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Article in International Journal of New Computer Architectures and their Applications · April 2020

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## The Various Types of sensors used in the Security Alarm system

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### ABSTRACT

The most basic definition of any security system is generated from its name; it is literally a means or method by which something is secured through a system of interworking components and devices. With the help of the latest development of technology, it is possible to secure people's lives, industries, schools, organizations, and homes using an alarm security system that will monitor, guide and protect against burglar and abductors, because of the rate of theft and abduction in some parts of the world is increasing by the day; this imbibes fears that become a threat to the peace and economic development of any society or country nowadays. It is paramount to find viable technologies that will secure the lives of humans as countermeasures to tackle this kind of problem. This paper will review literature related to security alarm systems, different types of sensors used in the security system, advances in its technology, and disadvantages of installing the security alarm system and the importance of installation for security purposes in which most of the papers I read did not.

**KEYWORDS:** Abduction, Alarm System, Burglar, Security, and Sensors.

### 1. INTRODUCTION

The security alarm system likewise offers a great means for supporting and helping different needs of folks that have disabilities precisely old age people or individuals with a certain illness that will not allow them to be moving around either in offices, organizations or homes. The user of the home automation and its application area is very significant and will keep on steadily upsurge even in the future [1]. The security alarm system or home automation is also known as the automation of the placed is installed or

household activity. The home automation or security system usually explains a house or an area that is a link with technology and services through networking to watch over the area needed to be secured and increase the eminence of living of people. The security alarm system or home automation comprises centralized control of lighting, appliances, temperature, and other systems, to provide better relaxation, ease, security, and efficiency.

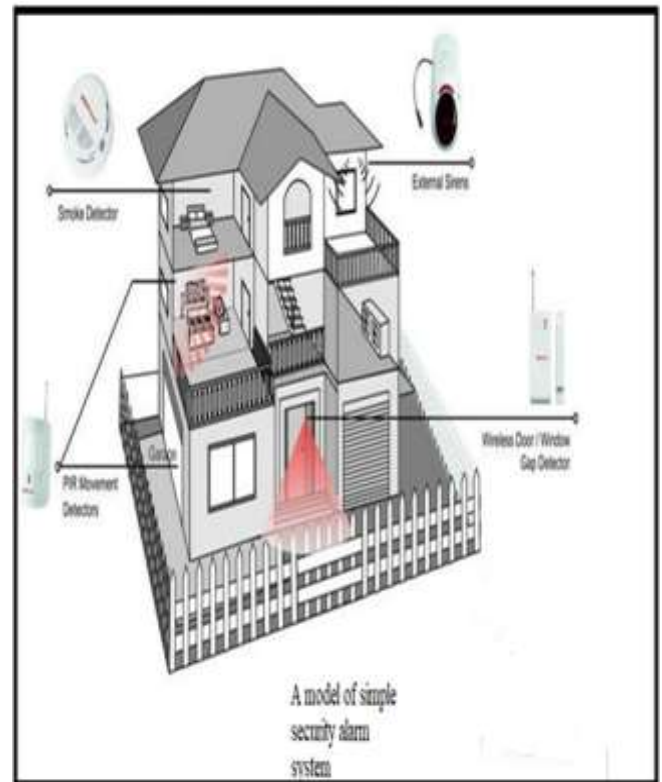


Figure 1: A model of a simple security alarm system.

Today, our home monitoring and alarm security systems have become common. One of the motives for this is the increase in crimes, abduction, and robbery in the world today. Many of our homes, industries, schools, and organizations today are invade mostly by force either through a criminal entry or through

