted mean score 2.40 as well as with the purchasing cost of the device with the weighted mean score 2.10. While slightly less than three-fourth (35%) of the respondents were satisfied with the emitted light quality of the device with the weighted mean score 2.35.

Table-22: Frequency and percentage distribution of respondents according to the extent of satisfaction experienced by them while using Motion Sensor Light

Respondent (n=20)

Sr. No.	Aspects of Motion Sensor Light	Satisfied		Undecided		Not Satisfied		Wt. Mean Score (1-3)
		f	%	*f*	%	*f*	%	
1	Functioning of device	20	100.00	0	0.00	0	0.00	3.00
2	Comfort in use	20	100.00	0	0.00	0	0.00	3.00
3	Design of the device	19	95.00	1	5.00	0	0.00	2.95
4	Accuracy of the device	19	95.00	0	0.00	1	5.00	2.90
5	Material of the device	18	90.00	1	5.00	1	5.00	2.85
6	Maintenance cost	10	50.00	8	40.00	2	10.00	2.40
7	Emitted light quality	7	35.00	13	65.00	0	0.00	2.35
8	Purchasing cost	10	50.00	2	10.00	8	40.00	2.10
9	Response frequency	19	95.00	1	5.00	0	0.00	2.00
						Total Weighted Mean		**2.62**

Figure-17: Distribution of the respondents according to the extent of satisfaction experienced by using Motion Sensor Light



Therefore, it can be concluded that, majority of the respondents were highly satisfied with the functioning, comfortability of using, design, accuracy and material of the Motion Sensor Lights installed in their residence.

4.4.2. The extent of satisfaction experienced by the respondents regarding various aspects of Burglar Alarm

Table-23 gives a clear representation about the extent of satisfaction experienced by the respondents regarding various aspects of Burglar Alarm.

It was observed that, all the respondents (100%) were satisfied with the material and design of the Burglar Alarm with the weighted mean score 3.00. More than half (66.67%) of the respondents were satisfied with the functioning of the device, comfortability of using the device, sound quality of the device and frequency of responses given by the device during the emergency with weighted mean score 2.67.

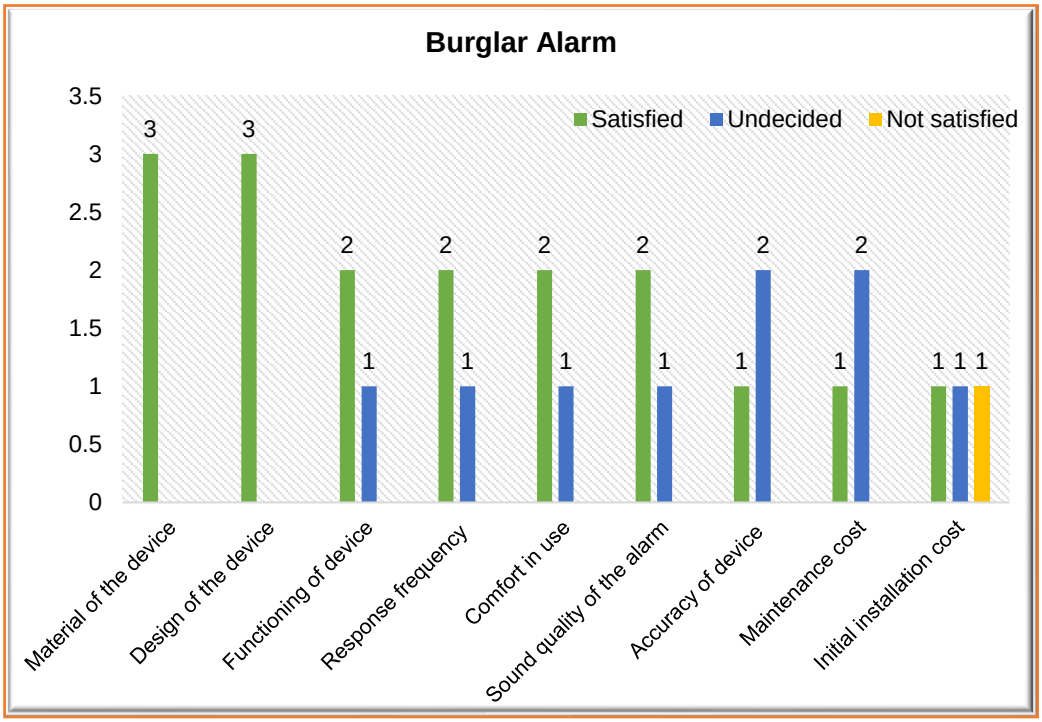
Whereas, one-third (33.33%) of the respondents found the accuracy and maintenance cost of the device with the weighted mean score 2.33 and initial installation cost of the device more satisfactory with the weighted mean score 2.00.

Table-23: Frequency and percentage distribution of the respondents according to the extent of satisfaction by using Burglar Alarm

Respondent (n=03)

Sr. No.	Aspects of Burglar Alarm	Satisfied		Undecided		Not satisfied		Wt. Mean Score (1-3)
		f	%	*f*	%	*f*	%	
1	Material of the device	3	100.00	0	0.00	0	0.00	3.00
2	Design of the device	3	100.00	0	0.00	0	0.00	3.00
3	Functioning of device	2	66.67	1	33.33	0	0.00	2.67
4	Response frequency	2	66.67	1	33.33	0	0.00	2.67
5	Ease in use	2	66.67	1	33.33	0	0.00	2.67
6	Sound quality of the alarm	2	66.67	1	33.33	0	0.00	2.67
7	Accuracy of device	1	33.33	2	66.67	0	0.00	2.33
8	Maintenance cost	1	33.33	2	66.67	0	0.00	2.33
9	Initial installation cost	1	33.33	1	33.33	1	33.33	2.00
Total Weighted Mean								**2.59**

Figure-18: Distribution of the respondents according to the extent of satisfaction experienced by using Burglar Alarm



Therefore, it can be concluded that, majority of the respondents were highly satisfied with the material and design of the device followed with functioning of the device, frequency of responses received by the device during emergency, comfortability and emitted alarm sound of the Burglar Alarm.

4.4.3. The extent of satisfaction experienced by the respondents regarding various aspects of Security Camera

Table-24 gives a clear representation about the respondent's extent of satisfaction experienced by the respondents regarding various aspects of Security Camera.

It was observed that, majority of the respondents were satisfied with the functioning of security camera (95.40%) with weighted mean score 2.95, design of the security camera (91.95%) with weighted mean score 2.90, material of the device (88.51%) with weighted mean score 2.86, comfortability of using the device (86.21%) with weighted mean score 2.84, regularity in capturing videos without any defect (87.36%) with the weighted mean score 2.83. Whereas, more than three-fourth of the respondents were satisfied with the quality of video

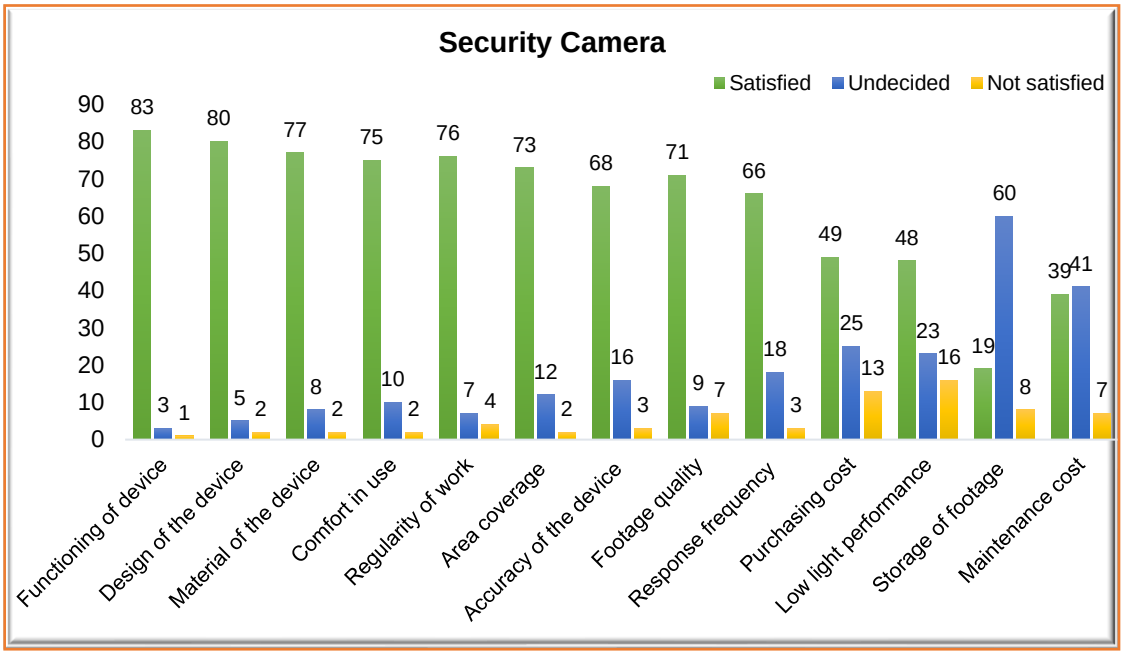
footage (81.61%) of security camera with weighted mean score 2.74 mean and area coverage under the security device (83.91%) with weighted mean score 2.82. However, more than three-fourth of the respondents were satisfied with the accuracy of the device (78.16%) and frequency of response (75.86%) when the device detects any movement within its range with weighted mean score 2.75 and 2.73 respectively.

Although, more than half of the respondents were satisfied with the purchasing cost of the device (56.32%) and the low light performance capacity (55.17%) of the security camera with weighted mean score 2.41 and 2.37 respectively. Less than half (44.83%) of the respondents were satisfied with the maintenance cost of the device with weighted mean score 1.87 and one-fifth (21.84%) of the respondents were satisfied with the storage capacity of video clip by the security camera with weighted mean score 2.13.

Table-24: Frequency and percentage distribution of the respondents according to the extent of satisfaction experienced by using Security Camera

							Respondent (n=87)	
Sr. No.	**Aspects of Security Camera**	**Satisfied**		**Undecided**			**Not satisfied**	**Wt. Mean Score (1-3)**
		f	**%**	***f***	**%**	***f***	**%**	
1	Functioning of device	83	95.40	3	3.45	1	1.15	2.94
2	Design of the device	80	91.95	5	5.75	2	2.30	2.90
3	Material of the device	77	88.51	8	9.20	2	2.30	2.86
4	Comfort in use	75	86.21	10	11.49	2	2.30	2.84
5	Regularity of work	76	87.36	7	8.05	4	4.60	2.83
6	Area coverage	73	83.91	12	13.79	2	2.30	2.82
7	Accuracy of the device	68	78.16	16	18.39	3	3.45	2.75
8	Footage quality	71	81.61	9	10.34	7	8.05	2.74
9	Response frequency	66	75.86	18	20.69	3	3.45	2.73
10	Purchasing cost	49	56.32	25	28.74	13	14.94	2.41
11	Low light performance	48	55.17	23	26.44	16	18.39	2.37
12	Storage of footage	19	21.84	60	68.97	8	9.20	2.13
13	Maintenance cost	39	44.83	41	47.13	7	8.05	1.87
							Total Weighted Mean	**2.63**

Figure-19: Distribution of respondents according to extent of satisfaction experienced by using Security Camera



Therefore, it can be concluded that, the respondents were highly satisfied with the functioning of the device, design and material of the device, comfortability, regularity and accuracy of the device, area coverage of the camera and its footage quality, response frequency of the Security Camera.

4.4.4. The extent of satisfaction experienced by the respondents regarding various aspects of Video Door Phone

Table-25 shows the respondent's extent of satisfaction experienced by the respondents regarding various aspects of Video Door Phone.

From the responses received from the respondents, it was observed that, all the respondents were satisfied with the functioning of the device, comfortability in using of device, responses received from the device, footage quality of the device, regularity in capturing the videos and material of the device with the weighted mean score 3.00. Majority (85.71%) of the respondents were also satisfied with the design of the device and the sound quality of Video Door Phone with weighted mean score 2.86.

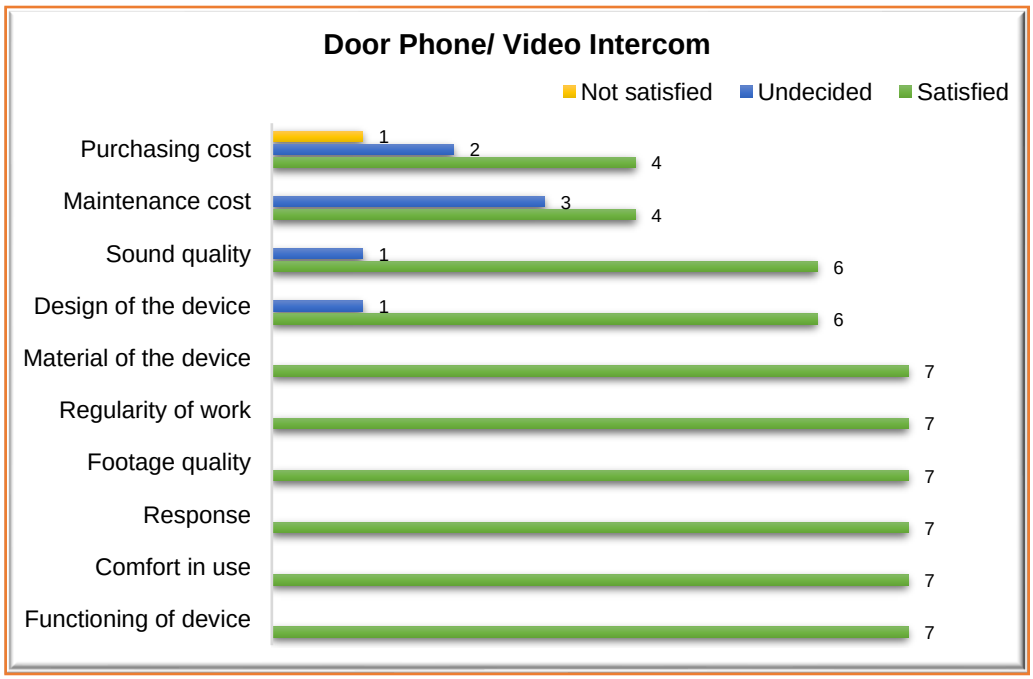
Similarly, more than half (57.14%) of the respondents were satisfied with the maintenance cost and purchasing cost of the devices with weighted mean score 2.57 and 2.43 respectively.

