

THEFT ALERT AND AUTO ARRESTING SYSTEM IN JEWELRY SHOPS

A Project Report Phase – II

Submitted in partial fulfillment of the requirements for the award of Bachelor of
Engineering degree in Electronics and Communication Engineering

by

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**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
SCHOOL OF ELECTRICAL AND ELECTRONICS**

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

Accredited with Grade“A” by NAAC

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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of K.Siva Reddy (39130195), J.Rohan Siddhu (39130192), who carried out the project entitled "Theft alert and auto arresting system in jewelry shops" under my supervision from November 2022 to April 2023.

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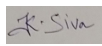
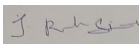
DECLARATION

We K. Siva Reddy (39130195), J. Rohan Siddhu (39130192) here by declare that the Project Report entitled “**Theft alert and auto arresting system in jewelry shops**” done by us under the guidance of Dr. N. M. Nandhitha, M.E, Ph.D., is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Electronics and Communication Engineering.

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ABSTRACT

The major goal of this project is to create a system for auto-arresting theft in jewellery stores and notifying shop owners to it. The system's goal is to create a mechanism for auto-arresting theft in jewellery stores and notifying shop owners to it. The security provided by this technology benefits the owners of jewellery stores. The phrase "THEFT ALERT AND AUTO ARRESTING SYSTEM IN JEWELLRY SHOPS" says and denotes that once anyone attempts to steal a jewel from a jewellery store, the thief will be stopped using the usage of some human sensing detectors, which will also cause the doors to automatically close. As a result, the thief has been apprehended. Two portions make up this. In the transmitter part, there is a PIR sensor.

Technology has given humanity a variety of security systems, but GSM-based security systems are the most practical. Sensors, which essentially look like an alarm system that detects movement, are the heart of many security systems. Because the alarm goes off frequently without cause, this type of technology has suddenly become irrelevant and ineffective. In this work, we design and develop robbery prevention network for jewelry stores that includes identifying monitoring and camera footage. This system, which is essentially a security system in and of itself, is currently employed to prevent theft and robbery attempts. The enhanced security system being offered employs an embedded system made up of a GSM module and an open hardware microcontroller, motion sensor, RF transmitter and receiver, high beam LEDs, and vibration sensors. Through SMS or a phone call, it notifies the owner and the closest police station about the intrusion and switches on a high-intensity halogen lamp to deter the robber from fleeing the site of the crime. The above is the abstract for the project theft alert and auto arresting system in jewellery shops.

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CHAPTER 1

INTRODUCTION

Thefts of valuables have been increasingly rising lately. Thefts are occurring everywhere in the entire planet. As a result, a lot of individuals were interested in purchasing the jeweler because it is a precious item in great demand. There are a lot of examples of jeweler theft in India. In the modern world, jewelry has a very high value. Jeweler is something that people all over the world are particularly interested in wearing. A special kind of device needs to be developed to stop all jeweler thefts. jewelry Tracker helps law enforcement find and apprehend criminals, retrieve stolen goods, and deter future crime when the theft takes place, protecting jewelry. Jeweler's use this tried-and-true technique to safeguard rings, watches, and chains. Numerous models are put out to address the issue of jewellery theft. The same concepts are suggested for security systems in cars and homes. Though the afore mentioned models are not perfect, they do help with the afore mentioned issue. The aforesaid project's primary requirement is GPS that aids in pinpointing the spot of the theft. This makes it simple for us to find the theft's location. Since there are more occurrences of jewellery theft today than ever before, a great protection should be created using a trustworthy anti-theft gadget. Nearly everywhere, including outside of India, jewellery thefts occur, and they get worse every day. Though the afore mentioned models are not perfect, they do help with the afore mentioned issue. The aforesaid project's primary requirement is that aids in pinpointing the spot of the theft. This makes it simple for us to find the theft's location. Since there are more occurrences of jewellery theft today than ever before, a great protection should be created using a trustworthy anti-theft gadget. Nearly everywhere, including outside of India, jewellery thefts occur, and they get worse every day.

Most jewellery store proprietor had installed CCTV footages, burglar alarms, and personnel to increase shop security, but the results are worrying, especially against the backdrop of recent night time burglaries at jewellery outlets in several parts of India. The shop management's haphazard approach to putting in place proper security measures is a significant issue when trying to avoid burglaries in jewellery stores. With such riches, they conduct business but do not take care to install a burglar alarm. Although installed at various stores, the CCTV cameras do not have

recording capabilities or energy backup. The CCTVs are useless if no original checks are done and if there is a electricity outage. Recently, we've heard of robberies that take place at night and involve the robber excavating a tunnel in a jewellery store. Once inside, the thief quickly steals all the gems from the store and then destroys the footage by stealing the existing information with the jewels. As a result, our law enforcement agencies were unable to identify the true offender due to a lack of evidence. To address these concerns, we designed and implemented a theft prevention system for jewellery stores in this paper, giving the owner with information before the store opens the next morning.

Due to the rising number of jewellery theft instances, you must make sure that your jewellery and other things are shipped in a secure manner at all times. With GPS tracking systems, it is simple to find out where your belongings are and to know when something suspicious is about to happen. You only need to contact the police if you see that something is not right; with their assistance, finding and recovering the missing item will be simple. The whereabouts of jewellery can be tracked in real time with the use of high-end tracking devices, which also provide a route map. The GPS can record the details of the path used to transport your jewellery.

Robberies are becoming more frequently and are getting more violent. Jewelers are adopting jewellery Tracker, a customised GPS monitoring system that when activated sends a alerting message, to prevent robberies. The model had an arrest and recapture of more than 70%. Therefore, when jewellery is stolen, the GPS pinpoints the location, and the authorities apprehend the thieves and put them in jail where they can't harm anyone else. Attaching a spot identifying module to the stolen jewellery item solves the difficulty of locating it down. All component dimensions can not be so accurate to scale, the original component proportions may vary from those depicted in the accompanying drawings. A tiny GPS circuit that may be mounted to a piece of jewellery is one embodiment of the location tracking module. In one example, the circuit using GPRS technology may serve as the spot identifying module for identifying the spot. Another design for the module could include an RFID tag. A universal communicator that can connect with a number of devices, such as an e-RFID reader, a Wi-Fi device, a GSM device, a UMTS device, an LTE device, a Bluetooth device, an IR device, etc., may be the module incorporated into the jewellery item.

Different components and sub components of the mentioned communicating devices may be used in different embodiments. The jewellery piece might have a location tracking gadget attached to it.

Implementation flow:

Stage 1:

Taking into account the shortcomings of current approaches and providing a solution by taking into account the fundamental needs for our suggested system.

Stage 2:

Taking into account the hardware needed for the proposed system To do this, choose the following elements:

1. a microprocessor
2. Materials in suggested system (ex: sensors, drivers etc..,)
3. Results (ex: relays, loads)

Stage 3:

We must now look at the software needs after evaluating the hardware requirements. We can choose from a variety of coding, compiling, and debugging tools depending on the microcontroller we use. Based on our criteria, we must create the source code for the suggested system, build it, and debug it in the software. After completing all of the hardware and software requirements, we must combine them to operate our system. To do this, we first burn our source code onto a microcontroller. Once this is done, we must link all of the input and output modules to the microcontroller in accordance with our needs.

Stage 4:

Upload the source code to the ide platform after verifying the needed and software. After submitting the code to the ide platform, we can verify our details.

1.1 SYSTEM OVERVIEW

A system needs a equipment platform that enables to operate, just like any other electronic system. A microprocessor or microcontroller is used to create embedded system hardware. Hardware components found in embedded systems include different interfaces, interfaces, memory, displays. The purpose of the software for embedded devices is to do something particular. Normally, code is produced in a high-level format and then disassembled into code that can be kept in hardware's non-volatile memory. A programme for embedded systems is made to consider these three constraints:

1. The presence of computer memory.
2. The speed of the processor is accessible.
3. Power consumption for operations like stop, run, and wake up must be reduced to a minimum when the system is running continuously.

In order to make software operate with embedded systems, software and hardware must be combined. To accomplish this, our source code must be uploaded into a microprocessor or microcontroller, a hardware component that manages all tasks performed by the embedded system in accordance with our code. Embedded system source codes are typically written in machine language however only executable files are run by processors. There are three fundamental processes involved in turning your embedded programme's source code representation into an executable binary image:

1. An object file must be created by compiling or assembling each of the source files.
2. In order to create a one thing file known as the shift code, all of the object files created in the first step must be linked together.
3. A procedure known as relocation must be used to allocate physical memory addresses to the relative offsets inside the re-locatable application.