breaching a window, entering through a cutting ceiling or even entering through a closed door or sometimes even an open window [2]. Case studies show that most criminals are usually cut off by the help of the simple existence of an alarm security system in our homes hospitals, schools, organization, and industries. Criminals usually invade far more defenseless constructions compared to those guarded by security alarm systems. The improvement of the security alarm systems started with the creation of man. To give threatening information, human being implements a form of a signal, shout, and sound. It was then replaced with the help of the clapping of hands and with the instilling of signals to notify society or to blowout a certain message during the early periods of some African society [3]. All these methods of warning are fundamental, unreliable and unsystematic. With the help of advancement in technology today, these undeveloped methods of producing security alarm systems were changed by programmed security alarm systems in the late eighteenth period. These types of electronic security alarm systems usually work without the aid of any human being energy. When the modern security alarm system senses a positive signal which may be a sign of intrusion or breakage, it normally gives a warning of a very high sound or sends an alert to the owner subject to the type of security design [4]. The earliest electronic fire, security alarm system was developed by a man named William .F. Channing. Late on an electrical electronics engineer, Mr. Moses G. Farmer invented the construction. This alarm system uses automatic indicator boxes to label the position of the outbreak fire and was first lunch in Boston, United States of America. The development of this alarm system by Dr. William was then followed by the improvement of various stylish and difficult fire and intruder security alarm system technology that is so many to deliberate [5]. The most significant among these security system technologies is the use of remote signaling thief security alarm. This type of security alarm system was design in the early 1970s. This administers a fast inventive reaction to alarm calls. However, organizations and industries are based on the supply of security service apparatus that usually come in dissimilar designs to keep burgles and thugs away from the

environment that are not built for them. Today, we have an innovative group of electronic security alarm system with complexity at various levels [6]. With the latest flow in crime rates in the world, it has become very essential to safeguard our buildings and our property with the aid of sophisticated stages of various advanced security alarm devices. The prices of such kinds of security alarm devices depend on the apparatus technology and solicitation desires. These alarm security system devices are characterized by present electronic security alarm systems. Some of nowadays-modern security alarm systems are housebreaker alarms, threat alarms, industrial alarms, speed limit alarms, and anti-theft vehicle alarms [7]. The intruder alarm security is initiate by a cycle, from a comprehensive automated circuit loop that is close with an alarm at its output, or an indication to inform the owner of danger. They are a central control box that normally observer different gesture indicators and the perimeter protections that give an alarm or notify the owner when any of this sensor is a trigger [8]. Some of the intruder's security alarms system normally functions delicately on the conception of a magnetic contact and others. For those types of security systems working with the sensors, these devices are usually positioned at any entering of the industries, organizations, and building. In this case, the sensor will activate an alarm if the device gets a signal above its set inception [9]. In the case of motion detection, the ultrasonic sensor is normally used; the point indicator can be used in the concession of a criminal alarm, theft or illegal individuals at certain points such as doors or windows [10]. For instance, when a precise environment needs to be look over the awareness of the burglar in the protected environment is used, which is executed with the help of ultrasonic sensors and is normally fixed at an appropriate location. Presently, closed-circuit television (CCTV) shown in figure two below, has been combined in the thief security alarms system to recognize the existence of illegal personnel.



Figure 2: A model of closed-Circuit television (CCTV)

The output of the intruder alarm system can differ from a siren or loud bell cautionary to automatic telephone buttons and flashing outdoor rays [11]. It accomplishes the warning purpose possible of informing neighbors of an illegal individual and at the same time, it will function as a signal to the police. Automated dialers linked to the burglar alarms are set to call the police officials and to play a pre-recorded report notifying the police personal that the organization, industries or house has been broken into [12]. With the aid of advances in technological and scientific improvements, it has made significant advancements in the technology of the security alarm devices [13]. In this research, advances in security alarm system technologies against intrusion are reviewed considering an intruder alarm. A security alarm system has been a great concern in the world nowadays, considering the surge in burglaries in different parts of the world today and the rise in abduction, everyone needs to take protective actions to avoid an illegal entering into their industries, organizations or homes [14]. The point that a security alarm system exists in our environment or homes is often a hindrance to frightening a burglar before trying to force an entry, making the possessions of it in our home or environments, will make you feel safe and increase peace of mind to the users [15]. These devices function as inputs that trigger the security alarm. Some of the security alarm

sensor technologies that have been established over the centuries are

(1) **Microwave sensors:** the microwave sensor, is an electronic device that perceives signs and is used to control luminaires. The microwave function differs from passive infrared sensors, by extruding microwaves, which bounce off surfaces and return to a sensor within the indicator. The microwave sensor can easily perceive any activities within its range and do all this in less than a microsecond. The microwave sensors can easily penetrate holes and walls. Because of its ability, it can cover a very large area of commercial properties, industries, organizations and homes that need to be secure. Because its properties are required to make use of it especially for, those who want to secure a very large environment. The microwave sensors are mostly less expensive to buy. The microwave sensor is a motion-sensing device that normally flows in a definite area or in the area within the electronic field. Movement in or out of the area that needs to be secure quickens the speed and triggers the alarming figure three below shows the image of the microwave sensor.