Table-25: Frequency and percentage distribution of the respondents according to the extent of satisfaction experienced by using Video Door Phone/ Video Intercom

Respondent (n=07)

Sr. No.	Aspects of Video Door Phone	Satisfied		Undecided		Not satisfied		Wt. Mean Score (1-3)
		f	%	*f*	%	*f*	%	
1	Functioning of device	7	100.00	0	0.00	0	0.00	3.00
2	Comfort in use	7	100.00	0	0.00	0	0.00	3.00
3	Response	7	100.00	0	0.00	0	0.00	3.00
4	Footage quality	7	100.00	0	0.00	0	0.00	3.00
5	Regularity of work	7	100.00	0	0.00	0	0.00	3.00
6	Material of device	7	100.00	0	0.00	0	0.00	3.00
7	Design of the device	6	85.71	1	14.29	0	0.00	2.86
8	Sound quality	6	85.71	1	14.29	0	0.00	2.86
9	Maintenance cost	4	57.14	3	42.86	0	0.00	2.57
10	Purchasing cost	4	57.14	2	28.57	1	14.29	2.43
						Total Weighted Mean		**2.87**

Figure-20: Distribution of respondents according to the extent of satisfaction experienced by using Video Door Phone



Therefore, it can be concluded that, respondents who had installed Video Phone were highly satisfied with the aspects device except its maintenance and purchasing cost.

4.4.5. The extent of satisfaction experienced by the respondents regarding various aspects of Smart Door Lock

Table-26 depicts the respondent's extent of satisfaction experienced by the respondents regarding various aspects of Smart Door Lock.

It was observed that, cent percent of the respondent (100%) were satisfied with the functioning, comfortability of using, accuracy, design and material of the Smart Door Lock with the weighted mean score 3.00. While nearly cent percent of the respondents (94.12) were satisfied with the frequency of responses received while using the device like biometric sensor and regularity in capturing the videos by the device with weighted mean score 2.88.

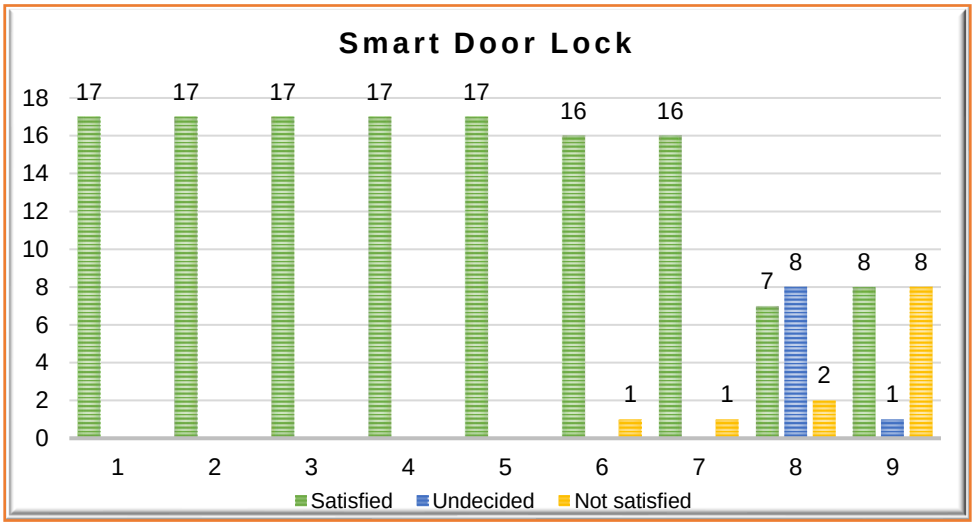
Whereas, less than half of the respondents were satisfied with the purchasing cost (47.06%) and maintenance cost of the device (41.18%) with the weighted mean score 2.00 and 2.29 respectively.

Table-26: Frequency and percentage distribution of the respondents according to the extent of satisfaction experienced by using Smart Door Lock or Biometric System

Respondent (n=17)

Sr. No.	Aspects of Smart Door Lock	Satisfied		Undecided		Not satisfied		Wt. Mean Score (1-3)
		f	%	*f*	%	*f*	%	
1	Functioning of device	17	100.00	0	0.00	0	0.00	3.00
2	Comfort in use	17	100.00	0	0.00	0	0.00	3.00
3	Accuracy of device	17	100.00	0	0.00	0	0.00	3.00
4	Design of the device	17	100.00	0	0.00	0	0.00	3.00
5	Material of the device	17	100.00	0	0.00	0	0.00	3.00
6	Response frequency	16	94.12	0	0.00	1	5.88	2.88
7	Regularity of work	16	94.12	0	0.00	1	5.88	2.88
8	Maintenance cost	7	41.18	8	47.06	2	11.76	2.29
9	Purchasing cost	8	47.06	1	5.88	8	47.06	2.00
Total Weighted Mean								**2.78**

Figure-21: Distribution of the respondents according to the extent of satisfaction experienced by using Smart Door Lock



Therefore, it can be concluded that, the respondents were highly satisfied about the functioning, comfortability, accuracy and regularity of work, response frequency, design and material of the Smart Door Lock.

4.4.6. The extent of satisfaction experienced by the respondents regarding various aspects of Medical Security Device (Panic Button)

Table-27: Frequency and percentage distribution of the respondents according to the extent of satisfaction experienced by using Medical Security Device

		Respondent (n=25)						
Sr. No.	**Aspects of Medical Security Device**	**Satisfied**		**Undecided**		**Not satisfied**		**Wt. Mean Score (1-3)**
		f	**%**	***f***	**%**	***f***	**%**	
1	Functioning of device	25	100.00	0	0.00	0	0.00	3.00
2	Design of the device	25	100.00	0	0.00	0	0.00	3.00
3	Size of the device	25	100.00	0	0.00	0	0.00	3.00
4	Accuracy of work	24	96.00	1	4.00	0	0.00	2.96
5	Comfort in use	24	96.00	1	4.00	0	0.00	2.96
6	Purchasing cost of the product	23	92.00	1	4.00	1	4.00	2.88
7	Maintenance cost	20	80.00	4	16.00	1	4.00	2.75
						Total Weighted Mean		**2.94**

Figure-22: Distribution of respondents according to extent of satisfaction experienced by using Medical Security Device

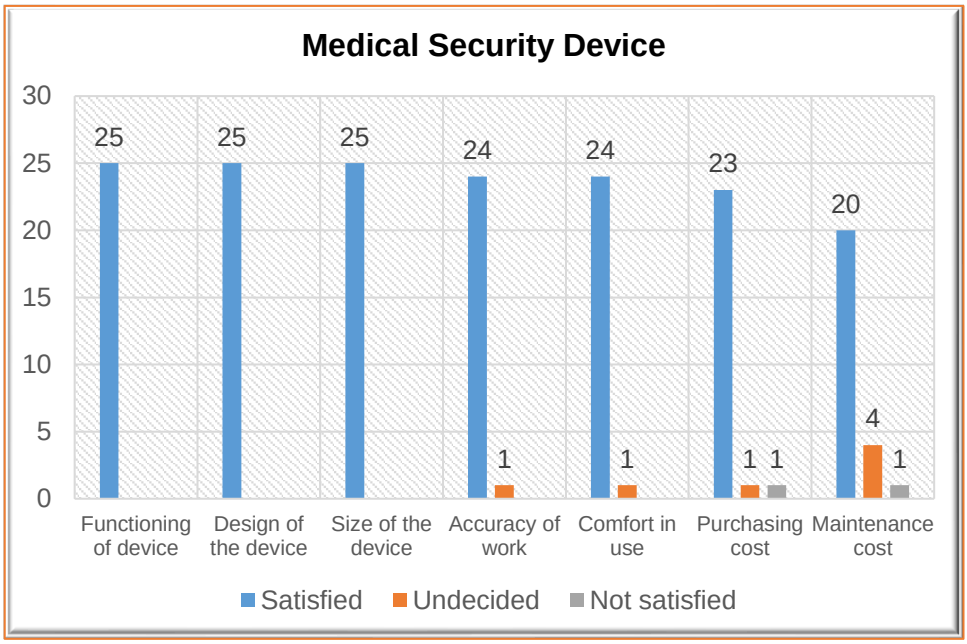


Table-27 gives a clear representation about the respondent's extent of satisfaction experienced by the respondents regarding various aspects of Medical Security System.

It was observed that, cent percent of the respondents were satisfied with the functioning of the device, design and size of the device i.e.; Panic button. Whereas, almost all the respondent were satisfied with the accuracy and comfortability of using the device (96%) with the weighted mean score 2.96. and purchasing cost of the devices (92%) with weighted mean score 2.88. While, more than three-fourth (80%) of the respondents were satisfied with the maintenance cost of the device with weighted mean score 2.75.

Therefore, it can be concluded that, all the respondents were highly satisfied with the various aspects of the Medical Security Device.

4.4.7. The extent of satisfaction experienced by the respondents regarding various aspects of Automatic Pill Dispenser

Table-28 depicts the respondent's extent of satisfaction regarding various aspects of Automatic Pill Dispenser. It can be seen that, all the respondents (100%) were satisfied with the functioning, comfortability of using, design and

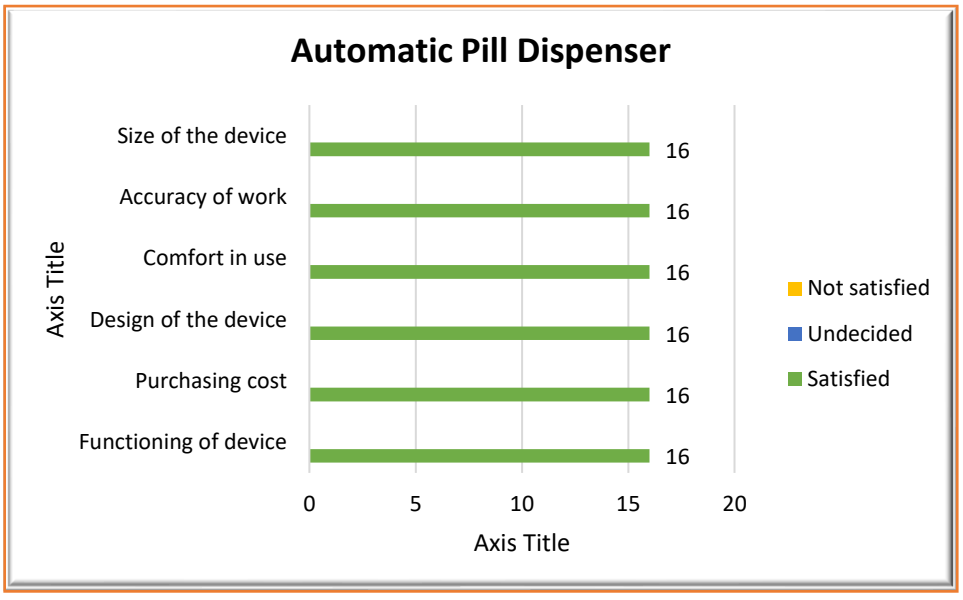
size, purchasing cost and accuracy of the Automatic Pill Dispenser with the weighted mean score 3.00.

Therefore, it can be concluded that, respondents were highly satisfied with all the aspects of the Automatic Pill Dispenser system.

Table-28: Frequency and percentage distribution of the respondents according to the extent of satisfaction experienced by using Automatic Pill Dispenser

		Respondent (n=16)						
Sr. No.	**Aspects of Automatic Pill Dispenser**	**Satisfied**		**Undecided**		**Not satisfied**		**Wt. Mean Score (1-3)**
		f	**%**	***f***	**%**	***f***	**%**	
1	Functioning of device	16	100.00	0	0.00	0	0.00	3.00
2	Purchasing cost	16	100.00	0	0.00	0	0.00	3.00
3	Design of the device	16	100.00	0	0.00	0	0.00	3.00
4	Comfort in use	16	100.00	0	0.00	0	0.00	3.00
5	Accuracy of work	16	100.00	0	0.00	0	0.00	3.00
6	Size of the device	16	100.00	0	0.00	0	0.00	3.00
Total Weighted Mean								**3.00**

Figure-23: Distribution of the respondents according to the extent of satisfaction experienced by the Elderly respondents by using Automatic Pill Dispenser



Respondent's overall Satisfaction Scale for Home Security Systems for Elderly

Least Satisfied	Moderately Satisfied	Highly Satisfied
1.00 – 1.59	1.60 – 2.59	2.60 – 3.00

Table-29: Overall Extent of Satisfaction experienced regarding Home Security Systems for Elderly by the respondents

Sr. No.	Home Security Systems for Elderly	Wt. Mean Score (1-3)
1	Motion Sensor Light	**2.62**
2	Burglar Alarm	**2.59**
3	Security Camera	**2.63**
4	Video Door Phone	**2.87**
5	Smart Door Lock	**2.78**
6	Medical Security Device	**2.94**
7	Automatic Pill Dispenser	**3.00**

The data in the table-29 depicts that, Automatic Pill Dispenser scored the highest on the respondent's satisfaction scale with the weighted mean 3.00. The second highest was the Medical Security Device with the weighted mean 2.94. The third highest was Video Door Phone with the weighted mean 2.87. The fourth highest was Smart Door Lock with the weighted mean 2.78 followed with Security Camera with the weighted mean 2.63 and Motion Sensor Lights with the weighted mean 2.62. Whereas, respondents were moderately satisfied with the Burglar Alarm System as it scored 2.59 on the respondent's satisfaction scale.