Embedded systems can be used for several things. Smart cards, and other niche uses of embedded systems are a few examples:

Embedded Systems in Automobiles

- Mobile and E-Com Access
- Radars
- Cars
- Airplanes

Embedded systems in Telecommunications

- Cell phone
- Stations
- Communication without wires Embedded Systems in Cards
- Debit card
- Mobile phone
- Security cards

1.2 PROBLEM DEFINITION

In the suggested system, we are employing a PIR sensor, vibration sensor, and micro controller. The mobility of people is detected using a PIR sensor. Shop vibrations are detected using vibration sensors. If any vibrations are detected, the door will close automatically using a DC motor, the LED will glow a sms would be received for appropriate people with the location using GSM. The appropriate individual will receive the alert if any human motion is detected.

1.3 OBJECTIVE

- To identify appropriate jewelry model for GPS (Global positioning system).
- To find methods for keeping vibration sensors in unknown place.
- To make an efficient GPS tracking system for tracking the location.
- To make the GPS module and GSM module in an efficient way such that it intimates the owner of the jewelry shop.

CHAPTER 2

LITERATURE SURVEY

2.1 OVERVIEW ON LITERATURE

This chapter provides a thorough survey review on the theft alert systems that are available for the detection of theft. This chapter explains many works that were done by various individuals on the same works mentioned above.

IOT-based smart supervisor system abstraction by Sushma N. Nichal and Prof. J. K. Singh is based on embedded Linux and the ARM11 architecture(2014). They developed a A live video surveillance system and data were gathered for this work. PIR, temperature, and humidity sensors have also been incorporated into this system. To activate the system, they should validate themselves. Suppose the model detects a human, it will communicate that information to the host or the user's mobile. PIR sensors and two other types of sensors, such as temperature and humidity sensors, are both utilised to detect human motion. It is an ARM11-based real-time video surveillance system.[1]

U Sowmiya, J. Shafiq Mansoor(2004) have created a system that allows any door to be connected to the internet, and the user has also integrated a PIR sensor and camera. PIR sensors are used to find out people, while cameras are utilised to record footage of visitors to doors. The approved person will receive the video using a 3G dongle. A few benefits of this system have also been suggested. They have concluded using this method in places like hospitals and banks. Only 70% of attempts at door connectivity using the internet were successful.[2]

Prof. Vijay Bagdi and Ms. Renuka Chuimurkar(2005) have proposed a smart monitoring system that uses a Raspberry Pi, a PIR sensor, and a mobile smartphone. Smoke detectors were also employed by the authors to find the fire. After sending the photograph to the user's email through Wi-Fi, the user will warn others of the intruder or fire. For motion detection and smoke detection, they have employed the background subtraction technique. They feature advantages like dependability and

privacy that are indicated.[3]

By Shivprasad Tavagad(2009) They conducted a survey on numerous surveillance systems and covered the value of video monitoring as well as the advantages of many different security systems. They have talked about the significance of the security sys authors also described the suggested system's architecture, and they came to the conclusion that a new design would be used to offer security and safety.[4]

Real-time monitoring and security systems using Raspberry Pi have been presented by Khushbu H. Mehta and Niti P. Gupta(2010). The systems enable users to live monitor from any location. In the system, the authors have discussed how when motion is detected, a face detection check is performed, and if a face is found, it is saved locally using a background subtraction algorithm. The authors came to the conclusion that the system can identify faces and they can observe in offline.[5]

Dr. S. Kanagasuba Raja has previously concentrated on using Raspberry Pi for home automation and security(2010). The security system used by the authors of this article to detect intrusions and record footage for playback in the future. Additionally, they have automated household appliances. The ability to remotely turn on and off household appliances.[6]

To identify the car intrusion, Dr. Mamunal employed a GSM module, microcontroller, and automatic dialer. The owner will receive a call if the thief attempts to engage in any criminal behaviour involving the vehicle, and using a password, the owner can lock the engine. NodeMCU can be a nice option when a work is repetitious and modifying code is only possible on the Raspberry pi, according to polls on the Raspberry pi and NodeMCU. The Blynk mobile application was used to monitor data produced by humidity.[6]

In order to decrease the amount of data exchanged between a GPS receiver and a host server, A.M. Salman developed and implemented a system in the year (2020). The module combines a GPS, GSM, and Arduino-UNO R3 microprocessor for data transmission. GSM and GPRS both send Hipper Text Protocol and with this the data

of vehicle was stopped, there were no Hipper Text Transfer Protocol requests. Google Maps stores information on the server before displaying it to the user. Information tracking and retrieval were done via web and mobile applications.[7]

In (2019), O. A. Awad and D. A. Bahr developed an integrated anti-theft system to prevent the theft of automobiles. This system, which is based on the Raspberry Pi and the LTE Release Module, is installed in a secret location on the car. When a theft occurs, the owner's mobile phone initiates a call to GSM, which the Raspberry Pi then disconnects, causing GPS to broadcast the location of the vehicle to the owner as SMS through GSM and possibly monitor it on Google-map, before the Pi-Camera takes a image of the offender and sends it to the owner via high-speed internet services. Owner controls regulator signal to stop ignition module.[8]

In order for the owner to be able to identify the thieves, P. Chandra Shreyas et al. developed a plan for tracking and monitoring theft in (2019). The embedded photographic camera and GPS system in the thief's car capture a still image of the burglar as soon as the vehicle is turned on and send it to the Raspberry Pi. Additionally, data is saved in the cloud, which gathers all data, including data from the GSM module, and sends it to the owner of the vehicle. By using a specialised mobile app that can communicate data with the cloud and grant remote access to the vehicle, the property owner can verify the image and, in the event of an intruder, turn off the vehicle.[9]

Tahesin Attar and colleagues developed a "Advanced Vehicle System based on IoT" with cloud in (2018) to provide safety and automatically control theft with a negligible delay time. Both cordless and affordable Bluetooth systems are used for communication. messaging over GSM. they made use of an Infrared sensor, a Bluetooth module, limit switches, and a mobile app. Entering a password on the keypad opens doors and secures the safety harness. The owner gets a signal from the alarm. If a burglar ever enters the house through the window or as soon as the IR sensor picks one up. It resolves issues similar to using a tow truck with a limit switch, where the controller receives a signal when the switch is pressed and then sends an order. [10]

A method to prevent robberies was put in place by Shruthi K(2011). It allowed for the

mailing of the offender's photograph. It has been expanded for use by automobile owners to enable them to take security measures against robbery. It aids in monitoring and pursuing vehicles. This configuration improves further to function as an airplane's Black Box. Owner maintains position backup to cut down on driver overtime, enhancing yield for special objectives like the safe passage of prisoners or protected cargo. [11]

IoT-based oil monitoring system was implemented by K. Kumar Jha(2012). This system combines temperature, ultrasonic, and photodiode sensors with microcontroller interface and Arduino-based sensor programming. Using data collected from numerous samples and Thing Speak Channel analysis, a math work product was created. This paper discusses the specifics of real-time sensor programming, input and output data extraction, and analysis.[12]

A passive RFID-based automated door locking safety system is created by P. Tripathi and G. K. Verma(2011). The three main computer systems used in the technique are "Data, Clock, and Power" in all three zones. Hardware for computers such USB connections, cable links, position sensors, RFID monitors, and labels are all included in this module. For users, this system keeps important information safe. The RFID tag picks up the information connected with the new person after the machine detects them. The unit will either have access to the RFID tag or not. The scanner can determine if a visitor is a legitimate member or an impostor whenever an authorised user approaches the entry point and places the tag in front of it. After successful authentication, the door has been opened for the individual to enter.[13]

Gangi, Subhramanya Sarma, and Raghu Ram Gollapudi (2012) creates locker security systems with GSM, RFID, fingerprint, and password technology. The RFID monitor would only be able to browse the fingerprint scanner when the amount of information is appropriate; otherwise, the operation would be stopped. The controller sends its security code to an authorised cell number if a user's fingerprint

matches, but if not, validated user must type the programme into the controller, which may then be used by the user's key. If the programs match, the lock could unlocked or even the system might send an alert to a pre-owned user's mobile number, but the

warning message will remain sealed.[14]

The RFID-based protection system for paper leakage inspection was developed by P. Madhuri, P. Nalajala, B. Godavarthi, M. Bhavana, and G. Reddy(2012). It uses an electromagnetic locking mechanism, which is turned ON initially by providing a power supply. The LCD then displays a "welcome message" right away. The system must be restored for it to function properly. Immediately receipt of the RFID card data, a prompt message requests that users provide a mobile phone number for OTP creation. This is followed by a prompt request to examine the card, and when the identification is successful, an SMS is sent to something akin to a predetermined phone number. The phone number has already received a warning message in case someone else conducts an unethical behaviour. The OTP may only be sent after that.[15]