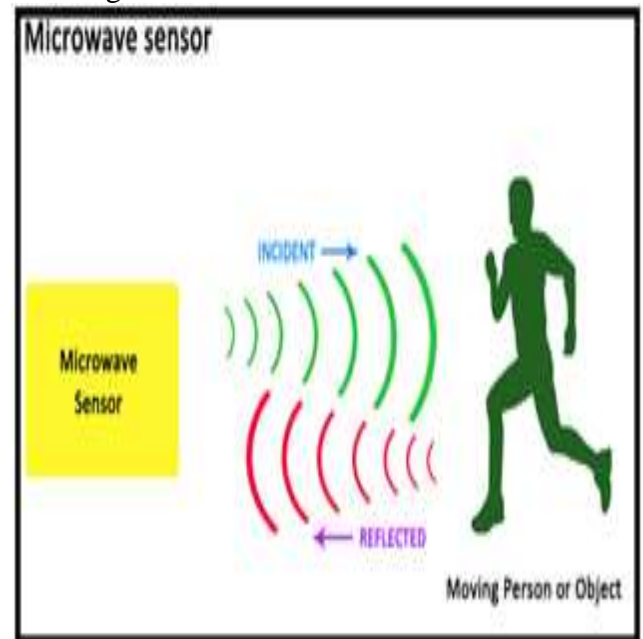


Figure 3: Microwave sensor

(2) **Vibration Sensors:** Vibration sensors are sensors that are used for displaying, measuring, and evaluating linear velocity, displacement, acceleration, and proximity. Vibration sensors are usually fixed on ceilings, floors, and walls to sense mechanical vibrations produced by drilling, chopping, or because of any physical attack figure four below shows the image of the vibration sensor.

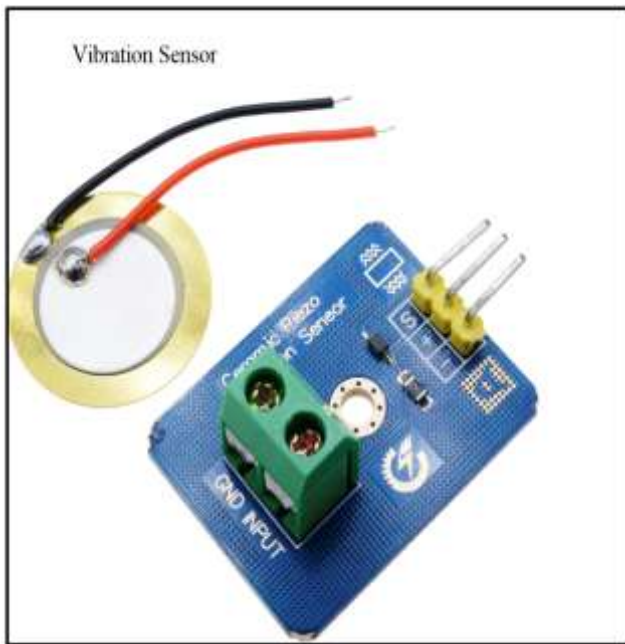


Figure 4: Vibration sensor

(3) Photo electrical ray sensor: The photoelectric sensor usually discharges a light ray infrared or visible from its light-emitting element. A reflective-type photoelectric sensor is usually used to notice the light ray reflected from a certain target. While a thru beam, type of sensor that is to measure the changes in the light magnitude caused by the target passing through the optical axis. The photoelectric sensors usually transfer infrared beam to the receiver, usually in the form of a light ray, in a remote area, thus forming an electronic fence. These types of sensors are usually used to close openings, such as corridor paths or doorways, which are broken open. Whenever the light ray is disturbed or interfered, it will automatically produce an alarm signal figure five below shows the image of the photoelectric sensor.