Conclusion

It can be concluded that, the respondents were highly satisfied with Automatic Pill Dispenser, Medical Security Device, Video Door Phone, Smart Door Lock, Security Camera and Motion Sensor Lights. Whereas, respondents were moderately satisfied with the Burglar Alarm System.

Regarding the extent of satisfaction for various aspects of Home Security Systems for Elderly, respondents were highly satisfied with the functioning aspect of the Motion Sensor Light and Security Camera. For the Burglar Alarm, the respondents were highly satisfied with the material and design aspects of the device. For the Video Door Phone, the respondents were highly satisfied with the functionality, comfortability during use, response frequency, quality of footage, regularity of work and material of the device. For the Smart Door Lock, the respondents were satisfied with the functioning, comfortability, accuracy, design and material of the device. For the Medical Security System, the respondents were satisfied with the functionality, design and size aspect of the device. Besides that, for the Automatic Pill Dispenser, the respondents were highly satisfied with all the aspects of the device.

4.5. Section V: Testing of Hypothesis

The present section covers in detail the statistical analysis of hypothesis for the present study. The relational statistic applied to test the hypotheses was “Analysis of Variance”.

Analysis of Variance was computed to show the variation between the extent of utilization of Home Security Systems for Elderly with the selected personal variables (Age, Occupation and Family Monthly Income) and situational variables (Living Arrangement of the Elderly) of the respondents selected from the districts of Upper Assam.

HO_1: There exists no relationship between the extent of utilization of Home Security Systems for Elderly with the selected personal variables (Age, Occupation and Family Monthly Income) and situational variable (Living Arrangement) of the respondents selected from the districts of Upper Assam

Table-30: Analysis of Variance for selected personal and situational variable with the extent of utilization of Home Security Systems for Elderly by the respondents

Independent Variables	Sum of Square	df	Mean Square	F-ratio	Level of Significance
Age					
Between Groups	.467	2	0.233	0.072	**N.S.***
Within Groups	381.500	117	3.261		
Total	381.967	119			
Occupation					
Between Groups	1.618	2	0.809	0.249	**N.S.***
Within Groups	380.349	117	3.251		
Total	381.967	119			

Family Monthly Income					
Between Groups	41.649	2	20.824	7.159	**0.01****
Within Groups	340.318	117	2.909		
Total	381.967	119			
Living Arrangement					
Between Groups	28.920	5	5.784	1.868	**N.S.***
Within Groups	353.047	114	3.097		
Total	381.967	119			

* ***N.S.= Not Significant*** ****Level of Significance = 0.01 level**

df: Degree of Freedom

The findings of the table-30 clearly depict that, the computed F-ratio for selected personal variables “Age and Occupation” and situational variable “Living Arrangement” of the Elderly were found not to be significant with the extent of utilization of Home Security Systems for Elderly by the respondents. However, the selected personal variable “Family Monthly Income” was found to be significant - at 0.01 level with the extent of utilization of Home Security Systems for Elderly by the respondents from the selected districts of Upper Assam as the F calculated was higher than F tabulated ($F_c > F_t$ at 0.01 level). Thus, the null hypothesis HO_1 was partially accepted.

Therefore, it can be concluded that, the extent of utilization of Home Security Systems for Elderly does not vary with the personal variable “Age, Occupation” and situational variable “Living Arrangement” of the respondents. However, significant difference was found in the extent of utilization of Home Security Systems for Elderly with the personal variable “Family Monthly Income” of the respondents.

4.6. Section VI: Proposed working drawings with cost estimation of a respondent's house according to the needs and requirements for house specification and Home Security Systems for Elderly

The present section deals with the working drawing of one of the respondent's house and its implementation. In order to present this section in a more reasonable manner it has been divided into three phases described as follows:

Phase I: Assessment of residential space provided for designing house and identification of needs and requirements of the Client for installation of Home Security Systems for Elderly.

Phase II: Development of designs.

Phase III: Cost estimation of electrical plan and Home Security Systems for Elderly to be installed in selected design and its implementation.

Phase I: Assessment of residential space provided for designing house and identification of needs and requirements of the Client for installation of Home Security Systems for Elderly.

This phase comprises detailed information about the space provided by the client for designing their residence and their needs and requirements regarding installation of the Home Security Systems for Elderly at their residence.

Client's Profile:

1. **Name of the client:** Mr. Atul Prosad Acharyya
2. **Occupation:** Un-employed
3. **Location:** Jorhat, Assam
4. **Age:** 91 years
5. **Living arrangements:** Lives with daughter, son-in-law and grandchildren
6. **Family Monthly Income:** ₹ 80,000 (approx.)
7. **Health Related Problems:** None

Brief description regarding client's needs and requirements for the house specification and installation of Home Security Systems for Elderly:

The client and the family members wanted to construct a house which has all their comfort, safety, and security inside it and also can fulfill their needs. For that purpose, they had provided a plot of 3800 Sq. Ft. area. The shape of the plot was rectangular (66'-5"x57'-3") and the entry to the plot was from the East direction.

Details of house specification according to the Client's needs and requirements

- **Physical structure of the house**: The Client and the family member required a Detached House of 2000 Sq. Ft. area with four bedrooms i.e.; one Bedroom with attached Bathroom for the client himself who was an

elderly member, one Master Bedroom with attached Bathroom for daughter and son-in-law, one Bedroom for grandchildren and one Guest Room. Along with that, a Living area, Dining area, Kitchen area, and one small balcony was required. The client wanted to install false ceiling in all the room and wanted to use contemporary lighting fixtures for decorative purpose of the house.

- **Foyer area:** Client needed a Foyer area with pleasing appearance and automatic door locking system for the main entrance door so that user can easily lock and unlock the door with their fingerprint or password.
- **Living Room:** Client wanted a spacious and aesthetically pleasant Living Room, as the family mostly spent the family time in this room. Client needed a sofa unit and a TV unit for the living room. Family wanted to install a Security Camera for monitoring the area because the elderly member mostly prefers to sit in this room when other members were going out of the house.
- **Dining Room:** In Dining Room, the family only required a six-sitter dining table unit and one cabinet near it for storing of cutleries.
- **Kitchen:** The client and the family member needed a spacious and well-lighted kitchen with enough storage area for utensils on it. Family wanted to install a Motion Sensor Light in the kitchen area to avoid accidents due to darkness at night.
- **Master Bedroom:** The client wanted a well-organized Master Bedroom for Daughter and Son-in-law. Client needed an attached Bathroom, a king-size bed, a TV unit, and a wardrobe in the master bedroom.
- **Bedroom for Elderly:** The client needed a large bedroom with an attached Bathroom by considering safety and security aspects of the elderly user. The family wanted to monitor the Elderly's movement when other members were not at home, as the age of the elderly person was above 90 years, and the family was more cautious about the health of the elderly. Client also wanted to install Motion Sensor Lights in the Bedroom and also in the Bathroom to minimize the fear of falling because of darkness during the night.

- **Children's Room:** The client wanted a children room comprised of queen-size bed, a study table with chair and a wardrobe for the storage of clothes for the grandchild.
- **Guest Room:** The family wanted a separate Guest Room with a bed and a wardrobe in it.
- **Balcony:** The family wanted a small Balcony on the roadside direction i.e.; the South or West direction of the house where the family can sit for recreation and enjoy the roadside view during the morning and evening hours.
- **Common Toilet:** Along with that, the client needed a Common Toilet or Powder Toilet for everyone's use near the Living or Dining area.
- **Outside the building:** The client wanted a Parking Area in front yard of the house. The family wanted to install a Video Door Phone at the entrance area of the house and a Smart Door Lock at the entrance door to increase security at the entry point of the residence. The family also wanted to install Security Cameras in all directions of the house to monitor the surrounding remotely.

Cost limitations for Electrical works: Below 5 lakhs rupees.

Other limitations: Because of the declination of age, the client (elderly member of the house) always felt difficulties in opening the doors with keys; if any sound heard outside the house when the other members were not at home, it is difficult for the elderly to go outside and wonder what is going on there. Therefore, the family member wanted to install the Home Security Systems for Elderly at their residence to monitor the house, to get assistance in their daily life, and also to monitor the movement of the elderly in the house.

Time of allocation of the project: September, 2020

Expected completion date of the project: April, 2021

Phase II: Design development

For selection purpose of the physical structure for the residence, three option of floor plan were provided to the client described as follows;

(A) Proposed Floor Plan of the residence

The Floor plan of the residence consists of placements of the rooms, door, and window of the house. Between the boundary wall and the building, 6’ of distance was kept on the three sides of the building while 15’ of distance was kept on the entry side by providing adequate space for car parking in front of the house.

According to the needs and requirements of the client and the family members and various observations gathered from the studies came across during the review of literature, three option of house plan were proposed.

The area of the space provided for designing the residence was **3,800 Sq. Ft.**

Floor plan of the house option-1: Proposed build-up area of the house was 2021 Sq. Ft.**,** entrance for the house was given from the East direction and a car parking area was provided near the Verandah of the house. Floor plan of the house comprised of one large Verandah (17’-6”x5’), one Living cum Dining Room (29’x15’-6’), one Kitchen (11’-1”x13’), one Master Bedroom (15’x14’) with an attached Bathroom (7’x11’) and one Dressing area (7’-6”x6’-6”), one Bedroom for the Elderly (16’-6”x11’-6”) with attached Bathroom (7’-6”x7’6”), one Children Room (16’x12’-6”), one Guest Room (10’-6”x12’-6”) with attached Bathroom (4’-6”x8’-6”) and one Common Bathroom (8’-6”x7’-6”). (figure-24)

Floor plan of the house option-2: Proposed build-up area of the house was 2064 Sq. Ft. and entrance for the house was given from the East direction and a car parking area was provided near the entrance of the house. The Floor plan of the house comprised of one Foyer Area (12’x5’), one Living Room (17’-5”x27’), one Dining Room (12’x15’), one Kitchen (11’-1”x15’-10”), one Master Bedroom (12’-11”x12’-10”) with attached Bathroom (12’-11”x4’-6”), one room for the Elderly (12’-7”x13’-6”) with attached Bathroom (5’x8’-10”), one Children Room (12’-5”x13’-6”) with attached Bathroom (5’-11”x8’-3”),

one Guest Room (12’-6”x13’), one Common Toilet (6’x8’-3”) and a Balcony (16’-11”x4’-3”) in the South direction. (figure-25)

Floor plan of the house option-3: Proposed build-up area of the house was 2055 Sq. Ft. and entrance for the house was given from the East direction and a car parking area was provided near the entrance of the house. Floor plan of the house comprised of one Foyer Area (12’-11”x4’), one Living Room (17’-5”x26’), one Dining Room (12’x6’-3”), one Powder Toilet (12’x4’) one Kitchen (11’-5”x15’-10”), one Master Bedroom (12’-11”x14’-9”) with attached Bathroom (8’x5’-8”), one room for the Elderly (12’-7”x11’-10”) with attached Bathroom (5’x7’), one Children Room (12’-4”x14’-10”) with attached Bathroom (7’x4’-11”), one Guest Room (12’-6”x10’-10”), one Common Toilet (4’x8’-5”) and a Balcony (10’-5”x4’-5”) in the South direction. (figure-26)

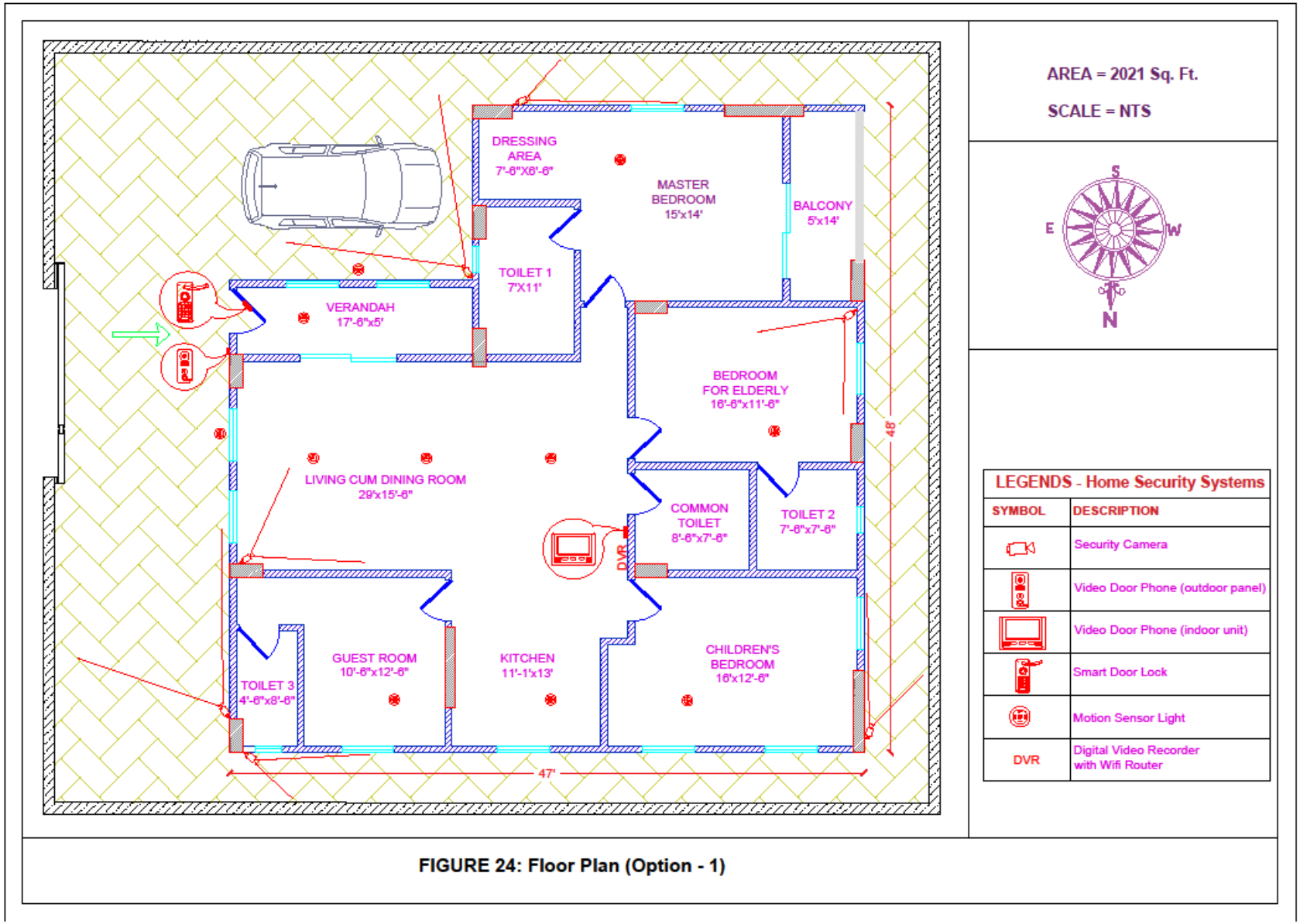


FIGURE 24: Floor Plan (Option - 1)

