PIEZOELECTRIC BURGLAR ALARM

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Abstract -Since the late 1970s, there has been talk of home automation. Yet, as technology and services improved, so did people's expectations, which affected how they perceived home automation systems. In this work, we use a modest PIR built around an Arduino controller to construct an advanced electronic security system. PIR and IR sensors detect an intruder's presence, and the controller interprets the signal from the sensors. Intruder detection activates the bell, places a call, and sends an SMS to a predetermined number using a GSM modem. In tandem, the controller activates a camera to record an intruder's image and send it to the person via GSM module AT instructions.A excellent security system is centrally located, making it easy to maintain a close eye on the entire area, which lowers personnel requirements and labour costs.

Key Words: *PIR sensor, IR sensor, arduino controller, GSM modem, Camera and Memory card*

1. INTRODUCTION

Home security has changed significantly since the turn of the century and will continue to do so. The applications for smart homes should include security as a key component or feature. Applications for pedestrian traffic detection and quantification systems are numerous, ranging from data collecting for municipal planning to perimeter security systems for national security. Often a big region cannot be effectively monitored by a single guard. One can maintain a close check on the entire region with a centralised security system, which lowers the need for labour and labour costs. It is an unconventional source of energy. This self-sustaining technology is beneficial for rural areas where installing electricity transmission lines is impossible.

Everywhere, theft has become a huge problem (societies, mall, shop etc). The primary goal of this project is to provide security at residential and business locations during both our times at home and when we are away from those locations. CCTV cameras have been placed, as we can see, for security reasons. However, the CCTV cameras can only record and store the data. There are many GSM-based electronic security systems on the market, but these systems can only notify the owner of the crime; they cannot capture and store the thief's image.We are therefore developing an electronic security system that can detect an intruder's presence, alert the owner of the property of the intruder's existence (by call or SMS), and capture a picture of the intruder in order to solve this drawback of the existing system.When a human being is recognised by PIR or IR sensors, the sensors' output will change. We are employing these sensors to identify the presence of intruders.

The core system construction block, the Arduino controller, receives this output. It will carry out program-defined operations in accordance with the output of the sensors. Next it will send AT commands to the GSM module in order to call the owner of the shop or house at a predetermined number. It also sends commands to the camera in order to take a picture of the burglar.

2. LITERATURE SURVEY

In their study, N. Srikanthan and Tan Karand demonstrated the use of Bluetooth technology for home automation. The remote house robotization system is implemented using Bluetooth technology, which emerged in the late 1990s. various devices, like air-conditioning and heating units, home theatres, cell phones, and so forth. are linked together, creating a personal area network in a domestic setting. The Bluetooth module serves as the conduit for communication between a few customer modules and the host server. To enhance communication between the host server and the customer modules, the Home Automation Protocol was developed. The framework is flexible because it also allows for the addition or removal of devices from the system.

A web-based remote house mechanisation framework for multifunctional devices has been developed by A. Z. Alkar and U. Buhur. A flexible, low-effort remote solution for home computerization is offered. It has been discussed changing the fundamental utility control mechanism of gadgets to more unpredictable devices. Using a server, the home computers are connected to a central hub. The system

is protected from unauthorised users by using SSL calculation. During experiments, it was discovered that the remote correspondence was limited to just 100 metres inside a solid structure. Muhammad IzharRamli, MohdHelmyAbdWahab, Nabihah built up a model electrical gadget control framework utilising Web. An electronic controller has been constructed by them, for directing electrical equipment.

A phone and PIC remote-controlled device designed and implemented by E. Yavuz, B. Hasan, I. Serkan, and K. Duygu is used to operate household electrical appliances. This calculation for the pin check was done where the link arrangement, not remote correspondence, was used. The system ensures safety because it can't be used by clients who aren't authorized because it uses a Pin-check system. Although the engineering is somewhat unexpected, it offers a possibility for remote house robotization systems.

Using GSM, Shahriyar, E. Hoque, M. M. Akbar, S. Sohan, I. Naim, and M. K. Khan demonstrated home appliance control and correspondence. The Home Mobile receives several AT summons for operating various machines. This framework's drawback is that the client doesn't receive a Graphical User Interface (GUI). To use the connected devices, clients must recollect certain AT commands. The framework also supports mobile phones with Java capabilities. As a result, the framework becomes less useful because fewer phones with Java capabilities are being used nowadays while the popularity of Android phones is skyrocketing.

In their study, Jitendra Rajendra Rana and Sunil N. Pawar implemented a ZigBee-based home computerization system. Zigbee is a strange state communication protocol used to create unique zone organisation. It supports all types of microcontrollers. In the case of wired mechanization, the framework eliminates the complexity of wiring. Therefore, a large amount of energy saving is possible. Functioning range exceeds Bluetooth. In any event, the framework forbids remote machine monitoring and control.

3.METHODOLOGY

The project is aimed for detecting burglars and informing the owner by making a phone call. PIR sensor recognises motion by identifying the difference in infrared or radiant heat levels released by surrounding objects. The output of the PIR sensor goes high when it senses any motion. The range of a ty PIR sensor is approx 6 metres. For appropriate operation of PIR sensor, it needs a warm up time of 20 to 60 seconds. This is the senser's "settling time," when it makes any necessary adjustments to the

surroundings and deactivates the infrared detector. There should be no motion or very little motion in front of the sensor throughout this time. This much time is strongly advised for reliable output.