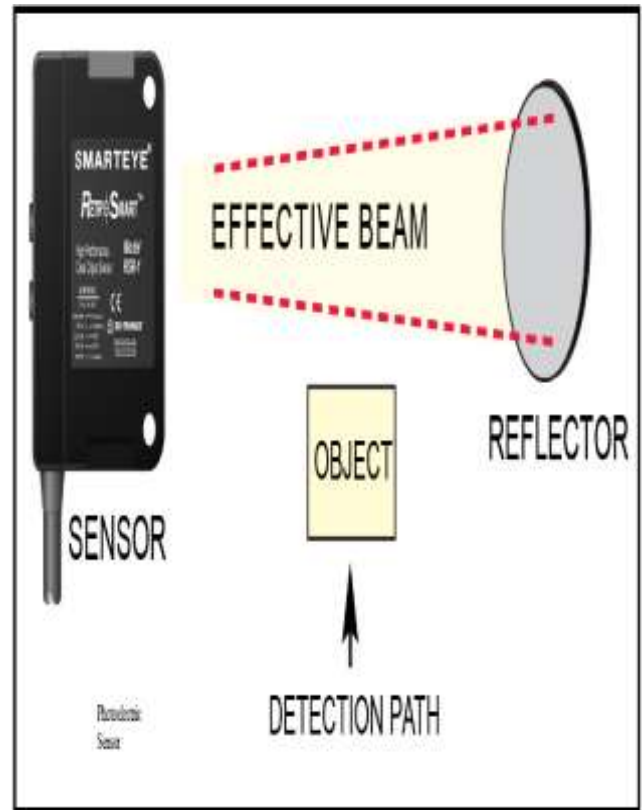


Figure 5: Photoelectric Sensor

(4) Electric field sensors: The electric field sensor is a micro-electronic based device that can normally notice the existence of both stationary and moving objects through solid materials. Its facility to function through any non-conductive material permits complete invisibility. The electric field sensor function by noticing any small changes in an ultra-low-power electromagnetic field produced between two remotely positioned antenna electrodes. These sensors normally create an electrostatic field between and round a series of conductors and an electrical ground. Is for identifying up and down or degradation in the field. The sensor can be activated by anybody touching or approaching the sensor figure, six below shows the image of the electric field sensor.



Figure 6: Electric Field Sensor

(5) Sound sensors: The Sound Sensor is usually a minor board that is merging with a microphone and some processing circuitry. It produces not merely an audio output, but also a binary sign of the presence of sound, and an analog exemplification of its amplitude. These sensors usually react to the sound generated by intruders entering through the secure environments figure seven below shows the image of the sound sensor.



Figure 7: Sound Sensor

(6) Capacitance sensors: Capacitive sensors can normally be used to identify metallic substances as well as close all additional tools like liquid and solid substances. The capacitive sensors are frequently used as a limit switch, for flow

control, object detection and for counting purposes. The capacitive sensors notice variations in the electric field. Whenever an intruder gets closer to it or by direct contact with the sensor wire, it brings about changes in the capacitance of the field, which can either be a higher or lower level than the verge signal level, this will automatically generate a signal figure-eight below shows the capacitive sensor.



Figure 8: Capacitive Sensor

(7) Glass break detector: This type of sensor is used in electronic criminal alarms detectors if a piece of the glass is broken or shattered. The detectors are usually kept or fixed closed to glass storefront windows or glass doors in our houses, offices or organizations. The glass break sensors generally either use a microphone, which observer's vibrations or noise that is coming from the glass. If this noise or vibrations surpass a certain verge that is user-selectable, they are evaluated by sensor circuitry the figure 9 below shows the glass break detector.



Figure 9: Glass break detector

(8) Seismic detectors: This seismic sensor is useful for watching over armored cabinets, automatic teller machines, cash boxes, armored safes, night safes, and safe vault walls for all known break-in apparatuses such as oxygen lances, diamond-tipped drills, explosives, and hydraulic rams. Any mechanical vibrations triggered by a break-in attempt are scrutinized and detected by this seismic detector sensor, and an alarm will be triggered figure 10 below shows seismic detectors.