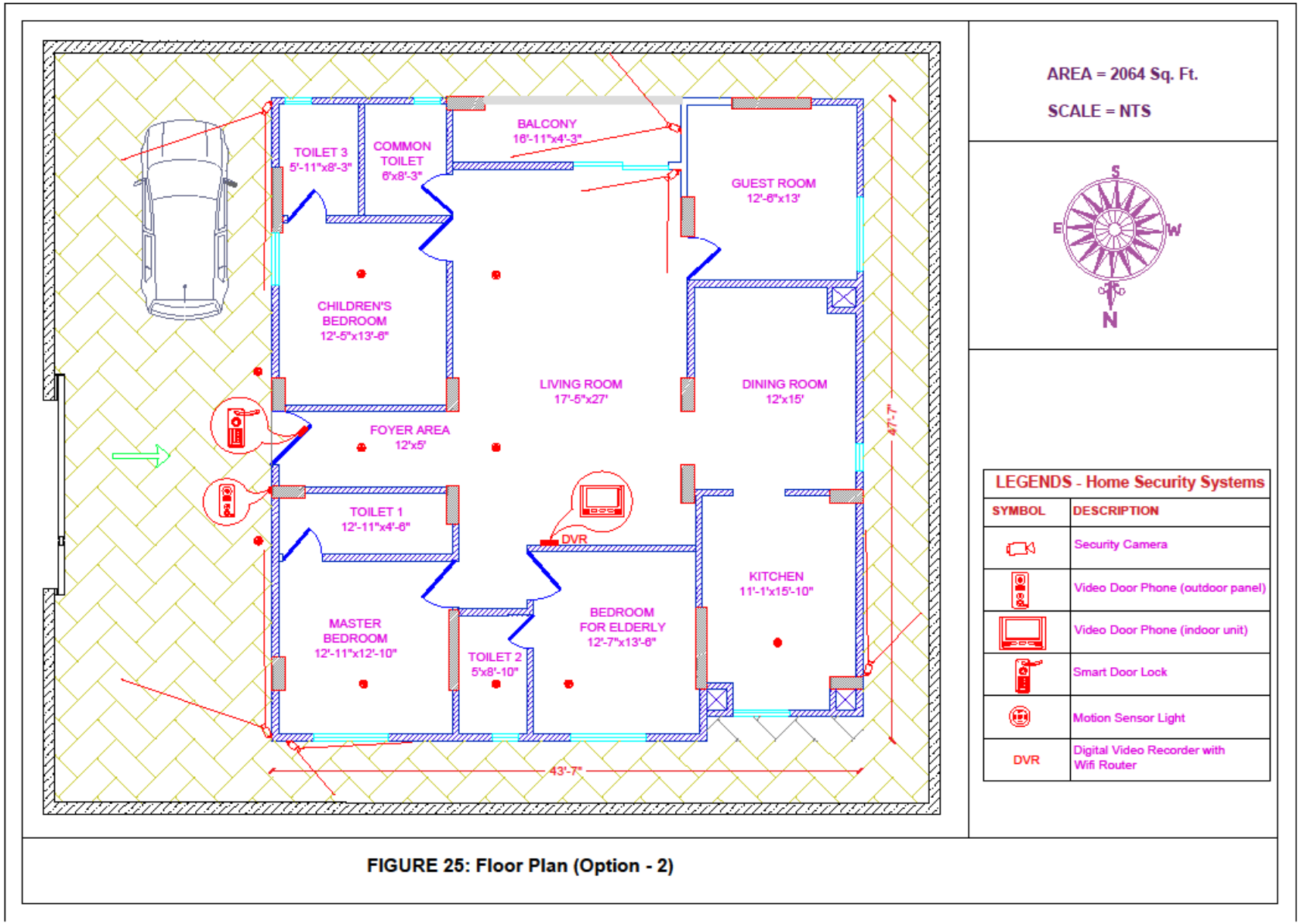
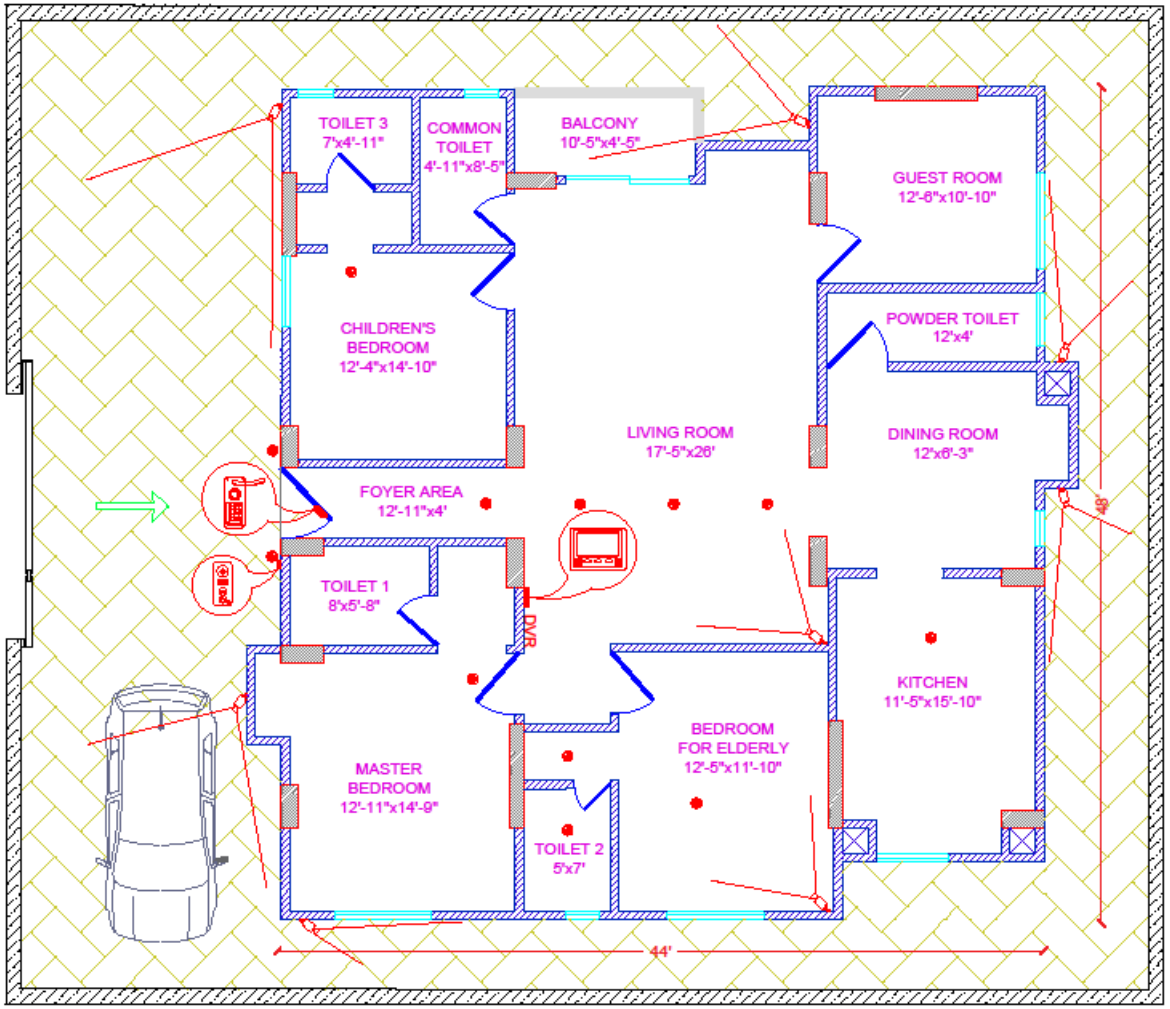
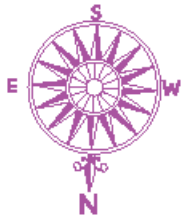


FIGURE 25: Floor Plan (Option - 2)



AREA = 2055 Sq. Ft.

SCALE = NTS



LEGENDS - Home Security Systems	
SYMBOL	DESCRIPTION
	Security Camera
	Video Door Phone (outdoor panel)
	Video Door Phone (indoor unit)
	Smart Door Lock
	Motion Sensor Light
DVR	Digital Video Recorder with Wifi Router

FIGURE 26: Floor Plan (Option - 3)

(B) Dimensions and layouts of Selected Design

Amongst the proposed three alternative house plan, option 3 was selected by the clients for designing the physical structure of the residence. The dimensions of the various spaces, electrical fixtures and Home Security Systems for Elderly installation points as required by the client proposed in the design are described as follows: - (table-31)

The built-up area of the selected design (Option-3) was **2055 Sq. Ft.**

Table- 31: Dimension of Rooms of the selected design

Sr. No.	Room	Dimension	Used electrical fixture	Used Home Security Systems for Elderly
1	Foyer Area	12’-11” x 4’	1 Ambient light	1 Motion Sensor Light Video Door Phone Smart Door Lock
2	Living Room	17’-5” x 26’	12 Ambient lights 1 Ceiling fan 1 AC	1 Security Camera 3 Motion Sensor Light
3	Dining Room	12’ x 6’-3”	4 Ambient lights 5 Focus lights	-
4	Kitchen	11’-5” x 15’-10”	7 Ambient lights	1 Motion Sensor Light
5	Master Bedroom	12’-11” x 14’-9”	3 Ambient lights 5 Focus lights 1 Ceiling fan 1 AC	1 Motion Sensor Light
6	Toilet 1	8’ x 5’-8”	2 Ambient lights	-
7	Bedroom for Elderly	12’-5” x 11’-10”	4 Ambient lights 3 Focus lights 1 Ceiling fan 1 AC	2 Motion Sensor Light 1 Security Camera
8	Toilet 2	5’ x 7’	1 Ambient light	1 Motion Sensor Light

9	Children's Room	12'-4" x 14'-10"	5 Ambient lights 2 Focus lights 1 Ceiling fan 1 AC	1 Motion Sensor Light
10	Toilet 3	7' x 4'-11"	2 Ambient lights	-
11	Common Toilet	4'-11" x 8'-5"	2 Ambient lights	-
12	Guest Room	12'-6" x 10'-10"	5 Ambient lights 2 Focus lights 1 Ceiling fan 1 AC	-
13	Powder Toilet	12' x 4'	2 Ambient lights	-
14	Balcony	10'-5" x 4'-5"	1 Ambient light 1 Ceiling fan	-

For implementation of the house plan, a working drawing of the house was prepared (figure-27) by providing all the dimensions of the room and furniture layout of the house based on clients' needs and requirements (figure-28). Furniture is a major component in a house, it completes the interior of a building. While planning Home Security Systems for Elderly in a house, furniture arrangement must be needed for proper placement of the devices.

Along with that, the false ceiling layout was prepared for the house and the ceiling height of the house was kept 9'-4" and 9'-8". False ceiling drop was kept 8" and 4" below the slab level to accommodate all the lighting fixtures and connection of all the Home Security Systems for Elderly (figure-29).

Electrical layout of the house by placing the electrical items in the house like ceiling fans, air conditioner (AC), lighting fixtures, switch boards, etc with all the electrical wirings was prepared (figure-30).

Again, a separate electrical layout was prepared by placing all the required Home Security Systems for Elderly for the client's house (figure-31).