Bhumi Bhatt has put up a proposal that successfully utilises wireless technology in automobile settings by employing a GSM modem(2014) to give the customer the information he requests. To stop the car, they are employing an 8051 microprocessor. The 8051 gets activated and sends the message to the owner when the thief tries to steal it. The car is stopped when owner sends a "STOP" communication after seeing the message. The car may travel quite a distance and not stop automatically if the owner does not see the message in time.[16]

Procedures for guaranteeing worker safety or spotting worker falls in the workplace were put out by K.M. Mehata et al(2015). The suggested system consists of two pieces. One illustration is a wearable device with electrical and sensor components. Another crucial element is the smartphone. The GSM module makes it easier for the two parts to communicate. Additionally, those systems continuously monitor the worker's health and safety. With the use of this technology, falls will be correctly detected and the register person will be informed so they can provide medical assistance.[17]

To prevent accidents and track alcohol use, Divyasudha Netal.[3] suggested a system that includes a microcontroller, location sensor, alcohol sensor, piezoelectric sensor, RF transmitter, IOT modem, GPS receiver, power supply, and solar panel(2014). Two things are checked by this device: whether the rider is wearing a

helmet, as well as ingested alcohol. If the rider doesn't follow these instructions, the bike won't start, can be located by a beeping alarm. An IOT modem is used to alert the police station and a predefined number in the event of an accident. This system is less expensive than other kinds of helmets.[18]

A system with six parts has been proposed by P. Rojaet al(2015) an air quality sensor, an infrared sensor, an Arduino uno micro controller, GPRS, and GSM. When the helmet is taken off, the workers are alerted of hazardous chemicals in the mining areas, and the server receives the information. In this situation, IoT technology is used to send the data.[19]

A system created by Manish Uniyalet.al (2015)comprises of a helmet and a two-wheeled vehicle. Through an RF receiver set to the appropriate frequency, the two-wheeler component gets the helmet location information. Information about the helmet position will be stored in the microcontroller on the TW section and verified periodically. The TW vehicle also has a GPS module, an accelerometer for measuring tilt angle, and a Hall- effect sensor for measuring speed (location pointer). If there is an internet connection, the micro controller then delivers the data to the server when the sensors have collected it. Anyone can access information regarding the vehicle's speed at any momentthanks to thistechnology. People canobtain information using this technique.[20]

The link smart helmet system was presented by Sreenithy Chandran et al. [8]. They use an integrated network of sensors, WiFi-enabled CPUs, and cloud computing infrastructures to detect and prevent mishaps. Additionally, this technology transmits data to the government.

Several integrated features for a smart helmet system were suggested by Agung Rahmat Budiman et al. A warning is given to a cyclist who is not wearing a helmet if they arrive in dangerous conditions and do not have their helmet properly fastened. In this instance, the system issues a warning to the rider in the form of a notification should he find himself in a hazardous circumstance. In four smart helmets, the functionality test resulted in a 100% success rate, and the two modules' characteristics and communication tests both scored 98.3% success.[21]

Yanqing Gao, Weimin Sun, Jinliang He, Xiyuang Pan, Rong Zeng, and Qi Su (2018) The multilayer soil structure model is essential for creating grounding systems for power plants and substations. The electromagnetic field theory is used to determine the potential distribution of the ground surface produced by a point current source, as well as the correlation between apparent soil resistivity as determined by the Wenner four-electrode setup and the measuring electrode span.[22]

Mansoor, J., and Sophia, U. have created a system that allows any door to be connected to the internet, and the user has also integrated a PIR sensor and camera. PIR sensors can be used to detect people, while cameras are utilised to record footage of visitors to doors. The approved person will receive the video using a 3G dongle. A few benefits of this system have also been suggested. They have concluded using this method in places like hospitals and banks. Only 70% of attempts at door connectivity using the internet were successful.[23]

Using a Raspberry Pi, PIR sensor, and mobile device, Ms. Renu and Prof. Vijay K. presented a smart monitoring system (2017). Smoke detectors were also employed by the authors to find the fire. After sending the photograph to the user's email through Wi-Fi, the user will warn others of the intruder or fire. For motion detection and smoke detection, they have used the background subtraction technique. They feature advantages like dependability and privacy that are indicated.[24]

In (2002), Professor Akash Garg created "A Hybrid Intrusion Detection System." determines information system attacks. It is a security technique that looks for different types of threats. In this work, we studied ALAD, PHAD, LERAD, and NETAD as statistical anomaly-based programs in addition to Snort, a misuse-based intrusion detection system. estimating unusual activity, avoiding damaging security flaws, and identifying impacted systems. attack detection is limited and cannot identify live attacks.[25]

A work model titled "Fingerprint based anti-theft system for vehicles" was proposed in (2017) by Pooja, G.V.S.Jyothirmayee, D.L.Bhargav, N.V.S.Ganesh, J.S.Lakshman Kumar, and B. Naga Jyothi. Alcohol sensors, fingerprint scanner, and MSP430 microcontroller. The fingerprint identification system makes the car safer and restricts

access to those who have been authenticated. concentrating on how to get out of a situation where you're under the influence of booze and pressure.[26]

In the year (2017), Humaid Al Shamsi, Kapustka, and Hazza Al Shamsi put forth a work model titled "Real time tracking with Arduino Mega." Real-time GPS monitoring system architecture. GPS and GSM modules Significant benefit for non-public driving, salesman tracking, and vehicle security. This device can be used to increase security and safety for both private and business purposes. The above individuals suggested doing this job.[27]

Developed in the year (2019) by Dr. Pramod Sharma, Akash Shrivastava, Vivek Parashar, Lokesh Kumar, and Ram Naresh, the "Smart security system for automobiles" model. Only OTP, Microcontroller, GSM, and GPS Modules had been used. The mobile device receives alarm messages via a GSM module, and the module is tracked using GPS. The main benefit of the aforementioned model is that it offers excellent vehicle protection.[28]

Dr. S.Raja (2008) has concentrated on using Raspberry Pi for home automation and security systems. The security system used by the authors of this paper to detect intrusions and record footage for playback in the future. Additionally, they have automated household appliances. The user can remotely turn on or off applications and home equipment.[29]

2.2 LITERATURE SUMMARY

From the surveyed literature, it is found that the performance of the alert system mainly depends on the sensors and GPS and GSM networks. Many modifications cannot be done in this work. Hence, the proposed work must be in such a way to increase the overall performance of the system by using different sensors.

Automobile alarm strategies employ a variety of sensors, including as pressure, tilt, shock, and door sensors. are employed to stop auto theft. The drawbacks of these systems are their high cost, high rate of false alarms, and ease of disabling. Recent improvements in computer hardware and software have allowed the automotive industry to create low-cost automated biometrics-based identification and verification systems in order to overcome these problems.

The majority of automobiles have comparable physical characteristics and noises, and alarms may be deactivated during theft attempts. The siren cannot be heard due to the extended range. In congested spaces, alarm sound can be muted. Cost is high. In proposed system we are using PIC controller, Vibration Sensor and PIR Sensor. PIR sensor to identify human motion. Vibration Sensor is used to identify the vibrations in shops. If there are any vibrations are detected, automatically the door will be closed by using DC motor and LED will on and alert will be given by sending messages to corresponding person along with location using GSM. If any human motion is detected the message will be send to corresponding person.

However, these systems have several drawbacks, including expensive costs, a high rate of false alarms, and ease of disabling. Recent improvements in computer hardware and software have made it possible for the vehicle industry to create cost-effective automated biometrics-based identification and verification systems.

CHAPTER 3

REQUIREMENT ANALYSIS

Before entering into this section we should know the requirement analysis of the system and we have to implement it according to the analysis of the system. First thing is we have make some study on the system and should know what are the risks involved in this system. After that we have to gather all the hardware items and try to connect and implement that system.

3.1 FEASIBILITY STUDIES AND RISK ANALYSIS OF THE PROJECT

Feasibility Studies: Before embarking on the design and implementation of theft alert and auto arresting system in jewellery shops, it is essential to conduct feasibility studies and risk analysis to determine the project's viability and potential risks. Some of the feasibility studies and risk analyses that need to be considered are:

Technical Feasibility: This study assesses the technical feasibility of the project. It involves evaluating the technical requirements, such as sensors, communication systems, power supply, and navigation systems. This study will help determine the project's technical feasibility and identify potential technical challenges.