Figure 10: Seismic detectors

(9) Magnetic Contacts: This magnetic contact is most usually use in electromechanical appliances that trigger when the magnet and contact are alienated. It is mainly used on windows or doors, these switches are the prevailing detecting

gadgets in detecting closing or opening of windows or doors. The detectors are reliable and cheap. This type of sensors usually comprises two sections, a contact that is usually installed on your window or doorframe and an activating magnet that is mounted on the door figure 11 below shows the magnetic contact detectors.



Figure 11: Magnetic contacts

In this research, we have seen how we alert our neighbors if an intrusion occurs since the previous years before the introduction of various types of sensors that are used in the security alarm system and how they operate and function. We have also seen how essential the security alarm system or home automation system is very important. How its main uses range from expanded relieve and larger security and safeness, and to additional reasonable usage of other resources and energy, granting major savings [16].

## 2. RELATED WORKS

Presently, security alarm system manufacturers for building and alarm lookout facilities give a variety of means proposed for clients to supervise their alarm security systems, in case they are far away from their organizations, industries or home. Motivated by the encroachment of recent technology and the surge in abduction and robbery in the world today, which as result has appealed major consideration. This segment will discourse study associated with our studies on security alarm system against invasion, which will come both from local and foreign studies.

## 2.1. Local studies

In the designed of a simple dependable touch delicate security alarm system that is inexpensive since there is the accessibility of the component that they used with an abundance of close substitute of the components. An additional reason you have to consider was reliability when the power for the security alarm system is down; you have integrated the system with programmed change over to a power supply which will guarantee you with the constant power supply to your circuit. Moreover, the effectiveness of the system has to be taken into account by making use of a transistor to couple the microphone. In additional effort to make an alarm security system, developing an automatic alarm security system. The system has to comprise of an indicator and a sensor as a transducer for detecting intruders' activities or breaching beyond the gate or environment needed to be secured. The signal is at that point handle by a fixed microchip that activates the phone component and sends a short message service (SMS) notice to a mobile cell phone at your organization, industries or homeowners, which triggers a linked alarm structure. A study project containing the make use of a Short Message Service-based invasion recognition system, which will consist of a headset, antenna and switch circuit. The structure combines motion devices, not like unoriginal magnetic key alarms in entries and openings, such that a short notice will be sent to the owner in an effort to rob the owner organization or house or if abduction is about to take place. The design can be constructed by the means of an Arduino or microcontroller programmed with different components like motion sensors, and controls. A movement sensor usually called the Passive Infrared ray (PIR) sensor shown in figure twelve below is inserted into a prototype rooftop and a button near the entrance door or window so that dispatch is shown whenever a trespasser passes the passive infrared ray (PIR). An (LCD) Liquid crystal display will show a message which now will be sent via short message service to the embedded mobile numbers figure 12 below shows the model of the passive infrared sensor ray detection and how it works.