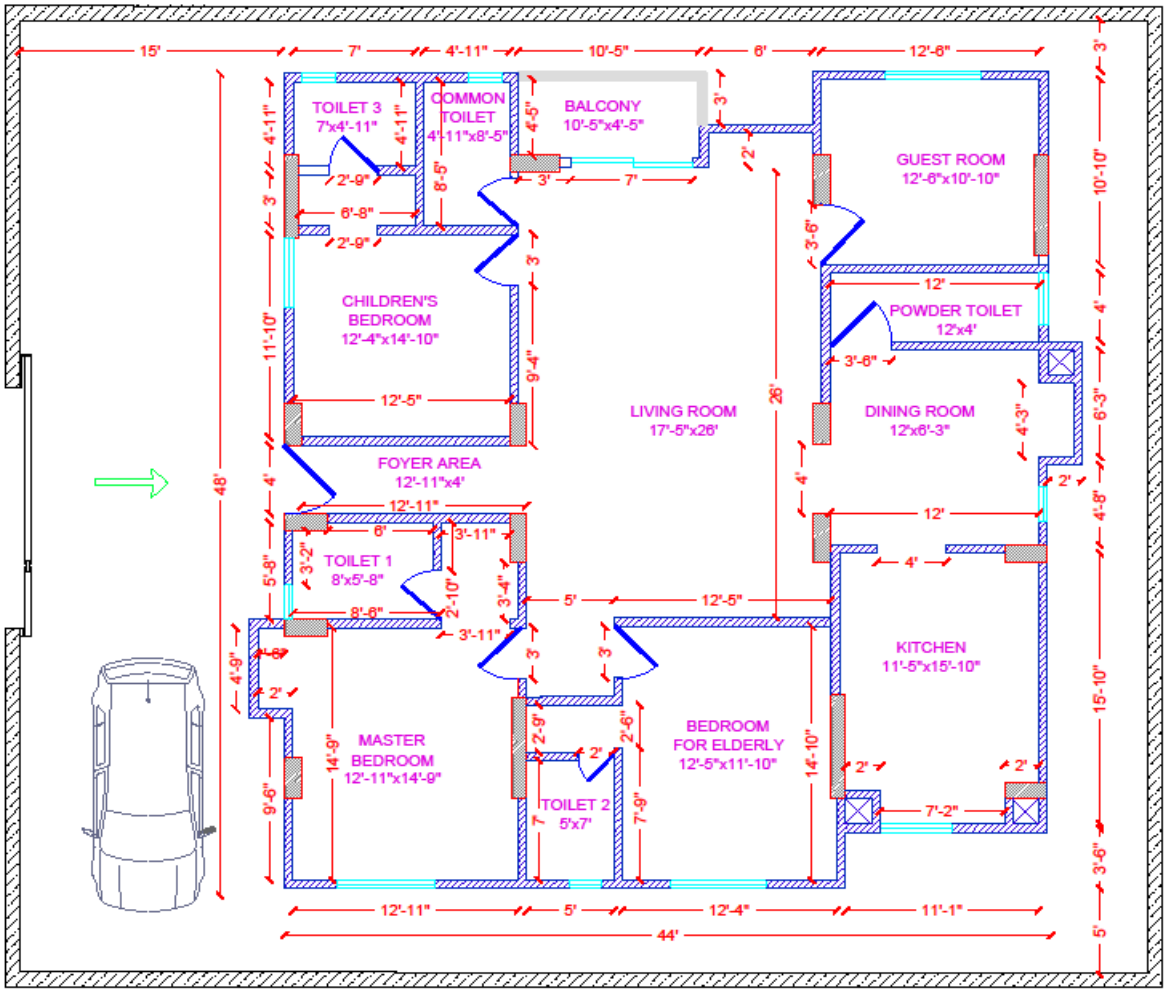


FIGURE 27: Selected house plan with dimension

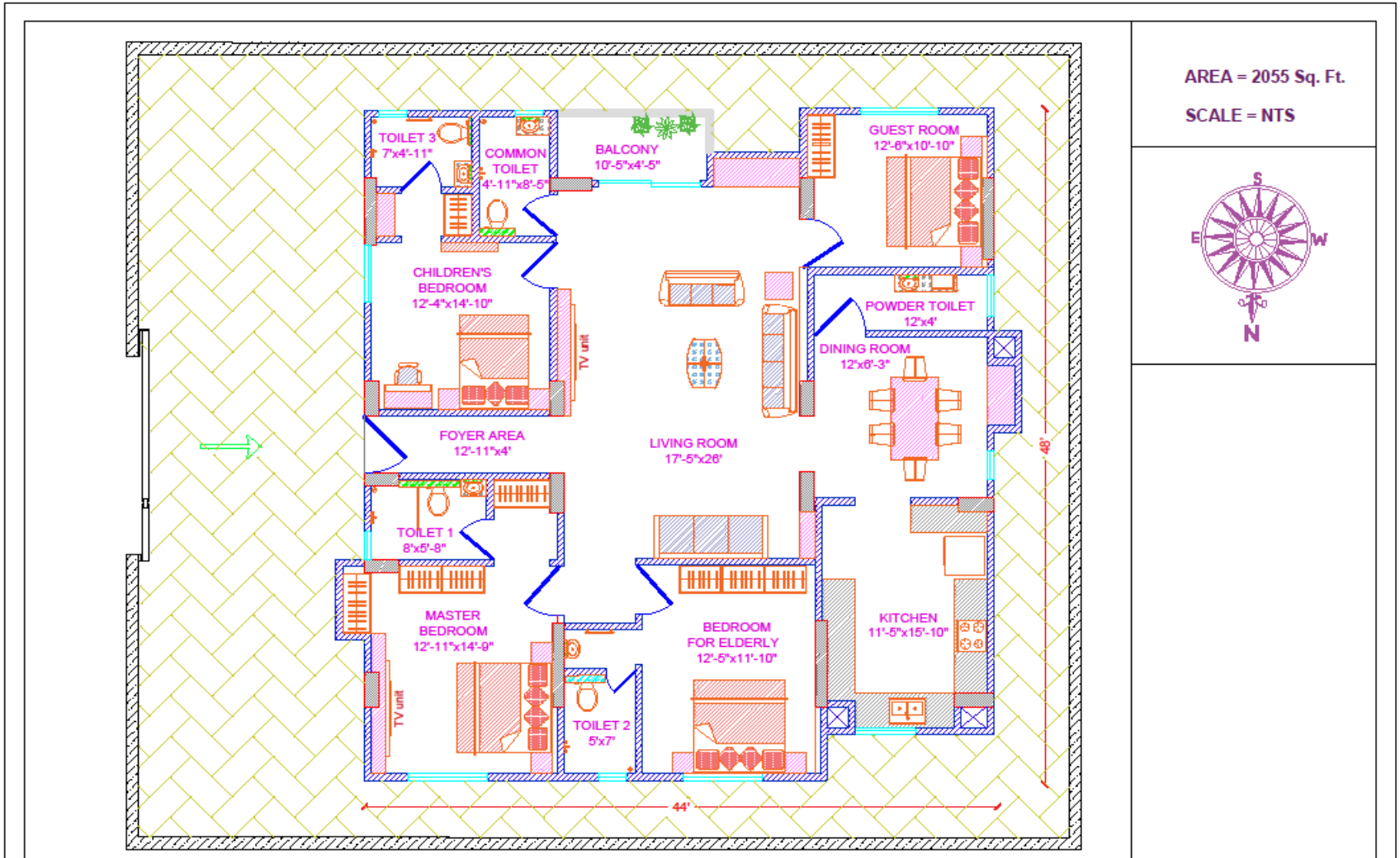
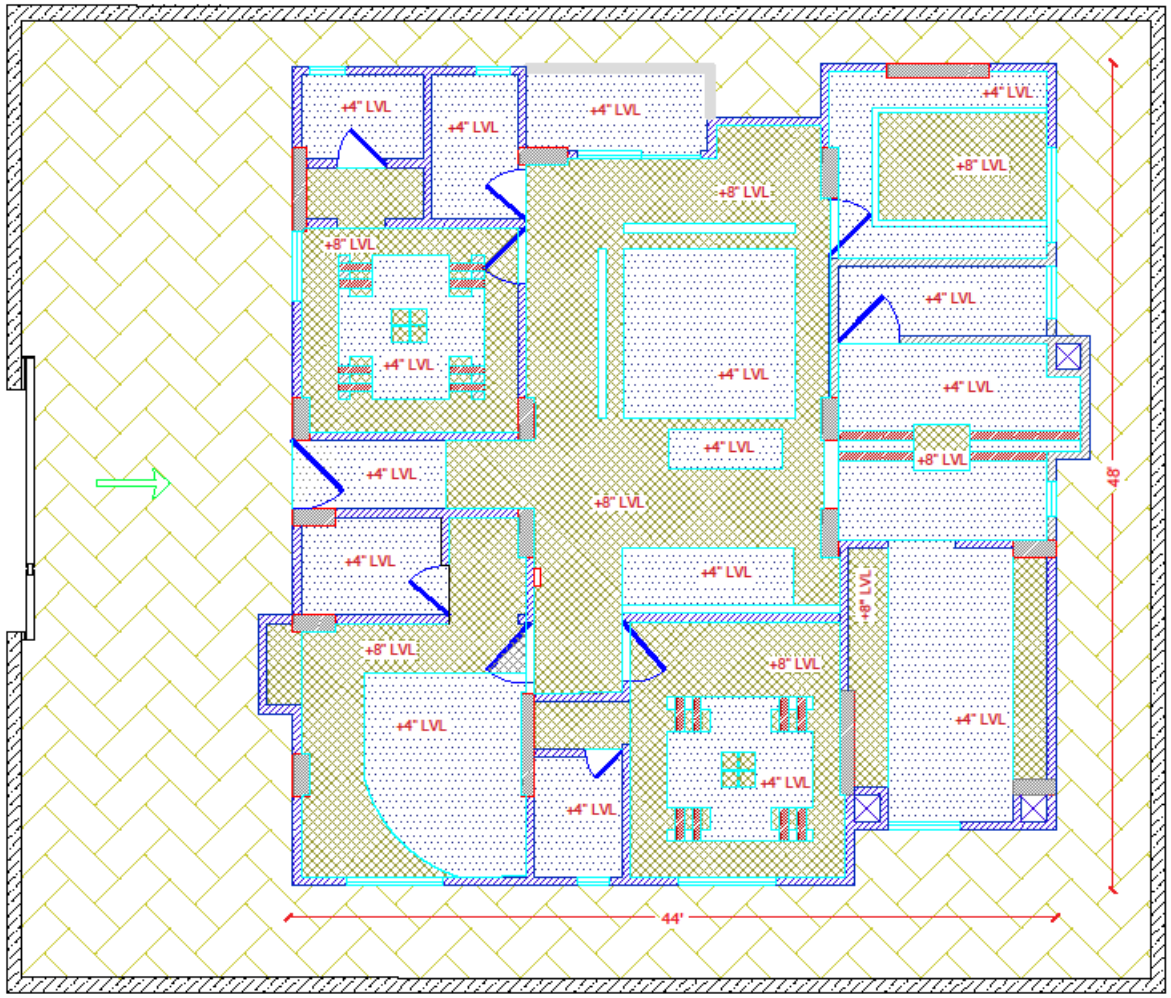
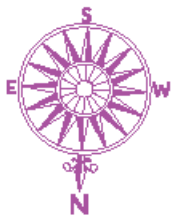


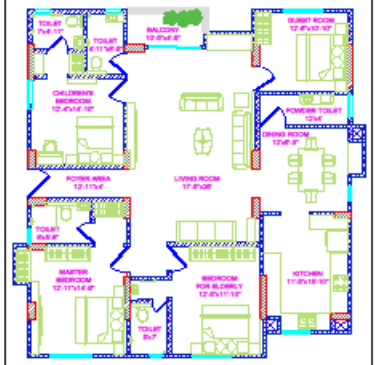
FIGURE 28: Furniture layout of the house



AREA = 2055 Sq. Ft.