Economic Feasibility: This study assesses the economic feasibility of the project. It involves evaluating the project's cost, including the development, maintenance, and operation costs. This study will help determine the project's viability in terms of financial resources.

Social Feasibility: This study assesses the social feasibility of the project. It involves evaluating the project's impact on society, such as job creation, improved safety, and reduced damage to property. This study will help determine the project's social viability and identify potential social risks associated with the project.

Legal Feasibility: This study assesses the legal feasibility of the project. It involves evaluating the project's compliance with legal regulations, such as safety standards and privacy laws.

3.2 HARDWARE REQUIREMENTS

Vibration Sensor: The ability to monitor, measure, and analyse vibration is currently crucial in industries like research and development. Researchers often struggle to understand the best methods for creating precise and repeatable vibration measuring systems due to the complexity of test instruments and vibration analysis.

The choice of appropriate components, system architecture, signal conditioning, waveform analysis, and setup are some of the issues associated with detecting vibration. The definition, operation, various types, and uses of vibration sensors are covered.

The piezoelectric sensor is another name for the vibration sensor. These flexible sensors are used to measure a variety of operations. Using the piezoelectric effects, this sensor transforms changes in acceleration, pressure, temperature, force, or strain into an electrical charge. By instantly determining capacitance and quality, this sensor is also utilised to determine airborne smells.



Fig. 3.2.1 Vibration Sensor

According to its operating concept, the vibration sensor is a sensor that employs different optical or mechanical methods to identify system vibrations. Although lower and higher sensitivity are also available, these sensors generally have sensitivities between 10 and 100 mV/g. Therefore, it is crucial to comprehend the range of vibration amplitude levels to which the sensor will be exposed when taking measurements.

Arduino:

The microcontroller that powers it includes all it needs to operate; all that is required forgetting it started requires the insertion of a USB cable, an AC-to-DC converter, or a battery. You are able to play about with your UNO without worrying excessively that you'll make a mistake; worst case scenario, we may substitute the memory chip for Arduino.



Fig. 3.2.2 Arduino Board

Italicized as "uno," which signifies "one," the Arduino Integrated Development Software(IDE) a value of edition has been identified. The board known as the Uno and the Arduino Development Software (also known as version one) were the basis upon which subsequent versions of Uno were built. The Uno motherboard board, the initial in the series of USB boards made by Arduino, acts as the system's standard. A complete listing of all previous, current, and outdated models may be seen in the Arduino list of boards.

PIR Sensor:

All living things with body temperatures greater than 0 degrees Celsius generate infrared radiation, which is also known as thermal radiation. The human eye cannot detect this Radiated radiation. A PIR sensor made specifically for the purpose of picking up these signals.



Fig. 3.2.3 PIR Sensor

If a passive infrared (PIR) sensor doesn't produce or release any energy during a detecting process, it is considered to be passive. Infrared radiation that is emitted or reflected from things is what PIR sensors find, not "HEAT."

They are easy to use, cheap, lightweight, and low-power. They are regularly found in places including houses, industries, and hospitals, among others.

Pyroelectric sensors, which can detect quantities of infrared radiation, are the main component of PIRs. The spherical metal container with a rectangular crystal in the middle is depicted in the PIR element's above figure.

Radiation of some intensity is emitted by every item, with the hotter objects emitting more radiation.

The sensor is split into two slots that are connected in a way that cancels out the effects of the other slot.

Depending on whether one component senses more or less IR radiation than the other, the output will fluctuate high or low.

The PIR element is covered by a lens to extend its operational range, and input signals from the PIR element's two terminals are compared using a comparator circuit after being amplified by an amplifier circuit.

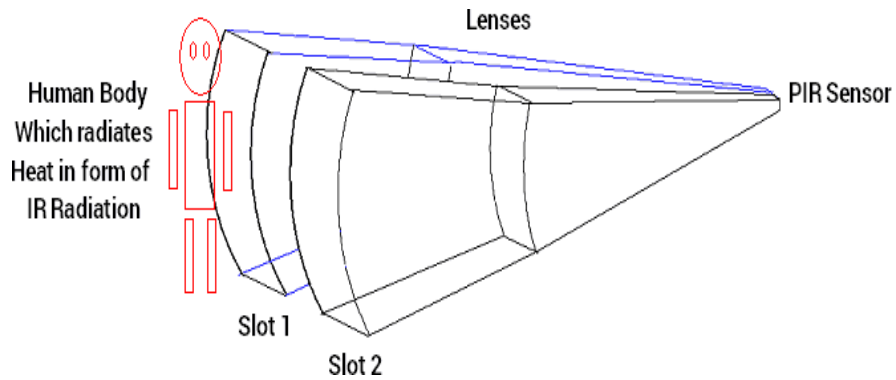


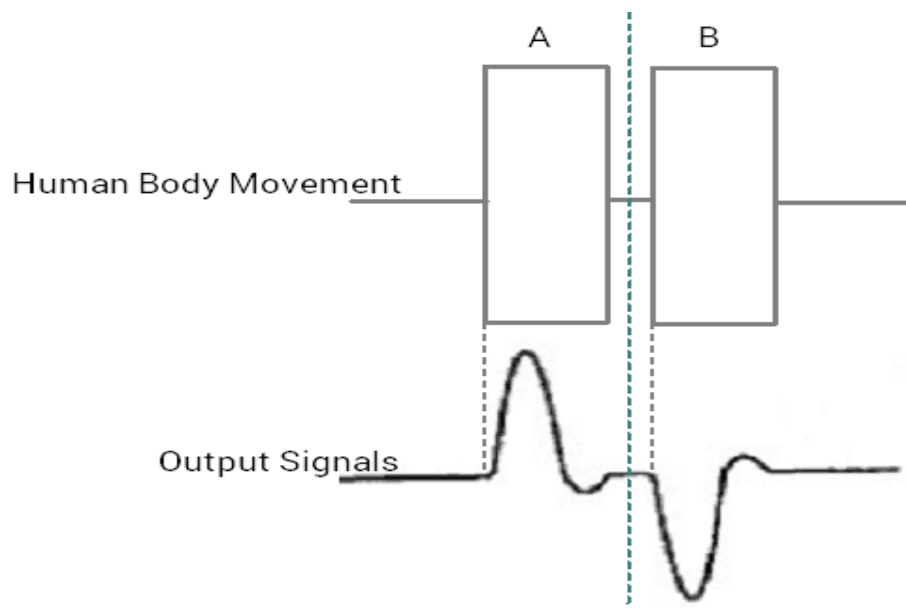
Fig. 3.2.4 PIR Sensor lens

The element RE200B is used by PIR motion sensors to detect infrared light. This sensor's differential amplifier is linked to both of its slots.

Because of the reality both of the slots receive an identical quantity of IR whereas the sensor itself isn't in use, there is no error signal between differential inputs. The final result of the comparison device is 0.

Object in Motion

Every thing that moves before to the sensor will block one of its slots. Positive differential change results between the two slots as a result of this. In the image below, Part A highlights this modification. The sensor produces a negative differential shift when a body departs the sensing area. In the image below, Part B denotes this modification.



The above picture depicts how the motion of the object or the movement of the object is done in real time environment when a person passes through pir sensor.

Pin Description

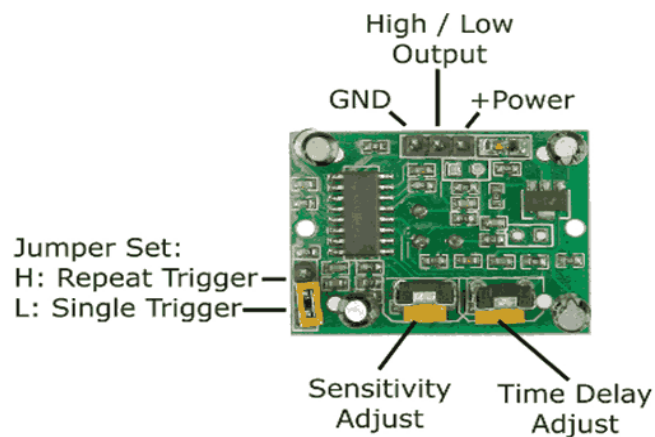


Fig. 3.2.5 PIR Pin Description

Vcc on port one

This pin possesses to be attached to ground. Outlet (Pin 2)

When movement is identified, the pin in question produces (3.5V). VCC on pin 3

This pin's value provides the PIR element and internal circuit supply voltage (+5v).