The PIR sensor produces a high output when it notices any movement. The Arduino picks this up. In order to call the preprogrammed mobile number and send the snapped photo to the predetermined phone number, Arduino then engages in serial communication with the GSM module. An important factor to be remembered regarding PIR sensors is that the output will be high when it senses motion. Even when there is motion, the sensor's output occasionally drops, which could trick the microcontroller into thinking there isn't any. The programming of Arduino must address this problem by rejecting low output signals with duration's less than a set time.This is accomplished by presuming that motion is constantly present in front of the PIR sensor.
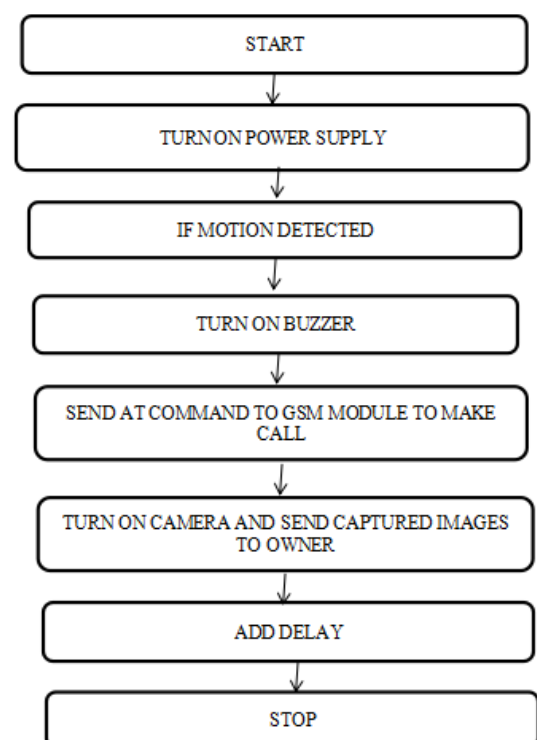
Fig 3.1 Working Diagram

4. HARDWARE REQUIREMENTS

4.1 PIR Sensor

PIR stands for passive infrared sensor or pyroelectric infrared sensor. The thermal radiation that strikes it is detected by pyroelectric sensors that are part of the device. Every living thing emits some radiation, and the more radiation that

is emitted the hotter the body gets. Two IR-sensitive components with opposite polarity make up PIR sensors. The components are mounted in a hermetically sealed metal with an IR-transmissive glass. Both slots register the same amount of IR radiation when the sensor is in the idle state. When a warm body, such as a human or animal, enters the PIR sensor's sensing range, the sensor's output changes positively.

The sensor produces a negative differential shift as soon as the warm body leaves the sensing region. These pulse changes indicate the presence of an object. The sensor's field of vision is shaped by a lens. The lens is made of cheap and lightweight polycarbonate. To cover a broader region, the detection lens is divided into many portions. Mini Power PIR Motion Detector IC is used in addition to Pyroelectric sensor.

This chip receives the signal from the sensor, processes it, and then outputs a digital pulse. The sensor detects IR radiation when a person enters its area of view and abruptly switches its output state. The controller is activated by a change in the PIR sensor's output.The range of PIR Sensor is roughly 6 metres i.e. 20 feet, and angle of 120 degree.

Fig 4.1.1 Working of PIR

4.2 Arduino Controller

Arduino is a minicomputer or electronics board that is open source. With the help of Arduino, artists and techies may develop interactive environments or objects more easily. The goal of Arduino's initial introduction in 2005 was to give professionals a quick and affordable approach to construct devices or other appealing projects. Arduino boards come in pre assembled form.