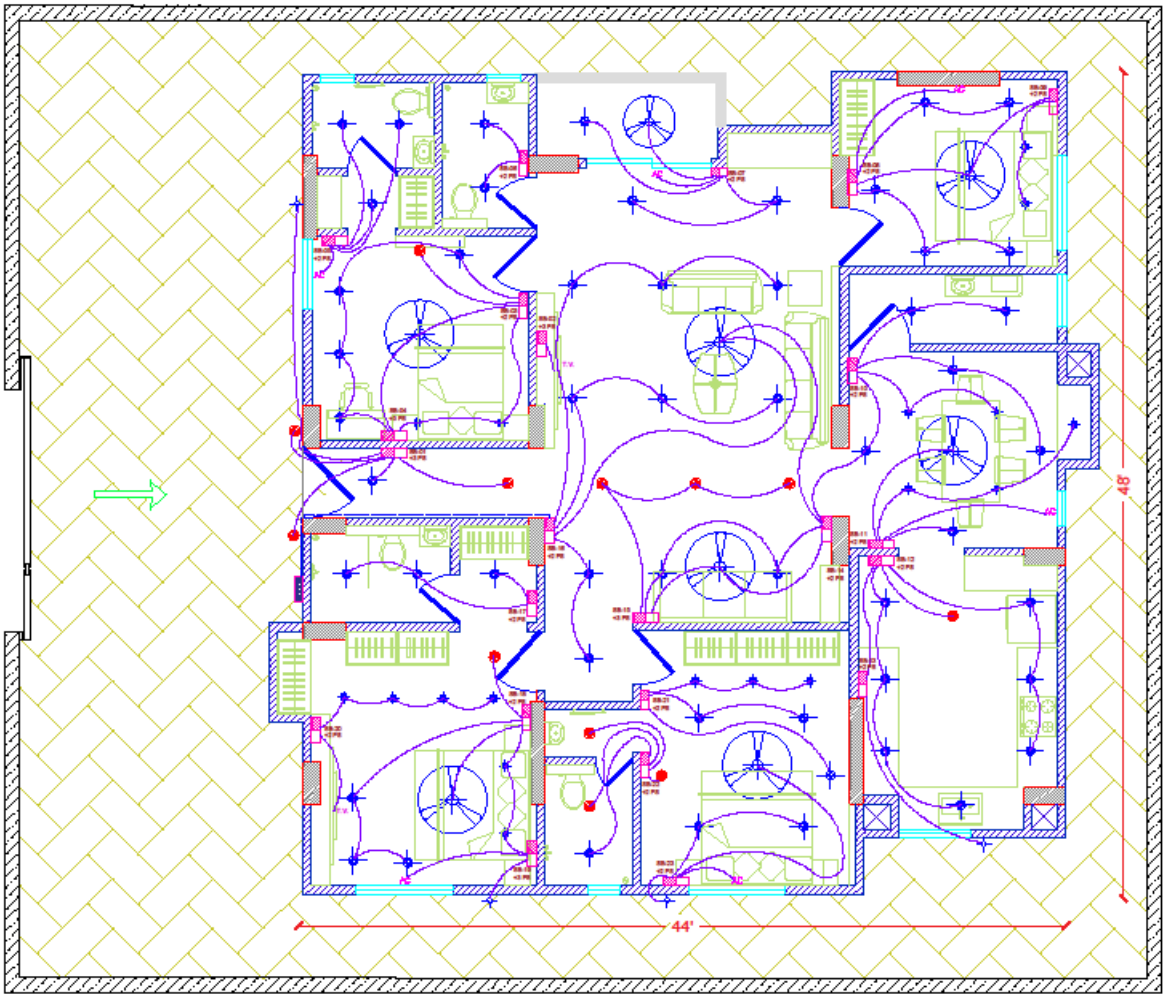
SCALE = NTS





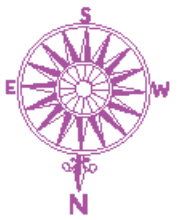
KEY PLAN OF THE HOUSE

FIGURE 29: Proposed false ceiling layout of the house



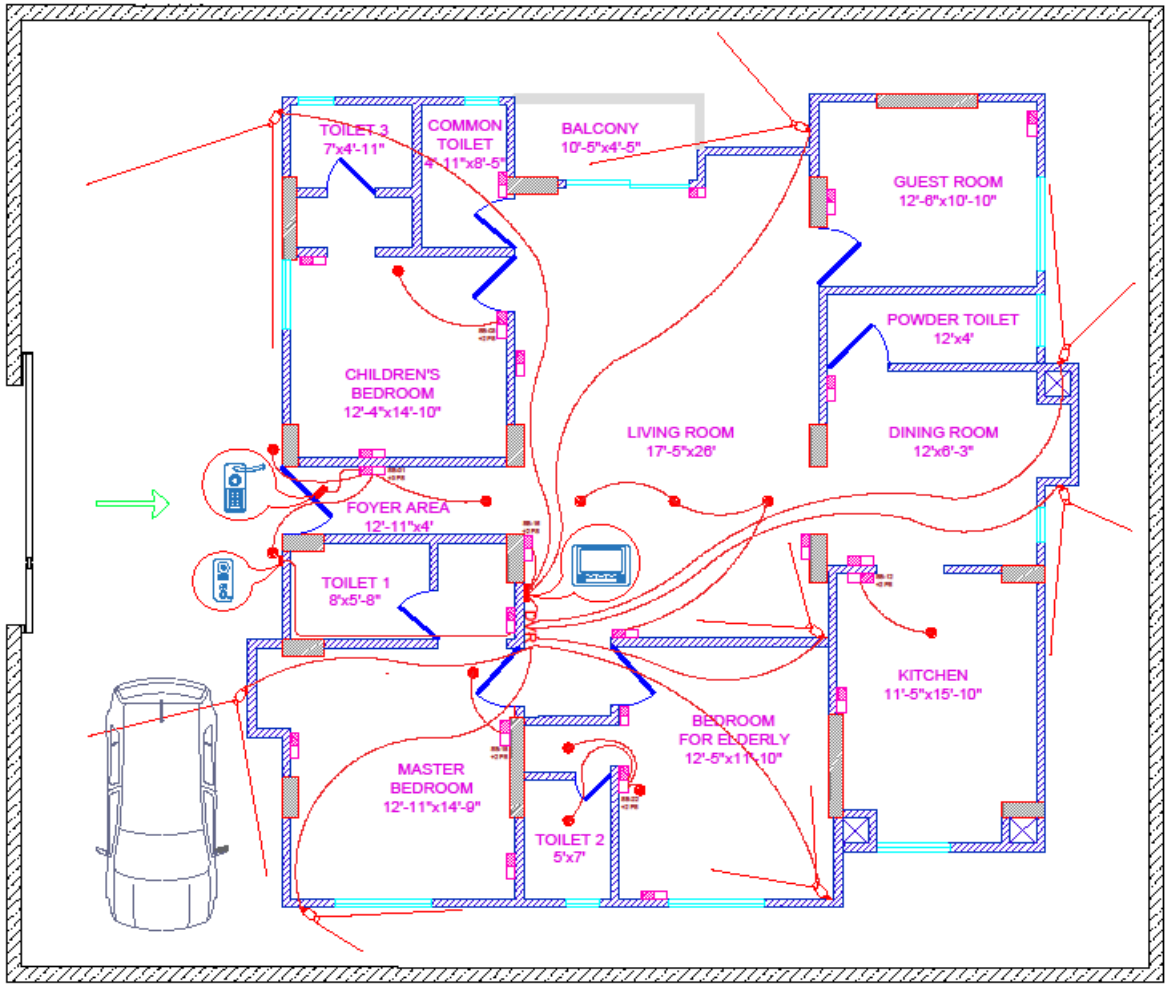
AREA = 2055 Sq. Ft.

SCALE = NTS



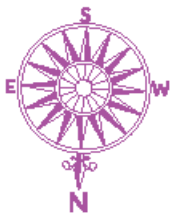
LEGENDS - Electrical	
SYMBOL	DESCRIPTION
	Ambient light
	Focus light
	Motion Sensor Light
	Ceiling Fan
	Switch board
AC	Air Conditioner
	Main switch
	Wall mounted light

FIGURE 30: Proposed electrical layout of the house



AREA = 2055 Sq. Ft.

SCALE = NTS



LEGENDS - Home Security Systems	
SYMBOL	DESCRIPTION
	Security Camera
	Video Door Phone (outdoor panel)
	Video Door Phone (indoor unit)
	Smart Door Lock
	Motion Sensor Light
DVR	Digital Video Recorder with Wifi Router

FIGURE 31: Proposed layout of House with Installation of Security Camera, Video Door Phone, Smart Door Lock and Motion Sensor Lights

(C) Proposed furniture, electrical fixtures and Home Security Systems for Elderly for the client's House:

By keeping in mind, the needs and requirements of the client and the family member, the furniture, electrical fixtures, and a set of Home Security Systems for Elderly were proposed to be installed in the house.

- **Outside the House:** In front of the house, an open area of 15 feet wide was provided where the family can park the car. To increase the security of the house, six numbers of Security Camera were proposed to mount on the outdoor wall at a height of 7 feet 6 inches from the ground level. Two Security Cameras at the entrance by focusing the Entrance area and Parking area, one camera in the South direction covering the Balcony area, one camera in the North direction by covering the windows of Master Bedroom and the room for the Elderly and two numbers of cameras were suggested to place at the backside of the house for monitoring the open backyard of the house. Along with that, two Motion Sensor Lights were proposed at the Entrance area which can automatically turn on and light up the area when any motion is detected near it. For illuminating the outdoor area of the house, in the North direction three wall mounted lighting fixtures were proposed and in front of the house along with the Motion Sensor Lights, a wall mounted led light was proposed to be installed. No lighting fixtures were proposed in the south and west directions of the house as there were roads and sufficient illumination was there from the street lights.
- **Foyer area:** In Foyer area of the house, one ambient lighting fixture and a Motion Sensor Light was proposed so that when someone entered the house during the dark, it gets easy to enter the house without searching for the switch board for light up the area. In the main entrance door, a Smart Door Lock of brand Valencia was proposed for security purpose of the house so that no one can easily entered to the house without the registered password or fingerprint and also it can help the user with keyless hassle-free entry to the house. Again, a set of Video Door Phone of Godrej brand was proposed for the house which consists of two units;

one outdoor panel and one indoor monitor. The outdoor panel, which was equipped with a camera (80^0 area coverage) and a microphone was proposed to place near the Entrance Door at a height of 5 feet from the ground and the indoor unit which was equipped with a receiver and a monitor was proposed to be installed in the Living Room near the DVR at a height of 4 feet 7 inch from the ground.

- **Living Room:** In Living Room, two numbers of three sitter sofa, a four-sitter sofa unit, one small side table, a center table and a TV unit for installing 52-inch TV was proposed. As the family wanted this area to be aesthetically pleasing and well lighted, twelve numbers of ambient lighting fixtures and four Motion Sensor Lights were proposed to be installed in the false ceiling. Two ceiling fan and one AC unit was also proposed for proper air circulation within the Living Room area. While, one Security Camera was proposed in the Living Room for monitoring the area where the elderly member mostly spends the time in the house. The Digital Video Recorder (DVR) unit and a Wi-Fi Router was proposed to install in the Living Area near the client's Bedroom at a height of 4 feet 7 inch from the floor level. DVR connects all the Security Cameras installed in the house and receives all the recording done by the Security Camera and it was connected to a Wi-Fi router so that users can easily assess the video footage through their mobile phone or laptop via the internet.
- **Dining Room:** In Dining Room, a six-sitter dining table set and a cabinet were proposed. To light up that area, four ambient lights and five focus lights were proposed to be installed on the false ceiling. A ceiling fan and one AC unit were also proposed for proper air circulation within the room. Near the Dining Room, a Powder Toilet including a washbasin unit was proposed.
- **Kitchen:** As the family needed a spacious and well lighted Kitchen, for that purpose seven numbers of ambient lights and a Motion Sensor Light was proposed in the Kitchen.
- **Master Bedroom:** In the Master Bedroom, a king-size bed, a TV unit and three wardrobes were proposed. For proper lighting within the room, six focus lights, two numbers of ambient lights, and a Motion Sensor Light

were proposed. For air circulation inside the room, an AC unit and a ceiling fan were suggested to be installed. Along with that, an attached Bathroom was also proposed to construct near the Master Bedroom.

- **Bedroom for Elderly:** As the client needed a large bedroom to spend his time with all comfort and security, a bedroom of size 12'-5" x 11'-10" was proposed for him and it included a king-size bed and a large wardrobe. In the elderly's room, a Security Camera, three focus lights, four ambient lights, one ceiling fan, one AC unit and two numbers of Motion Sensor Lights were also proposed. An attached Bathroom was planned near the room so that the elderly can use this bathroom independently and, in the Bathroom, ambient light and a Motion Sensor Light were proposed to minimize the fear of falling because of darkness during the night.
- **Children's Room:** In the Children's Room; a queen size bed, a study table with chair and a wardrobe were proposed. For light up the area, four ambient lights, two focus lights and a Motion Sensor Light were proposed to be installed on the false ceiling and a ceiling fan and an AC unit were also proposed there for proper air circulation within the room. An attached bathroom was included near the Children's Room with a WC unit, a wash basin and the wash area in it.
- **Guest Room:** In the Guest Room, a king-size bed and a wardrobe were proposed where the family can accommodate their guest. In that room, five numbers of ambient lights and two focus lights were suggested to be installed on the false ceiling of the room and for the air circulation within the room, an AC unit and a ceiling fan were suggested to be installed.
- **Balcony:** As the family wanted a small Balcony in the roadside direction, therefore a small balcony was proposed in the South direction of the residence where the family can sit and enjoy the roadside view. In that area, an ambient light and a ceiling fan was proposed to be installed.

Medical Security Systems and Automatic Pill Dispenser were not proposed to the client as the client had no any Health-Related Problems.

Phase III: Cost estimation of electrical plan and Home Security Systems for Elderly to be installed in selected design and its implementation.

This phase comprises details information regarding the computed cost estimation of electrical works and installed Home Security Systems for Elderly for the selected house plan.

In the successful planning and implementation of any project, cost estimation plays an important role. Therefore, cost estimation was prepared considering the market price of different Home Security Systems for Elderly and labour cost for installation of the devices. The cost estimation for installation of Home Security Systems for Elderly was done according to the rates prevailing in the market as of **August, 2020**. The details cost estimation of proposed electrical products and their accessories (table no-32) and cost of individual Home Security Systems for Elderly (table no-33) for the selected house are given in the following tables;

Table-32: Cost estimation of proposed electrical fittings, fixtures and accessories

Sr. No.	Product	Company	Quantity	Per unit cost (in ₹)	Total price (in ₹)
1	Electrical meter and meter box (9 kw)	Larsen & Toubro	1	7,000	7,000
2	MCB box	Havells	1	2,100	2,100
3	MCB	Havells	10	150	1,500
4	Switch board (4 module)	Havells	10	50	500
5	Switch board (6 module)	Havells	13	70	910
6	Switch	Havells	138	30	4,140
7	Two-way switch	Havells	7	90	630
8	Switch (16 amp)	Havells	15	106	1,590
9	Socket (16amp)	Havells	15	210	3,150

10	Socket (6 amp)	Havells	35	110	3,850
11	Focus light (8 w)	Phillips	17	250	4,250
12	Ambient light (8 w)	Victor	51	300	15,300
13	Foot lamp	Phillips	4	350	1,400
14	Air conditioner (1.5 ton)	Samsung	6	35,000	2,10,000
15	Ceiling Fan	Atomberg	8	4,500	36,000
16	Wire (2.5 mm)	Finolex	4 coils (360 m)	1,950	7,800
17	Wire (4 mm)	Finolex	1 coil (90 m)	2,800	2,800
18	Wire (1.5 mm)	Finolex	3 coils (270 m)	1,200	3,600
19	Wire for earthing (1 mm)	Finolex	5 coils (450 m)	830	4,150
20	Wall mounted exterior light	Philips	4	380	1,520
21	Miscellaneous				15,000
TOTAL COST					**₹ 3,27,190**

Table- 33: Cost estimation of proposed Home Security Systems for Elderly to the client

Sr. No.	Home Security Systems for Elderly	Company	Quantity	Per unit cost (in ₹)	Total price (in ₹)
1	Security Camera with DVR and cables	CP PLUS	Set of 8 camera	18,800	18,800
2	Router	JioFiber	1	1,500	1,500
3	Smart Door Lock (Fingerprint sensor)	Valencia	1	20,000	20,000

4	Video Door Phone	Godrej	1	20,000	20,000
5	Motion Sensor Light (cover up to 6 meter)	Mi	12	600	7,200
TOTAL COST					**₹ 67,500**

Table- 34: Total cost estimation of Electrical products for the Client's House

Sr. No.	Products	Total price (in ₹)
1	Electrical fittings, fixtures and accessories	₹ 3,27,190
2	Home Security Systems for Elderly	₹ 67,500
3	Labour cost	₹ 70,000
TOTAL COST		**₹ 4,64,690**

Thus, cost estimation of the Electrical products, including proposed Home Security Systems for Elderly and all the electrical fittings, fixtures and accessories of the selected house was **₹4,64,690.**

Implementation of Electrical works and Home Security Systems for Elderly at the client premises

For the selection purpose, three alternative house plans for the installation of Home Security Systems for Elderly were shown to the client, of which the one selected house plan of area 2055 Sq. Ft. was implemented.