Modes of Operations:

The above has two types of operations

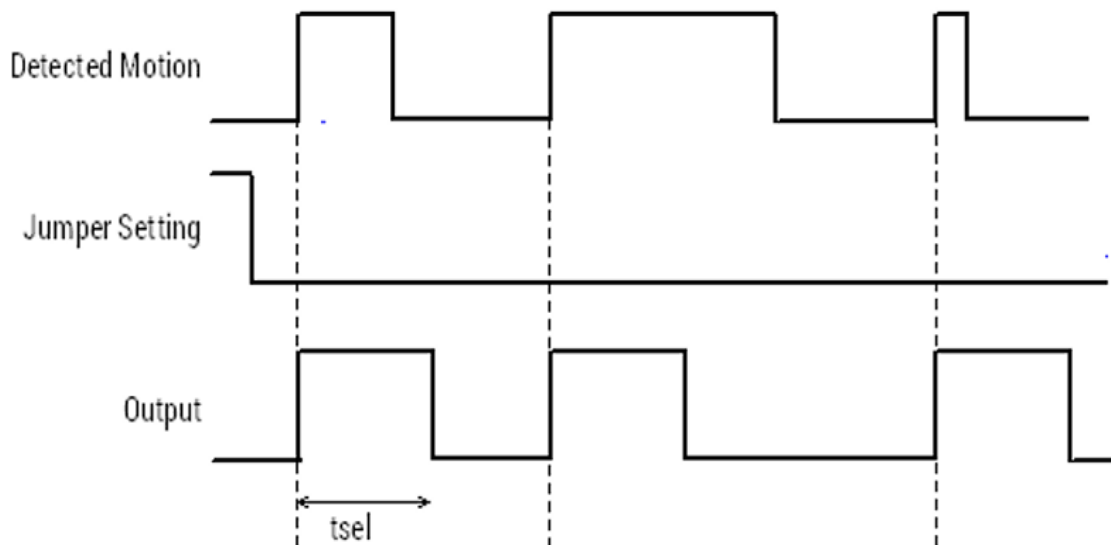


Fig.3.2.6(a) Single trigger mode timing diagram

The jumper setting on the PIR sensor should put to LOW in order to activate Single Trigger mode.

When movement is identified in the single triggered mode, the output turns HIGH.

Even if the item is moving, the output changes to LOW after a specific delay (tsel).

If the object is still moving, the output goes from LOW to HIGH for a while.

The user adjusts this delay (tsel) using the potentiometer. On the board of the PIR sensor.

- The PIR sensor responds to continuous motion by sending HIGH/LOW pulses.

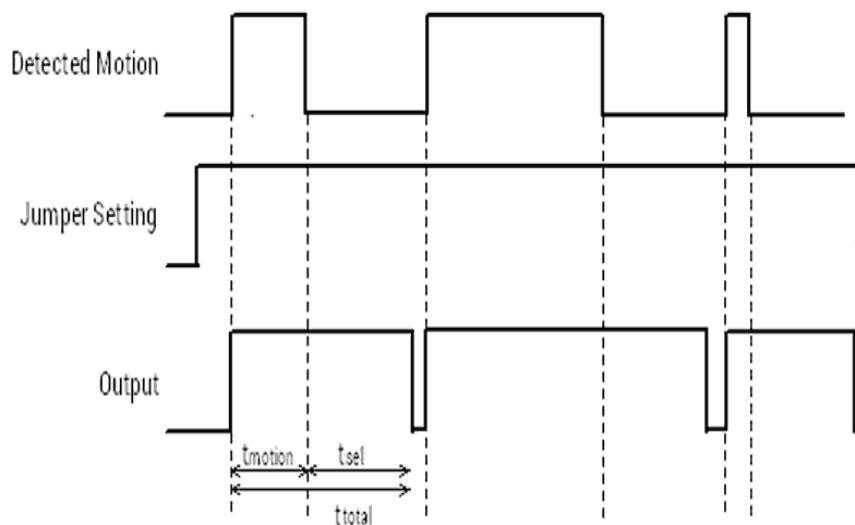


Fig.3.2.6(b) Repeat Trigger mode.

The setting on the PIR sensor should set to HIGH in order to select Repeat Trigger mode.

When movement is detected in the Repeat Triggered Mode, the output increases.

The PIR sensor's output is HIGH until the object starts moving.

Up to a certain duration after an object stops moving or leaves the sensor region, the PIR remains in the HIGH state (t_{sel}).

- By altering the potentiometer, we are able to provide this delay (t_{sel}). On the board of the PIR sensor module is this potentiometer.

- In this approach, if an object is moving continuously, the PIR sensor will produce a HIGH pulse.

GPS :

The GPS, which stands for the Global Positioning System, as a system based on which estimates and calculates where it is on the globe using satellite and ground units. The Global Time and Range Positioning Network is another name for the GPS. For precision, the GPS receiver has to get information from a minimum of 4 satellites.. The acronym "GSM modem" relates to a thing type of that functions as either a cell phone or a modem that can be used to connect a system or any other core to an internet connection.. A cell phone broadband needs the use of a mobile SIM card that is able to function on network for which the service provider have registered.



Fig. 3.2.7 GPS Transmitter

A GPS receiver predicts the exact place no whether it can be by using a group of satellites and earth.

These GPS will moving data to the receiving at radio frequency (1.1 to 1.5 GHz). A earth station or GPS module may predict its place and using the information it has received.

Different parameters like longitude, latitude, altitude, time, etc. are differentiated by commas in this NMEA string output from the GPS receiver.



Fig. 3.2.8 GPS Pin Description

VCC Power Supply 3.3- 6V

GND: Ground

TX: Send information sequentially that finds data about place, time etc.

We can assess the GPS module's output prior to interfacing it with the PIC18F4550 microcontroller. We can extract longitude, latitude, and time data from that string, which is useful for determining a place's and a time's position.

Connect this GPS module to the PC using a DB9 connector or USB to Serial adapter to accomplish this. Also, it is essential to keep the GPS module's aerial in the appropriate position.

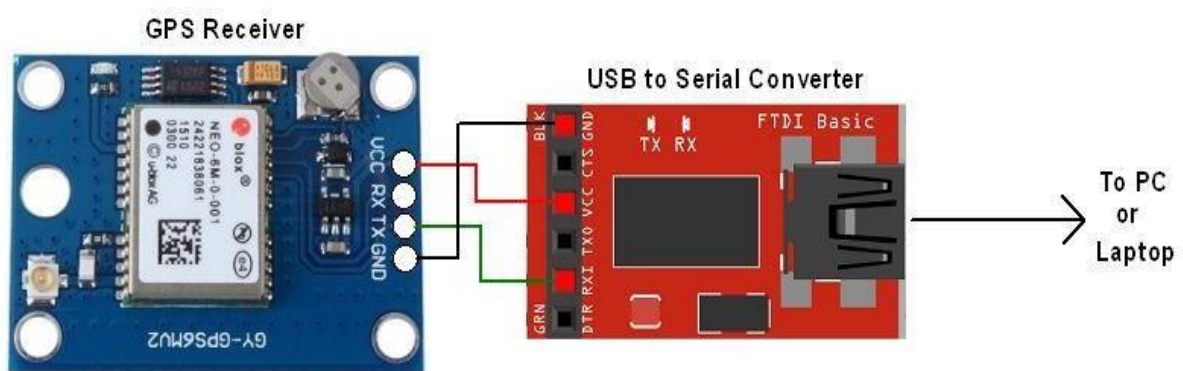


Fig. 3.2.9 GPS Receiver

Start your computer or laptop and any sequential terminal, such as Realterm, Hyper Terminal, Putty, etc.

Start the PORT at 9600 baud.

Data from the GPS receiver module will be shown on the terminal.

GSM : A wireless device is the "Global Standard for Cellular Communication," or simply "GSM. Bell Labs developed the GSM idea in 1970. The entire world utilizes this wireless communication method extensively. GSM, an open, digitized cellular technology, uses the 850MHz, 900MHz, 1800MHz, and 1900MHz frequency bands to offer cellular data and voice services.