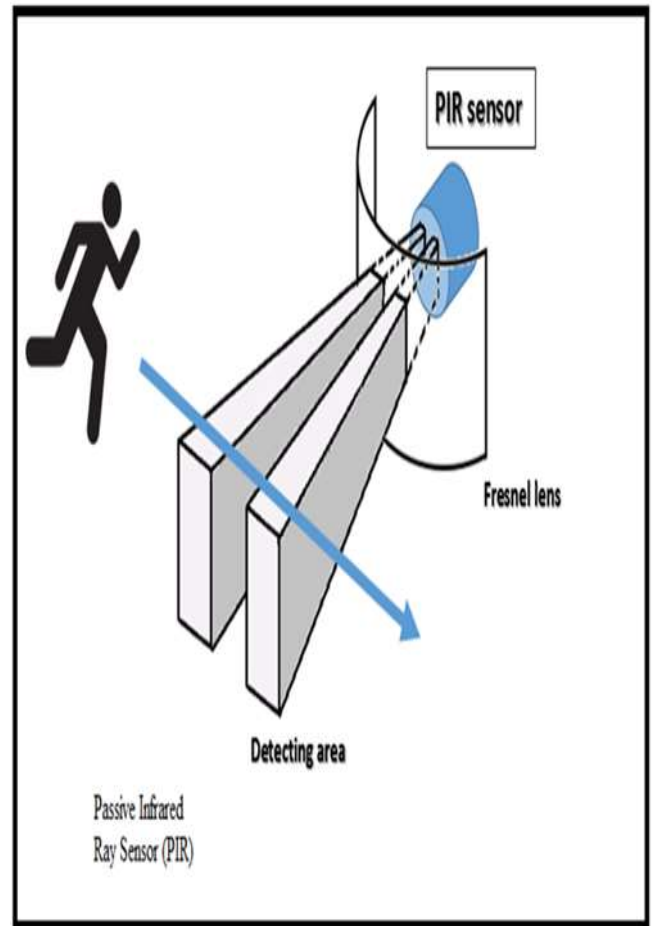


Figure 12: Passive Infrared Ray Sensor

## 2.2. Foreign studies

This area of study is consisting of a mobile security alarm system that will automatically dial an automated mobile phone number linked to the security system in case they is an intrusion in the secure environment and the system will then send a message immediately to the sensor of the programmed security system device it will then be activated. The construction of the circuit will consist of either an Arduino or microcontroller in the programming process which will serve as the brain of the system, with also various sensors to avoid misleading mistaken alarms driven by another anguish watching system. The system is going to be linked to both the owners and the people watching the secure environment which can be your house, private organization or government agencies and also to both the owners phone number, police unit and fire services unit in case they are any intrusion or fire outbreak it will automatically send a message to the house, organizations, industries and the people monitoring the secure environment, and the people monitoring the secure environment will send it to the police, in case it is a fired outbreak



the people monitoring the secure environment will send it to the fire service unit because of the various sensor installed for their different purposes in the configuration of the security system figure thirteen below shows a simple model of the foreign studies on security system and how it operates. This type of system can also help guard the environment to be secured from robbery or abductors when you are away from either your organization or home. That is whenever someone is trying to rob or abduct someone in the secure area or house, the security alarm system will be activated which will then automatically send a short message service (SMS) to the house owner's mobile phone and to the security agencies watching over the secured environment.

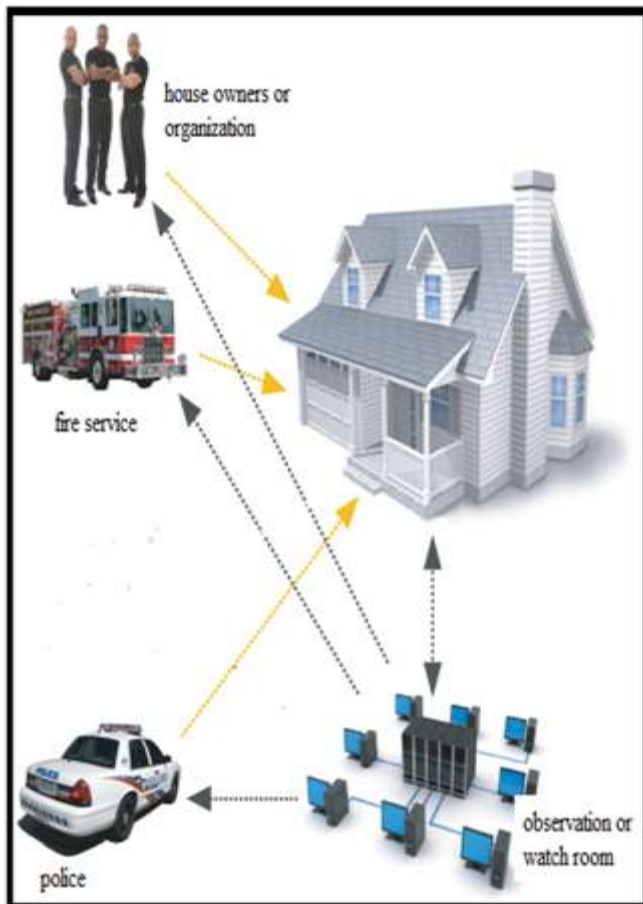


Figure 13: A model of the simple security alarm system of foreign studies

### 3. Importance of installing the security alarm system

The rate of Crime in the world is increasing day by day due to urbanization, unemployment, poverty, economic recession, and social inequality, which will bring chaos to the country. Most of the crimes that are usually done are abduction, robbery, theft and housebreaks, but

the most common one done today is armed robbery. This disturbing increase rate of crime in the world today, thus, threatened the life and properties of the people. A security alarm system should be installed as a standard device in our homes or the environments needed to be secure. The need for an operative and cost-effective system that caters to catastrophes and accomplishes safety concerns while one is away from their home is essential.