The implementation stage for this project has started in the month of **September, 2020** and the construction of the house, false ceiling works, implementation of different lighting fixtures have been completed and some of the Home Security Systems were installed in the client's residence. But due to the Covid-19 epidemic, the work is still in the process.

Plate 21: Implementation of electrical work at the client's residence

Plate 22: Implementation of ceiling fan at the client's residence

Plate 23: Implemented false ceiling at the client's residence

Plate 24: Implemented Security Cameras at the client's residence

Plate 25: Implemented Smart Door Lock at the client's residence

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

CHAPTER V

SUMMARY, CONCLUSION AND RECOMMENDATION

Summary:

Since the sense of security has been associated with healthy aging, quality of life in later years, and aging well, there has been a surge in interest in the concept of security during the last decade. The elderly population i.e.; those who are aged above 60 years, mostly prefer to aging in their own place and to grow old under security while maintaining their independence. The strategy “to age in place” usually refers to being able to stay in one’s own home as long as the old person wishes to do so and feels confident and secure. Security has often been argued from a risk perspective, like the risk of falling or the fear of crime, which implies the need to promote security for an older person as these risks are higher in that older age.

Due to loss of functionality or failing health as a result of aging, the majority of the world's growing older population needs some type of institutional or informal care. In addition, the cost and stress of caring for the elderly are continuously rising. Many elders would prefer to live independently in a residential setting with minimal intervention if given the option. Again, crime is increasing day by day and people have less time to spend at their houses.

Now it has become a matter of great concern. While remaining outside, people become tensed about their house and their elderly love one’s safety. To be universally beneficial to lessen the burdens on the caregivers and to increase the quality of care and life issues for the elderly, people can use different types of Home Security Systems for Elderly at their residence for their safety and support.

In recent years, home security has become a major concern. As technology advances every moment, a multitude of home-based security systems has been developed and implemented with a variety of sophisticated features to keep the home safe. A Home Security system can make the home secure, more convenient, flexible, and less expensive.

Objectives of the study

1. To conduct a market survey of Home Security Systems for Elderly available in the market of selected districts of Upper Assam.
2. To assess the extent of utilization of Home Security Systems for Elderly by the residents from the selected districts of Upper Assam.
3. To assess the extent of satisfaction experienced regarding Home Security Systems for Elderly by the residents from the selected districts of Upper Assam.
4. To prepare a working drawing and give cost estimation for one of the respondent's house according to the needs and requirements for house specification and Home Security Systems for Elderly.

Delimitation of the study

1. The present study was limited to the selected districts of Upper Assam namely Jorhat, Dibrugarh, Golaghat, Lakhimpur, Sivasagar, Majuli, Dhemaji Charaideo and Tinsukia.

2. The present study was limited to 120 households from the selected districts of Upper Assam where at least one elderly family member resides in the house.

3. The present study was limited to those households where at least one Home Security System for Elderly was installed and was being used since minimum past one year from the time of data collection.

Hypothesis of the study

1. There exists a variation in the extent of utilization of Home Security Systems for Elderly with the selected personal variables (Age, Occupation and Family Monthly Income) and situational variable (Living Arrangement) of the Elderly residents from the selected districts of Upper Assam.

Methodology

The present study was undertaken to investigate the utilization and satisfaction experienced by the Elderly regarding Home Security Systems for Elderly installed at their residences in the districts of Upper Assam.

Purposive sampling technique was used for the selection of the samples for the present study. Under this procedure amongst the nine districts of Upper Assam, only those respondents were purposively selected who were aged above 60 year and have installed and used minimum one Home Security Systems from minimum past one year at their residence.

The prime objectives of the present investigation were to assess the extent of utilization of Home Security Systems and its satisfaction by the Elderly residents from the selected districts of Upper Assam. Hence, in order to achieve these objectives, the investigator collected the data from the respondents of the specified area through online questionnaire method and then synthesized the collected data. The questionnaire was divided into three section, Section I dealt with background information of the respondents, Section II dealt with the extant of utilization of Home Security Systems for Elderly by the respondents and the Section III dealt with the extent of satisfaction experienced regarding Home Security Systems for Elderly by the respondents.

A Market survey was conducted in the districts of Upper Assam to record information regarding details of Home Security Systems for Elderly available in the market.

An Interview schedule was selected as a tool, for the purpose of collecting information about the client and his need for installation of Home Security Systems for Elderly at his residence to make the need based working drawing of the House with necessary Home Security Systems for Elderly.

For establishment of the reliability and content validity of the prepared tools, the tools were given to a panel of judges containing experts from Family and Community Resource Management, Electrical engineer, dealer and installation experts. Pre testing of the tools was done on 30 non-respondents.

Collected data was analysed through categorizing all the data, then coding it, tabulating it and lastly perform statistical analysis on it through its mean, frequency and percentage.

Major findings of the study

Section I: Market Survey: Details of Home Security Systems for Elderly available in the market of Upper Assam

A market survey was conducted in the districts of Upper Assam to collect information regarding the availability of Home Security Systems for Elderly. The researcher conducted the Market survey by visiting the shop and also collected information from leaflets and brochures related to the Home Security Devices which was provided by the company dealer and vendor during the survey.

In the market of Upper Assam, it was found that total of seven types of Home Security Systems for Elderly were available namely; Motion Sensor Light, Burglar Alarm, Security Surveillance Camera, Video Door Phone, Smart Door Lock, Medical Security System i.e.; Panic Button and Automatic Pill Dispenser.

Section II: Background Information of the respondents

- The age of the respondents ranged between 60 to 75 years with the mean age of 68.12 years. The study found that nearly more than three-fourth (78.33%) of the respondents belonged to the age group of 60 to 70 years.
- The data depict that less than half (43.33%) of the respondents were Unemployed.
- More than half (57.50%) of the respondents Family Monthly Income was more than ₹50,000.
- More than half (62.50%) of the respondents live with their Family members.
- Majority of the respondents were not sufferer of any of the health-related problems.
- A slightly more than half (51.67%) of the respondents were lives in the Other Type of House i.e.; Assam Type House as these types of houses are mostly found in the State Assam.
- Data revealed that more than half (54.17%) of the respondents were lives in Builder designed house.

- More than half (57.50%) of the respondents have taken the decision for installation of Home Security Systems for their residence by themselves.
- About more than half (56.67%) of the respondents installed the Home Security Systems in their residence for monitoring their house area.

Section III: The extent of utilization of Home Security Systems for Elderly by the respondents

It was found that out of a total of seven available Home Security Systems for Elderly in the market of Upper Assam, a slightly less than three-fourths (72.50%) of the respondents have used Security camera at their residence, majority of them were belonging to the age group of 60 to 81 years and they were using for more than 2 years. Whereas, respondents belonging to the age group of 82 to 92 years were highly utilizing Security Camera along with the Medical Security Device.

Concerning the Family Monthly Income, respondents having less than ₹25,000 Family Monthly Income, majority of them had installed Medical Security Devices (50%). While, the respondents having Family Monthly Income between ₹25,000 to ₹50,000 and more than ₹50,000 had installed Security Camera (67.44% and 79.71% respectively) at their residences.

respondents were highly utilizing the Security Camera in all categories of their living arrangements and Occupational status.

Cent percent of the respondents were highly utilizing Security camera and those respondents, who had Hearing Related Problem and Dementia, they were highly utilizing Smart Door Lock, Medical Security Camera and Automatic Pill Dispenser system.

respondent highly utilized Security Camera (78.46%) in Builder designed house, but in Self-designed house, respondents mostly used Security Camera (65.45%) and Motion Sensor Lights (40%).

Section IV: The extent of satisfaction experienced regarding Home Security Systems for Elderly by the respondents

- The data revealed that most of the respondents were highly satisfied with the functioning, comfortability, design of the device, accuracy of

work and material of the Motion Sensor Light which they have installed at their residences.

- Cent per cent of the respondents were highly satisfied with the material and design of the device, functioning of the device, responses frequency during emergency, comfortability and emitted alarm sound quality of the Burglar Alarm System.
- respondents were highly satisfied with the function, design and material of the device, comfortability, regularity and accuracy of work, area coverage, footage quality, response frequency of the Security Camera.
- Cent percent of the respondents were satisfied with the function, comfortability, responses of the video door phone, footage or picture quality in the display, regularity of its work and material of the device.
- The respondents were highly satisfied about the aspects like functioning, comfortability, accuracy and regularity of work, response frequency design and material of the Smart Door Lock.
- Cent percent of the respondents were satisfied with all the aspects of the Medical Security Devices and Automatic Pill Dispenser system.

Therefore, based on the calculated weighted mean score, it can be concluded that, the respondents were highly satisfied with the various aspects of Automatic Pill Dispenser, Medical Security Device, Video Door Phone, Smart Door Lock, Security Camera and Motion Sensor Lights. Whereas, respondents were moderately satisfied with the various aspects of Burglar Alarm System.

Section V: Testing of Hypothesis

ANOVA was conducted for the present study, and it was found that the selected personal variable “Family Monthly Income” of the respondents was significant - at 0.01 level with the extent of utilization of Home Security Systems for Elderly by the respondents from the selected districts of Upper Assam

Section VI: Proposed working drawings with cost estimation of a respondent's house according to the needs and requirements for house specification and Home Security Systems for Elderly

A client's house of floor area 2055 Sq. Ft. was selected and it was planned and designed according to the client's and his family's needs and requirements. Need-based Home Security Systems for Elderly viz. Security Camera, Video Door Phone, Smart Door Lock and Motion Sensor Lights were implemented at the house.

The drawings proposed to the client consist of the Floor plan and Furniture layout of the house, the False ceiling layout of the house, the Electrical layout and layout of Home Security Systems for Elderly implemented at the house i.e., Security Camera, Video Door Phone, Smart Door Lock and Motion Sensor Lights.

Conclusion

Elderly age group - which need much care and attention, Home Security Systems can help them age in place with dignity and safety by giving them more confidence in their ability to live alone and helping families avoid the wrenching decision to move aging parents into costly assisted-living facilities. The Elderly have long been considered an independent-minded generation; they find home is far more comfortable than an unfamiliar healthcare setting. But doing so can pose considerable risks to health and safety in residences that aren't designed to accommodate some elderly individuals' needs.[28]

Modern families may find it extremely difficult to provide support and care to the elderly for ageing and fulfil their needs, as adult children often have demanding professions or live far away. But fortunately, Home Security Systems for Elderly can help ensure the safety of elderly parents. There are various Home Security Systems for Elderly available in the market which can assist them in their home and make them feel safe and secure.

The collected data during the study revealed that, majority of the respondents were using Security cameras at their residence and they were

using it from more than last three years. Again, majority of the respondents were highly satisfied with the various aspects of Automatic Pill Dispenser, Medical Security Device, Video Door Phone, Smart Door Lock, Security Camera and Motion Sensor Lights. Whereas, respondents were moderately satisfied with the various aspects of the Burglar Alarm System.

The collected data shows that, there existed a significant relationship between the extent of utilization of Home Security Systems for Elderly with the selected personal variable “Family Monthly Income” of the respondents as the F calculated value was found higher than the F tabulated ($F_c > F_t$ at 0.01 level). Therefore, it can be concluded that the extent of utilization of Home Security Systems for Elderly was higher for those respondents who have higher Family Monthly Income.

Implication of the study

For the Field of Family and Community Resource Management

As the field of Family and Community Resource Management has Interior Design as specialization subject and diploma course on Hotel Interior, the information collected in the study, such as; types of Home Security Systems, there uses and benefit, source from where it can be installed and the product which are available in the market in present time for the security of elderly member, etc. can incorporate in the curriculum. Information based on Market survey will provide more clear and real information to the reader.

For Architects, Interior Designers and Builders

The finding of the study would be beneficial to the Architects, Interior Designers and Builders as the role of Architects, Interior Designers and Builders are very vital in the overall accomplishment of any design related project. The market survey report and the design developed under this study will provide an idea related to Home Security Systems for Elderly which they can incorporate in their upcoming projects where the need of providing security for elderly in a house will arises.

For the manufacturer, retailer and consumer of Home Security Systems

The finding of the study would also be beneficial to the manufacturer and retailer of the different Home Security Systems. On the basis of the feedback of the study, they can make improvement in their products, if needed. The extent of utilization and satisfaction of respondents will help to make any necessary changes if any dissatisfaction is observed in the study. It is also beneficial to the buyer those who want to buy a Home Security Systems for their house which is beneficial for the Elderly or Senior love one. User can know which system is required to fulfil their need and also, they can estimate the approximate cost of that system from this study.

Recommendation for future researches

- A comparative study with the same topic can be conducted in different states of India.
- A similar study can be carried out for larger sample size.
- A research can be carried out for other age group of respondents.
- A similar research can be carried out for the safety or medical aspects of the Elderly.
- A in- depth study can be done for the individual Home Security Devices.
- An experimental study can be conducted to know the adoption pattern of Home Security Systems by the Elderly.