The GSM system was created using the time division multiple access (TDMA) method as a digital communication mechanism. Before being transferred over a channel containing two independent streams of client data, each in its own individual time slot, the data is first compressed and digitalized by a GSM

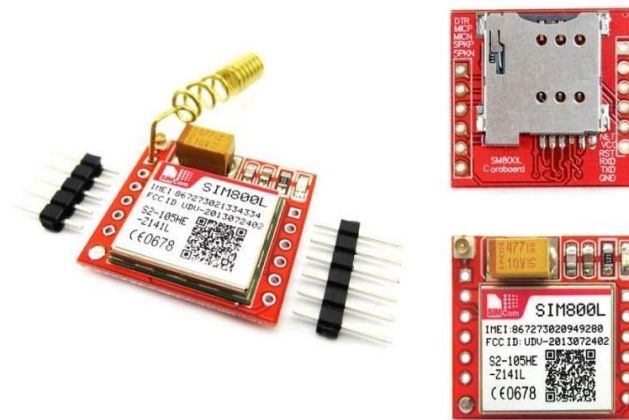


Fig. 3.2.10 GSM (SIM800L)

In a GSM network, there are the following elements:

A mobile station is a mobile phone with a transceiver, a display, and a processor that is operated by a SIM card that communicates across a network. Base Station Subsystem: This system serves as an interface between the network subsystem and the mobile station.

It is made up of the Base Transceiver Station, which manages the protocols for connection with mobiles and houses the radio transceivers. It also comprises of the Base Station Controller, which functions as a conduit between the mobile station and the mobile switching center and regulates the Base Transceiver station.

Network Subsystem: It gives mobile stations their first-ever network connection. The Mobile Service Switching Center is the foundational component of the Network Subsystem that access to a variety of networks, including ISDN, PSTN, etc. The Home Location Register and Guest Location Register are also included, which enable the GSM's call routing and roaming features. Moreover, it contains the Equipment Identity Registry, which keeps track of all mobile equipment and assigns an individual IMEI number to each mobile device. International Mobile Equipment Identity is what IMEI stands for.

Enhanced spectrum effectiveness

Fixed dialing number (FDN) management;

SIM phonebook management;

Real-time clock with alarm management

High-quality speech; call security enhanced by encryption; short message service (SMS). Thanks to the security protocols established for it, the GSM system is the most secure telecommunications technology now in use. This is a vital step towards achieving end- to-end security, even if call confidentiality and GSM subscriber secrecy are only guaranteed over the radio channel.

The ability to communicate between a computer or any other processor via a network is provided by a GSM modem, which can be either a mobile phone or a modem device. A SIM card is necessary to utilize a GSM modem, which utilizes a network range that the network operator has registered to. It has three distinct interfaces for PCs: Bluetooth, USB, and serial. Whenever linked to the machine's serial interface or USB socket using the appropriate connection and application driver, an ordinary GSM cell phone can serve as a modem for GSM networks. Many times, a GSM modem is preferred than a GSM

cell phone. A few instances of mobile phone uses include payment terminals, logistics administration, antivirus programs, and weather monitoring devices.

To get, transmit, or erase SMS writings, use a SIM.

Assess, alter, and retrieve the SIM's contact information.

Make a voice call and either accept it or not.

The MODEM requires AT instructions in order to communicate with the processor or controller, which is done via serial transmission. These orders are issued by the processor/controller. The MODEM reacts to a command by producing a result. To connect with the GSM and GPRS cellular networks, the processor, controller, or computer can transmit any of the AT instructions that the MODEM can receive.

GSM Architecture

The Radio system, Network and Switching Subsystem, and Operation Subsystem make up the GSM architecture. The earth station and base station systems together form the radio system. A receiver, display, and CPU make up the mobile station, which is typically a cell phone. Each handheld or mobile device has a unique identity that is kept in a SIM module (Subscriber Identity Chip). It is a tiny microchip that is put into the mobile phone and houses the mobile station's database.

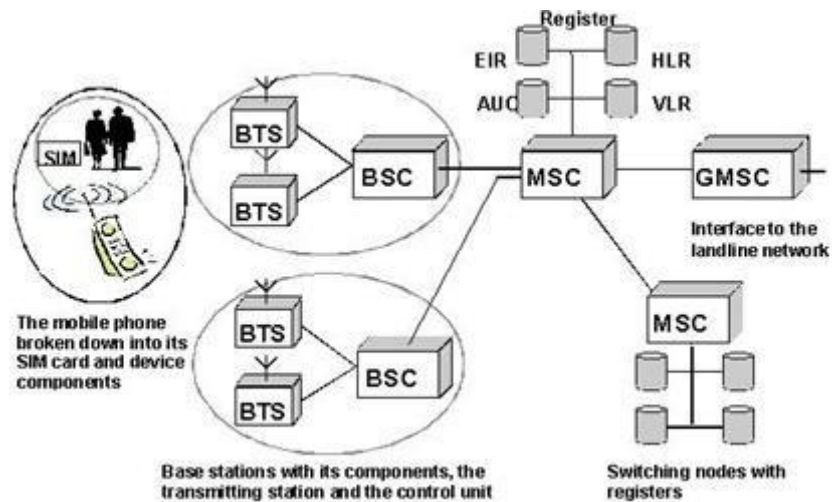


Fig.3.2.11 GSM Architecture

LCD:

Scratch pad displays and other smaller PCs use LCD (Liquid Crystal Display) technology. LCDs allow presentations to be far slimmer than technology for cathode beam tubes, similar to technology for light-producing diode (LED) and gas-plasma (CRT). LCD displays use a lot low electricity than LED and gas since they operate by the following of obstructing light rather than emitting it.

For a dynamic framework exhibition, an LCD is either constructed using an unconnected lattice or a showcase network. The flexible LCD is sometimes referred to as a thin film transistor (TFT) display. At each intersection of the network of pixels on the uninvolved LCD lattice, a matrix of conductors is present. A current is sent to control by two conductors on the lattice.

Every pixel crossing point in a functional framework has a transistor, which uses less current to control pixel luminance. Certain independent network LCDs have double filtering, which means that they inspect the matrix with current twice while the initial innovation only swept it once. Nonetheless, dynamic lattice is still a superior.

A 16x2 LCD display is a crucial component that is frequently used in many devices and circuits. It is popular to use these modules with more than seven segments and other multi-fragment LEDs. The grounds for this are that LCDs are reasonably priced, efficiently programmed, and do not have any limitations on the display of unusual and even custom characters (unlike in the seven fragments), movements, etc.

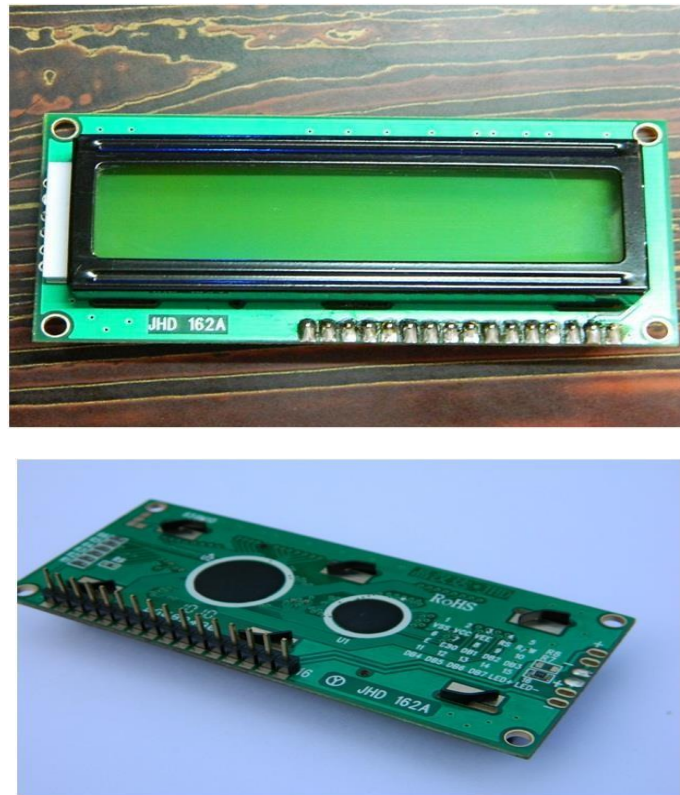


Fig.3.2.12 LCD Display

A 16x2 Display demonstrates how Sixteen letters may be shown in either of the two panels. In this LCD displays, every letter is presented within a grid of 5x7 pixels. The Control and Data bits on the display are two separate registers.

The orders sent to the display are kept in the order register. An order represents a command that tells LCD to perform a certain action, including introducing it, wiping out its screen, moving the pointer, controlling presentation, and so on. The information register will contain the data that will be shown on the LCD. The information is the ASCII reward for the symbol to show up on the LCD.

The LCD can distinguish two main message types: information inputs and controlling inputs. These signals are detected by the display module depending on the RS pin status. By increasing the R/W pin, information can now be extracted as well read from the display's LCD. The liquid crystal display (LCD) processes and displays information at the receding edge of each wave when the E bit is successfully pulsed; the same is also relevant in the transfer case.