Therefore, a security alarm system is an essential device in protecting organizations, industries or buildings and improving the quality of people's life since is going to be an actual means of decreasing the threat of abduction, burglary, and thefts in the world today. Therefore, the importance of installing the security alarm system are listed below;

1. Research has revealed that the installation of a security alarm system at our homes can prevent criminals from entering the secure area. As a result of this, you can leave comfortably with your family at all times or even if you are away from your home or the environment needed to be secure.
2. With the help of modern technology today, security alarm systems may include many computerization features. These features will allow you to monitor your energy consumption and turn off all the utilities when you are not going to make use of them or no longer in the room. This may help in less monthly billing of the electrical appliances and less lost energy that is by the use of the internet of things (IoT).
3. With the help of the installation of the security alarm system installed, one can watch over his house and what is happening around the environment or surroundings to be secure.
4. The sound of the installed security alarm system can secure the thief especially if the system is connected to a buzzer, which will make a sound if they are an illegal entering.
5. Many of the security insurance companies or agencies usually offer discounts to those who are interested in installing the security alarm system which is a great way to reducing the costs of installation and it encourages people to install it because of the discount of installation.
6. The alarm security systems usually give an early warning in the case of a fire outbreak which will call the attention of the house-owner

or people living in the area the system is installed and necessary measures will be taken.

7. With the help of the security alarm system installed, it may prevent the loss of valuables and properties which can lead to gigantic financial damage.

8. The installation of the security alarm system may provide the environment to be secure or homeowners with self-confidence and relaxation of the mind that their properties or homes are secured.

#### **4. Disadvantages of installing the security alarm system**

Not all the papers I read discussed the various disadvantages one may like encounter if the security systems are installed.

1. Privacy: There have been a few instances in the past where security cameras have stirred up controversies, especially in professional setups. There have been cases where employees have objected to being under constant surveillance without their permission and citing the ‘invasion of privacy’ as the reason. A few have also resorted to taking legal action against their employers in relation to this. Critics of security camera systems have taken offense to them being placed in offices and argued that doing so implies that the employer has either already assumed or is convinced that his employees are up to no good and will do something wrong which is why their activities need to be recorded.

2. Expensive: While dummy cameras may not be expensive, the real ones cost hundreds, even thousands of dollars depending on the features and the number of cameras and monitoring systems you buy. Getting them installed and their maintenance means added costs. If you are thinking of installing them yourself, lay that idea to rest unless you have good knowledge of wiring systems or you may end up damaging the cameras.

3. They can be Vulnerable: When we, as users of security cameras, try to keep ourselves updated on the latest in security systems, we should not forget that intruders and criminals are doing the same too. A clever trespasser will probably know all about them and may have figured out a way to go undetected. Further, tech-savvy criminals might have understood the technology and worked out ways to disable/disconnect them from their power source. In addition, if he

detects your cameras as fake/dummies, they can be useless in any crime prevention. In worst cases, hackers can play havoc with your security camera system by using the Internet and use them to spy on you instead.

This makes security cameras vulnerable to damage and/or misuse.

4. Can't Stop Theft: Cameras enable users to record footage for later viewing, and to help nab criminals, and receive justice from the law. They cannot, however, stop a crime when it is in progress. They do not alert neighbors or the police like an alarm system would. This means that you will incur losses even as you run to the court, make insurance claims and reorder stolen inventory, which may no longer make you feel absolutely safe and even cause you to lose faith in them.

#### **5. Conclusion**

The objective of this review is to give awareness on the advancement in different types of security alarm sensors used against abduction and intrusion and to create awareness regarding the security measures one has to take regularly due to increasing in break-in and abduction in the world nowadays. This research also reviewed some study on security alarm system from both local and foreign aspect and list the importance of installing the security alarm system in the environment we need to be secured or homes and also the disadvantages of installing the security alarm system in which most of the papers don't. With the security alarm system, one does not need to get a security guard or hired someone to be watching the environment needed to be secure.

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