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APPENDIX

APPENDIX I

HOME SECURITY SYSTEMS FOR ELDERLY

EXTENT OF UTILIZATION AND SATISFACTION

Market Survey tool

1. Name of the Shop:
2. Address:
3. Contact person:
4. Contact number:
5. Details of Home Security Systems for Elderly (HSSE) available in the market of Upper Assam:

(Please tick the appropriate answer)

Sr. No.	Name of the HSSE	Available (Yes/No)	Brand	Price	Specification (If any)
1	Motion Sensor Light				
2	Door and Window Sensor Alarm				
3	Burglar Alarm				
4	Security Camera				
5	Video Door Phone				
6	Pressure Sensor for Bed				
7	Smart Door Lock				
8	Glass Break Sensor				
9	Fire and Smoke Detector Alarm				
10	Medical Security System				
11	Automatic Pill Dispenser				

APPENDIX II

HOME SECURITY SYSTEMS FOR ELDERLY

EXTENT OF UTILIZATION AND SATISFACTION

Data collection tool for the respondents

SECTION - I

BACKGROUND INFORMATION

(Kindly provide the following information)

A. Background information about the respondent

1) Name:
2) Address:
3) Age:
4) Occupation:
    - Employed
    - Self-employed
    - Un-employed
5) Family Monthly Income (in ₹):
    - Less than ₹25,000
    - ₹25,000-₹50,000
    - Greater than ₹50,000

B. Information regarding your living arrangement and health status

6) With whom do you live with in your house:
    - With family member
    - With relatives
    - With servant
    - With family member and relatives
    - With family member and servant
    - With relative and servant
    - Any other
    - No one
7) Do you have any of the following health problem:
    - Impaired vision
    - Impaired hearing
    - Difficulties in walking
    - Blood pressure problem
    - Kidney and bladder problems

- Lung disease
- Cardiovascular or Heart disease
- Dementia
- Any other
- NIL

8) Are you confined to Wheelchair?
   - Yes
   - No

C. Information about the House

9) Type of your house
   - Apartment
   - Tenement
   - Row House
   - Bungalow
   - Detached House
   - Any other

10) Who has constructed the house:
   - Builder
   - Self or Family member

D. Information about Home Security Systems for Elderly

11) Who has taken the decision of installing the Home Security Systems?
   - Self
   - Other Family member

12) Reason for installing Home Security Systems:
   - To get protection from intruder
   - To monitor the house
   - To get peace of mind
   - To get assistance (ex; medical assistance)

SECTION – II & III

UTILIZATION AND SATISFACTION EXPERIENCED REGARDING HOME SECURITY SYSTEMS FOR ELDERLY BY THE RESPONDENTS

(Kindly answer the following questions regarding Home Security Systems for Elderly you are using)

- Which of the following Home Security Systems for Elderly you have installed in your home:
    - Motion Sensor Light
    - Burglar Alarm
    - Security Camera
    - Video Door Phone/ Video Intercom
    - Smart Door Lock/ Biometric System
    - Smoke And Fire Detector Alarm
    - Automatic Pill Dispenser
    - Medical Security Devices (Emergency Call or Panic Button)

1) **Motion Sensor Light**: A sensor light which can automatically light up the room or the dim areas like stairs, hallways; when any movement detected to prevent fall or other home accident.

Section II. 1. Utilization of Motion Sensor Light

1. How frequently you use this system:
    - Always
    - Sometimes
    - Never
2. From how long you are using this system:
    - From past 1 year
    - From past 2 years
    - More than 2 years
3. Where you installed this system in your home:
    - Outside the home
    - Foyer
    - Bedroom
    - Bathroom
    - Kitchen
    - Staircase
    - Someplace else

Section III. 1. Satisfaction regarding Motion Sensor Light

Are you satisfied with the following aspects of the Product-

Sr. No.	Aspects of product	Satisfied	Undecided	Not satisfied
1	Functioning of device			
2	Initial cost			
3	Maintenance cost			
4	Design of the device			
5	Comfort in use			
6	Accuracy of the device			
7	Response frequency			
8	Material of the device			
9	Emitted light quality			

2) **Burglar Alarm**: An alarm that tells where a door or window has been opened or closed when not expected or someone try to break the doors or windows.

Section II. 2. Utilization of Burglar Alarm

1. How frequently you use this system:
   - Always
   - Sometimes
   - Never
2. From how long you are using this system:
   - From past 1 year
   - From past 2 years
   - More than 2 years
3. Where you installed this system in your home:
   - Foyer
   - Balcony
   - Bedroom
   - Bathroom
   - Kitchen
   - Someplace else

Section III. 2. Satisfaction regarding Burglar Alarm

Are you satisfied with the following aspects of the Product-

Sr. No.	Aspects of product	Satisfied	Undecided	Not satisfied
1	Functioning of device			
2	Initial cost			
3	Maintenance cost			

4	Design of the device			
5	Comfort in use			
6	Accuracy of the device			
7	Response frequency			
8	Material of the device			
9	Sound quality of the alarm			

3) **Security Camera:** CCTV camera helps the users to livestream footage remotely as well as receive notifications when the camera detects movement.

Section II. 3. Utilization of Security Camera

1. How frequently you use this system:
   - Always
   - Sometimes
   - Never
2. From how long you are using this system:
   - From past 1 year
   - From past 2 years
   - More than 2 years
3. Where you installed this system in your home:
   - Entrance area
   - Foyer
   - Balcony
   - Bedroom
   - Kitchen
   - Staircase
   - Someplace else

Section III. 3. Satisfaction regarding Security Camera

Are you satisfied with the following aspects of the Product-

Sr. No.	Aspects of product	Satisfied	Undecided	Not satisfied
1	Functioning of device			
2	Initial cost			
3	Maintenance cost			
4	Design of the device			
5	Comfort in use			
6	Accuracy of the device			
7	Response frequency			
8	Footage quality			
9	Storage of footage			

10	Area coverage			
11	Low light performance			
12	Regularity of work			
13	Material of the device			

4) **Video Door Phone:** A device that enables to see who is at the front doorway and can communicate with them without opening the door.

Section II. 4. Utilization of Video Door Phone

1. How frequently you use this system:
   - Always
   - Sometimes
   - Never
2. From how long you are using this system:
   - From past 1 year
   - From past 2 years
   - More than 2 years
3. Where you installed this system in your home:
   - Entrance door
   - Entrance gate
   - Someplace else

Section III. 4. Satisfaction regarding Video Door Phone

Are you satisfied with the following aspects of the Product-

Sr. No.	Aspects of product	Satisfied	Undecided	Not satisfied
1	Functioning of device			
2	Initial cost			
3	Maintenance cost			
4	Design of the device			
5	Comfort in use			
6	Response			
7	Footage quality			
8	Sound quality			
9	Regularity of work			
10	Material of the device			

5) **Smart Door Lock or Biometric System:** The smart door lock system provides hassle-free keyless entry to a home with only the already set fingerprints or security number and if someone try to break the lock, a siren will ring.

Section II. 5. Utilization of Smart Door Lock

1. How frequently you use this system:
    - Always
    - Sometimes
    - Never
2. From how long you are using this system:
    - From past 1 year
    - From past 2 years
    - More than 2 years
3. Where you installed this system in your home:
    - Entrance door
    - Entrance gate
    - Bedroom
    - Someplace else

Section III. 5. Satisfaction regarding Smart Door Lock

Are you satisfied with the following aspects of the Product-

Sr. No.	Aspects of product	Satisfied	Undecided	Not satisfied
1	Functioning of device			
2	Initial cost			
3	Maintenance cost			
4	Design of the device			
5	Comfort in use			
6	Accuracy of the device			
7	Response frequency			
8	Regularity of work			
9	Material of the device			

6) **Smoke and Fire Detector Alarm:** A detector use to detect fire, smoke or any hazardous gases like carbon monoxide inside the home and alert the user by flashing strobe light or loud alarm.

Section II. 6. Utilization of Smoke and Fire Detector Alarm

1. How frequently you use this system:
    - Always
    - Sometimes
    - Never
2. From how long you are using this system:
    - From past 1 year
    - From past 2 years
    - More than 2 years

3. Where you installed this system in your home:
    - Outside the home
    - Foyer
    - Bedroom
    - Living room
    - Dining room
    - Kitchen
    - Someplace else

Section III. 6. Satisfaction regarding Smoke and Fire Detector Alarm

Are you satisfied with the following aspects of the Product-

Sr. No.	Aspects of product	Satisfied	Undecided	Not satisfied
1	Functioning of device			
2	Initial cost			
3	Maintenance cost			
4	Design of the device			
5	Comfort in use			
6	Accuracy of the device			
7	Response frequency			
8	Material of the device			
9	Performance of flash light			
10	Sound quality of the alarm			

7) **Medical Security Device (Emergency Call or Panic Button):** An electric device that lets the family members or friends know if the person is not ok or need any help in the home.

Section II. 7. Utilization of Medical Security Device

1. How frequently you use this system:
    - Always
    - Sometimes
    - Never
2. From how long you are using this system:
    - From past 1 year
    - From past 2 years
    - More than 2 years
3. Where you installed this system in your home:
    - Foyer
    - Bedroom
    - Bathroom
    - Kitchen
    - Someplace else

Section III. 7. Satisfaction regarding Medical Security Device

Are you satisfied with the following aspects of the Product-

Sr. No.	Aspects of product	Satisfied	Undecided	Not satisfied
1	Functioning of device			
2	Initial cost			
3	Maintenance cost			
4	Design of the device			
5	Comfort in use			
6	Accuracy of work			
7	Response frequency			
8	Size of the button			

8) **Automatic Pill Dispenser:** A medication dispenser device dispense the medicine on right time.

Section II. 8. Utilization of Automatic Pill Dispenser

1. How frequently you use this system:
    - Always
    - Sometimes
    - Never
2. From how long you are using this system:
    - From past 1 year
    - From past 2 years
    - More than 2 years
3. Where you installed this system in your home:
    - Bedroom
    - Living room
    - Someplace else

Section III. 8. Satisfaction regarding Automatic Pill Dispenser

Are you satisfied with the following aspects of the Product-

Sr. No.	Aspects of product	Satisfied	Undecided	Not satisfied
1	Functioning of device			
2	Cost of the product			
3	Design of the device			
4	Comfort in use			
5	Accuracy of work			
6	Size of the device			

APPENDIX III

HOME SECURITY SYSTEMS FOR ELDERLY

EXTENT OF UTILIZATION AND SATISFACTION

Interview schedule for the client

(Please give the following information)

Section I: Background information of the respondent

1) Name:
2) Address:
3) Age:
4) Occupation:
5) Family Monthly Income (in ₹):
    - Less than ₹25,000
    - ₹25,000-₹50,000
    - Greater than ₹50,000
6) Which of the following members live with you in your house:
    - With family member
    - With relatives
    - With servants
    - With family member and relatives
    - With family member and servant
    - With relative and servant
7) Do you have any of the following health related problem:
    - Impaired vision
    - Impaired hearing
    - Difficulties in walking
    - Blood pressure problem
    - Cardiovascular or heart disease
    - Dementia
    - Any other _____
    - None

Section II: House specification and Home Security Systems for Elderly to be installed as required by the client

1) Which type of house do you need to construct?
    - Tenement
    - Bungalow
    - Raw House
    - Any other _____

2) Specify the rooms, which you need in the house:

_____

_____

_____

_____

3) Specify the need of electrical fixtures, fan and AC. in the room:

_____

_____

_____

_____

4) Do you need false ceiling for your house?
    - Yes
    - No

5) Reason for installing Home Security Systems for your house:
    - To get protection from intruder
    - To monitor the house
    - To get peace of mind
    - To get medical assistance
    - To detect unusual events (if occur)
    - To get secured and hassle-free entry to the house

6) Which of the following Home Security Systems for Elderly you want to install in your house and where?

- Motion sensor light _____
- Burglar alarm _____
- Security camera _____
- Video door phone/ video intercom _____
- Smart door lock/ biometric system _____
- Smoke and fire detector alarm _____
- Burner alert for stove top _____
- Emergency call or panic button _____
- Automatic pill dispenser _____
- Panic button _____

7) How much money you want to spent on electrical work for your house:

_____

8) How much money you want to spent on buying Home Security Systems for your house?

_____

9) In which area you want more security:

- Entrance area
- Backyard
- Foyer are
- Living room
- Kitchen
- Bedroom
- Bathroom
- Staircase
- Any other _____

ABSTRACT

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Home Security Systems for Elderly are the devices that work to secure an Elderly and the house from every possible threat. Home Security Systems consists of different components, including Motion Sensor Lights, Indoor and Outdoor Cameras, Glass Break Detectors, Door and Window Sensors, Smart Door Lock, Smoke Detectors, Carbon Monoxide Detectors, etc. With the assistance that Home Security Systems provided to the Elderly, they'll likely be able to gain more independence and can live securely for a longer period of time.

There are different Home Security Systems for Elderly available in the market and many people have also installed them at their residence. However, there was a need to know the extent of utilization and satisfaction experienced regarding Home Security Systems for Elderly by the residents. Therefore, a study was conducted on 120 Elderly users from selected districts of Upper Assam who had installed at least one Home Security Systems at their residence and was being used for a minimum of one year.

The objectives of the study were to find out the Home Security Systems for Elderly available in the market of selected districts of Upper Assam, to assess the extent of utilization and satisfaction experienced regarding Home Security Systems for Elderly by the respondents from the selected districts of Upper Assam and to prepare a working drawing and give cost estimation for one of the respondent's house with necessary Home Security Systems for Elderly as required by him. The research design adopted for the study was descriptive in nature. The data for the research were gathered through an online questionnaire and it was analyzed by applying descriptive statistics (frequency, percentage, mean and standard deviations) as well as relational statistics (Analysis of Variance).

The major findings of the study revealed that; there are seven Home Security Systems for Elderly were available in the market of Upper Assam and amongst them, majority of the respondents belonging to the age group of 60 to 81 years were using Security Cameras at their residence and they were

using it for more than 2 years. Whereas, respondents belonging to the age group of 82 to 92 years were highly utilizing Medical Security Devices along with the Security Cameras. Concerning the Family Monthly Income, respondents having less than ₹25,000 Family Monthly Income, majority of them had installed Medical Security Devices. While the majority of the respondents having Family Monthly Income between ₹25,000 to ₹50,000 and more than ₹50,000 had installed Security Camera at their residences. Amongst the various Health Related Problems faced by the respondents it was found that those respondents, who had a hearing related problem and dementia, they mostly utilized Smart Door Lock, Medical Security Camera and Automatic Pill Dispenser at their residence. Again, it was found that, the respondents were highly satisfied with the various aspects of the Automatic Pill Dispenser, Medical Security Device, Video Door Phone, Smart Door Lock, Security Camera, and Motion Sensor Lights. Whereas, respondents were moderately satisfied with the Burglar Alarm System.

Along with that, a set of working drawings with cost estimation for one of the respondent's house was prepared using necessary Home Security Systems for Elderly i.e.; Security Cameras, Video Door Phone, Smart Door Lock, and Motion Sensor Lights was implemented.