Data/Signals/Execution of LCD

But this was related to the equipment and the signals. Now, let's talk about data, messages, and action.

Data messages along with control data are the two signal kinds that the LCD can distinguish between. Depending on the RS pin status, the LCD module recognizes these signals. By elevating the R/W pin, data can now be received from the display's LCD. The LCD display reads and executes data at the falling edge of the pulse after the E pin has been pulsed; this is also true in the transmission scenario. The LCD display places a character or issues a command in 39–43 S. Apart from clearing the display and looking for the cursor's home point, it takes 1.53 to 1.64 milliseconds.

Any attempt to communicate data prior to this window could prevent some devices from reading or processing the current data. Some devices reduce their speed by storing incoming data in a few temporary registers.

For LCD panels, there are two RAMs: DDRAM and CGRAM. The location where the character would appear in the ASCII chart is stored in DDRAM. Each point on the LCD panel is represented by one DDRAM byte.

The data is taken from the DDRAM by the display controller and shown on the LCD panel. With CGRAM, users may design their own characters. Users are given access to the initial 16 characters in ASCII as address space. Once CGRAM has been configured for displaying characters, users may quickly and simply display their unique symbols on the LCD screen.

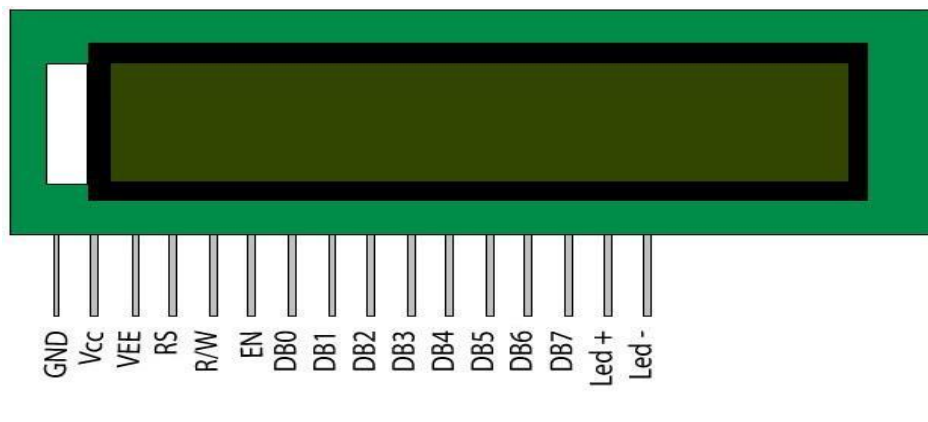


Fig. 3.2.13 LCD Pin Description

Light Emitting Diodes:

The light emitting diode is a two-lead semiconductor light source. In 1962, a General Electric employee Nicolas Holonyak created the idea for the light-emitting diode. The electrical properties of the light bulb, a special type of diode, are like those of a diode with a PN junction.

The LED takes up a very small space, less than 1 mm². LEDs are employed in a variety of electrical and electronic projects. The operation of the LED and its uses will be covered in this article.



Fig. 3.2.14 LED

The light-emitting diode is a p-n junction diode. It is an exceptional type of semiconductor and a highly doped diode. When a light emitting diode is forward biased, light is produced. A diode is frequently referred to as a light-emitting diode. When the diode is forward biased, the electrons and holes are constantly merging and pushing one another aside as they move fast across the junction. Just as the electrons go from n-type to p-type silicon, it mixes with the holes before dissipating. The outcome is a photon, a tiny packet of light, which gives the entire atom a little energy boost and makes it more stable.

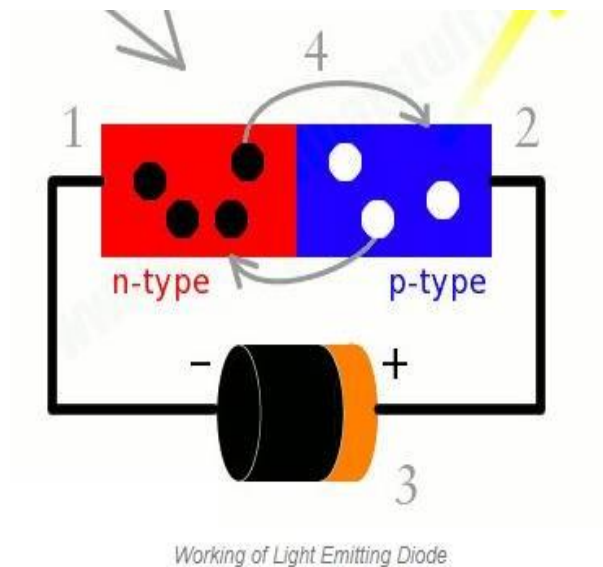


Fig. 3.2.15 LED Working

In essence, a (LED) is a pn junction diode. Incoherent light is produced when carriers are injected through a junction that is forward-biased. A heavily doped n and p junction is used to create the majority of commercial LEDs.

A crucial class of industrial LEDs that can be clearly distinguished. Ternary compounds with the intention of alloying the GaAs and GaP denoted by $\text{GaAs}_{1-y}\text{P}_y$ compound and

an instantaneous crevice is InGaAlP in this instance. A homojunction is a type of LED that uses two semiconductors with different levels of doping but the same base material. They are referred to as heterostructure devices when they are recognised using various bandgap material. A homojunction LED is less luminous than a heterostructure LED.

The LED is essential to the LED surface's ability to emit light.. The arrangement of the LEDs ensures that the bulk of recombinations occur by the following two methods at first glance. • By increasing the substrate's doping level, which causes more free minority charge transporters to rise to the surface, mix, and emit light there. By increasing dispersion length $L = D\tau$, wherein D is its dispersal coefficient and τ is the carrier life time. However, when stretched beyond a fundamental length, there is a chance that the photons will be retained by the apparatus once again.

The typical base for an LED is an n-sort substrate with a terminal attached to the p-sort layer stored on it. P-sort substrates do exist, despite being less basic. Many commercial LEDs, especially GaN/InGaN, also use sapphire substrate. Driving productivity: The outside quantum proficiency second is a crucial LED metric. It gauges how effectively electrical energy is converted into transmitted optical energy. Its distinctive feature is the isolation of the light production from the electrical information power.

It is also described as the outcome of productive extraction and internal radiative skill. $\eta_{\text{ext}} = P_{\text{out}}(\text{optical})/IV$ ext is typically less than 1% for backhanded band gap semiconductors, however it may be generous for an instantaneous band hole material. the ratio of the radiation recombination rate to the total recombination.

LED have a lot of applications. Following are few examples.

- Light bulbs
- TV remote (TVs, VCRs)

- Light
- Bike indicators
- Mobile
- Swimming pool lighting

LEDs release much light per unit than radiant knobs, which is advantageous in battery- or energy-powered devices.

Unlike conventional lighting systems, LEDs don't need to use shade channels to emit light with a designed shading.

The powerful bundle of the LED might be intended to focus its light, which is more efficient and can save startup costs. An outside reflector is frequently needed to collect and guide light from glowing and fluorescent sources.

Motor Driver:

In autonomous motors, the motors are often driven by a computer chip called a motordriver. A motor driver connects an Arduino to the motors. The most often used motor driver ICs are those in the L293 series, which includes the L293D, L293NE, etc. These ICs are designed to control two DC motors simultaneously. L293D has two H-bridges init. An H-bridge is the most basic circuitry for controlling an electric motor having a low power rating. We'll just call the motor driver integrated circuit L293D. L293D is made of 16 pins.