For programming arduino board, arduino integrated development environment (IDE) is utilised, which supports for C and C++ programming languages. An Atmel 8, 16, and 32 bit AVR controller is a component of an Arduino board. The Arduino's standard connectors, which enable users to connect the board to a variety of modules known as shields, are a significant feature.
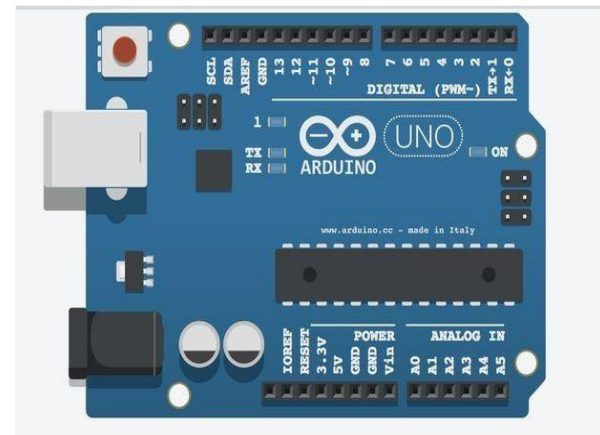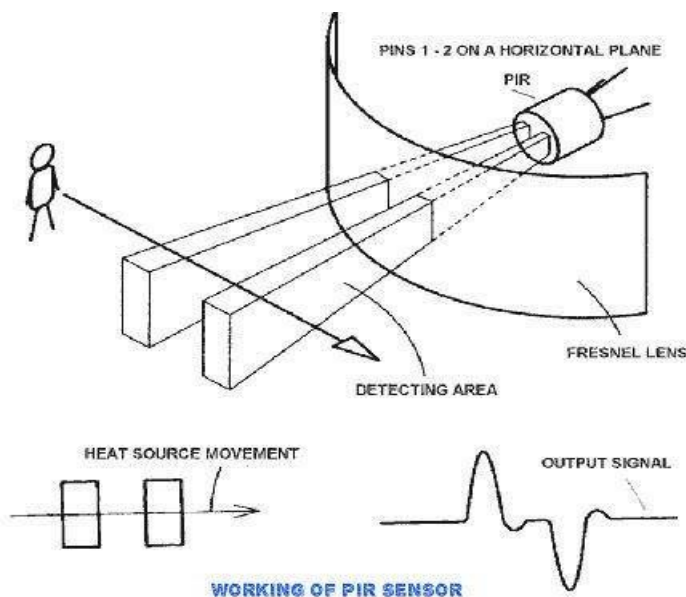

Fig 4.2.1 Arduino

4.3 GSM Module

Global System for Mobile Communications is the abbreviation for this term. Most GSM uses the 900 MHz or 1800 MHz frequency band. This GSM modem functions exactly like a mobile phone and can use any GSM network operator's SIM card. The modem is linked to the controller's serial port and communicates via the RS232 standard. To place calls and send/receive SMS, utilise a GSM modem. Moreover, it can be used as a GPRS modem to access the internet. When the Arduino receives a signal from the sensors, it sends AT commands to the GSM modem to call a pre-programmed number.AT directives: At the beginning of each command line is "AT" or "at". That is why AT commands are used to refer to modem commands.
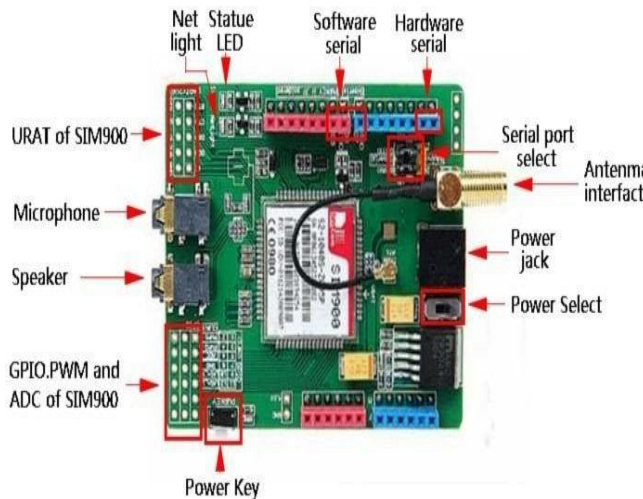
Fig 4.3.1 GSM Module

4.4 Buzzer

A buzzer is an audio indication device, which may be mechanical, electromechanical, or piezoelectric. Typically buzzer is used as alarm. When a PIR sensor detects an intruder, it sends a signal to the Arduino controller, which subsequently activates the buzzer.

Fig 4.4.1 Buzzer

4.5 Camera

Camera is utilized to capture the image of intruder. When a sensor detects an intruder, the Arduino instructs the camera to take a picture of that invader.
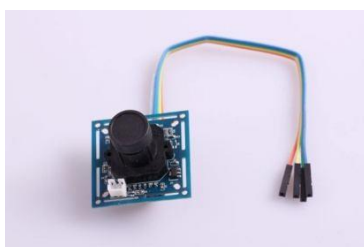

Fig 4.5.1 Camera

5. SOFTWARE REQUIREMENTS

5.1 Aurduio ide

The Arduino controller serves as the centre of the entire system. The Arduino Integrated Development Environment is used to programme the Arduino controller (IDE). The languages that can coexist are C and C++. Program is compiled & burned using arduino Integrated Development Environment (IDE) (IDE). It has tool bar, text editor for writing code and text console. Sketch is the name of a programme created using the Arduino software (IDE). The.ino file extension is used for Arduino sketches. The editor offers tools for text replacement, text searching, and text cutting and pasting. The message provides faults as well as feedback for storing and exporting. The Arduino Software's (IDE) text output, including error messages and other data, is displayed on the console.

6. CONCLUSION

Nowadays, people employ CCTV cameras and other security measures to protect their homes and businesses, but these tools have limitations, such as the inability to alert the owner of a crime. There are also GSM-based electronics systems, but these don't allow us to photograph theft. So to eliminate this drawback of existing systems we are implementing this project. To prevent theft, we are using a GSM-based advanced security system in this project. This device is affordable and suitable for usage anywhere security is required.In our system, we take a picture of the intruder in addition to comparing it to some specified human image qualities; if the photographs match, then and only then will the system call the owner of the property or business. Moreover, we can provide the ability to phone the police hotline.

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