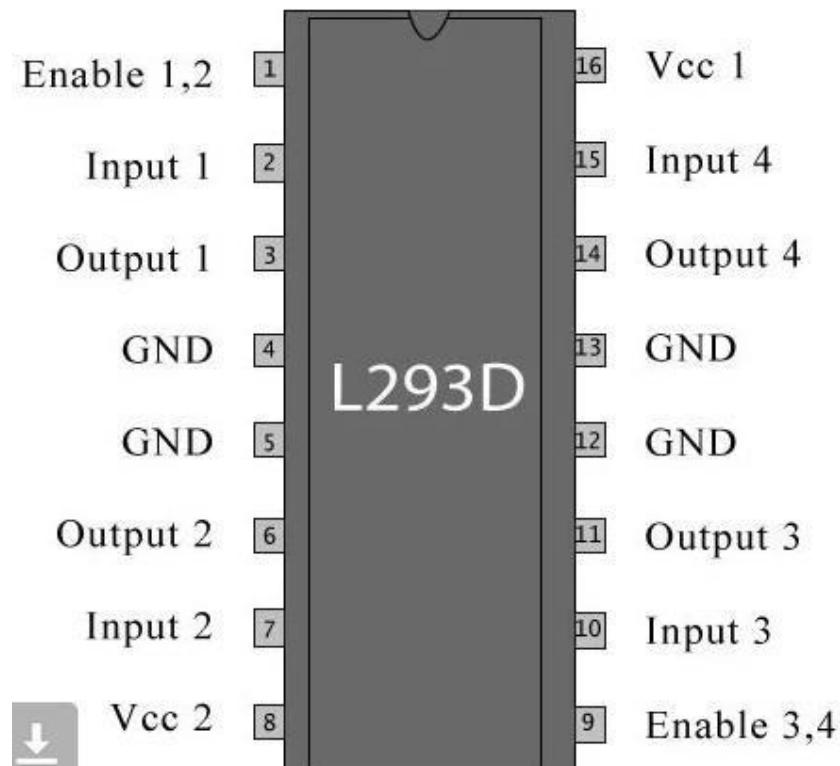


Fig. 3.2.16 Motor driver pin Description

According to the pin diagram, the l293d has 4 input pins: pin 2, 7, on the left, and pin 15,10, on the right.

Rotation will be controlled by right input for the motor on the right side and left input for the motor linked across the left. The motors are rotated by inputs that are supplied over input pins as LOGIC 0 or LOGIC 1.

Consider a motor that is attached to the left output pins (pin 3, 6). Logic 1 and Logic 0 must be connected to the input pins in order for the motor to rotate in a clockwise orientation.

Pins 2 and 7 have logic values of one and zero, respectively.

Pins 2 and 7 are both logic 0 and anticlockwise, respectively. Direction

Pins 2 and 7 are both set to logic 0 and idle, respectively. [High-Impedance condition]

VCC is the 5 volts it requires to operate internally; L293D won't use this voltage to power the motor. It features a separate provision to offer motor supply VSS for driving the motors (V supply). This will be used by L293d to power the motor. This means that if you wish to run a motor at 9V, you must supply 9V via the VSS Motor supply.

The VSS motor supply's maximum voltage is 36V. The maximum current it can deliver per channel is 600mA. You can drive quite large motors with this L293d because it can drive motors up to 36 volts. The voltage for its own internal operation is at VCC pin 16. The highest voltage reaches 5 volts.

DC Motor:

Often referred to as direct current, or DC, motors are devices that convert electrical energy into mechanical energy. Electricity is utilized by direct current (DC) motors to turn the wheels.

DC engines revolve a rotating component within the output shaft using magnetic fields created by electrical currents. The torque and velocity produced by an electric motor depend on both the electrical input and the motor's design. A "DC motor" is a common term for an electric spinning machine that converts straight-current electricity into mechanical power. DC motors come in a wide variety of designs, sizes, and powers, from little ones used in toys and household products to enormous ones used to power cars, lifts, staircases, and steel rolling machines.

A DC motor's two primary components are the armature and the stator, which is pronounced "stator." A motor's stator does not move; only the revolving armature does. The armature of a DC motor is propelled into motion by a rotating magnetic field created by the stator.

A simple DC motor employing a current-driven wire loop and a set of permanent attraction magnets in the stator produces a field of magnets centered on the coil. Insulated wire is wound in a few winds and wound around the base of the engine to concentrate the magnetic field.

The strands of insulated wire are connected to a commutator, an electrical switch that spins and turns the current to the windings. Every stator coil is switched on by the commutator.

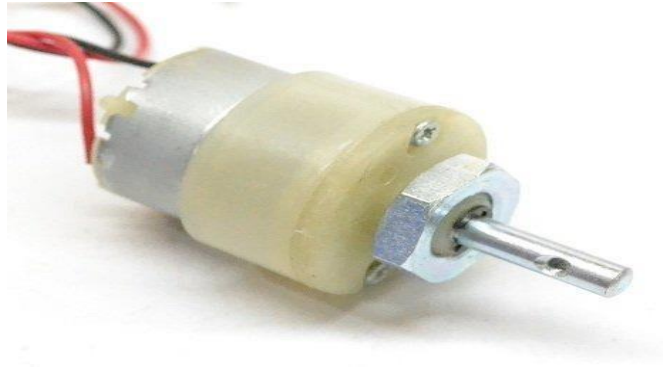


Fig. 3.2.17 DC Motor

A commutator, a switch on an electrical system that rotates and rotates the current to the windings of insulation wire, is linked to the the windings of insulated wire. A commutator may turn every armature coil in turn, creating a steady rotating force (referred to as torque).

3.3 SOFTWARE DESCRIPTION

Arduino IDE

Arduino.cc officially published a software called the Integrated Programming Sustainability, or the IDE for the Arduino, which is largely used for writing, assembling, and sending programs to Arduino hardware. Almost all Nintendo modules are interoperable with this free and open source device, which is easy to set up and begin using to start creating software when you're on the go.

Even the typical individual with little to no knowledge of technology can get their feet wet in the initial stages thanks to official Arduino program which makes assembling code so straightforward. Creating and generating programming for the Arduino Unit is done mostly using the free access Arduino IDE implementation.

It works using the Android Platform that laid out and is easily accessible for MAC, Microsoft Windows, and Raspberry systems of operation. For troubleshooting, editing, or generating programs in the environment, this system includes built-in methods and instructions.

Amongst the alternatives are the Arduino boards Uno, Usb Mega, Usb Leonardo, Usb Micro, and several additional Arduino modules. • Each of them includes a tiny computer on the motherboard that is actually programmable and takes user input.

Both languages C++ and C are available in this type of setting.



Fig. 3.3.1 Arduino IDE

One of the advantages of using the Arduino IDE is its versatility. It supports a wide range of Arduino boards and shields, and it can be used on different operating systems such as Windows, Mac OS, and Linux. It also has a large and active community of users who share their knowledge, code, and projects.

Overall, the Arduino IDE is a powerful and easy-to-use tool for programming Arduino boards, making it an ideal choice for hobbyists, students, and professionals alike.

CHAPTER 4

DESCRIPTION OF PROPOSED SYSTEM

This chapter tells about the or describes about the proposed system we are going to implement. Before going to implement this model we should know some basic things like the methodology of the model, block diagram or the architecture of the model and we should have some project management plan etc.....

4.1 METHODOLOGY OF THE MODEL

The title itself suggests that whenever someone tries to steal a jewel from a shopping centre, the robbery will be immediately stopped thanks to some human detecting sensors and vibration sensors, which will also cause the doors to close on their own. Thus, the thief has been apprehended. There are two aspects to this project. Three components make up the transmitter section: a PIR sensor, a motor, a microcontroller, and a GSM module. Using a PIR sensor, which is used to detect human motion, is one such example. One PIR sensor will be turned on when someone tries to steal jewellery from the jewellery counter in the mall, at which point it will begin to detect human movements at the receiving area. The proposed title itself indicates that robber wants to steal a gem from a mall or jewellery store, the robbery will be promptly caught with the use of some human recognizing sensors and vibration sensors, causing the ways to close naturally. That suggests the offender has been apprehended. There are two sections to this extension. A PIR sensor, an engine, a small-scale controller, and a GSM module make up the transmitter component. Utilizing a PIR sensor, which is used to identify human movement, is one such thing. One PIR sensor will be turned "ON" whenever someone tries to remove the diamond setter from the jewels corner in the shopping mall.

When input power is supplied to the system, it enters standby mode. However, when the connector terminals short circuit, which happens when a person steps on the floor mat and presses the button, the preprogrammed warning message is promptly delivered to the concerned telephone number. Using the suggested security method, the input connection is linked to three intrusion detection devices (one electronic mat and two motion sensors). The security system also has a call-alert feature that is optional and may be used to place a call. This option can also be used

to send a missed call alert during an intrusion attempt. Any of our SIM900A modems may be used with the device, as can any Arduino Uno board.

In this project, we have developed a model which is very useful for real time applications in jewelry shops, banking systems and in shopping malls. This model is very useful for the shop owners to and helps them to prevent jewelry robberies. The model is very efficient and working model has good efficiency but it has some setbacks or drawbacks. Firstly , Arduino board is connected to GSM and GPS. Again these GPS and GSM are interconnected. Arduino board pins are connected to LCD and LED and finally to the motor driver. The above discussed matter is all about the receiving section. Now coming to the transmitter section. Transmitter section consists of GPS ,PIR sensor, Vibration sensor. Arduino board pins are again connected to PIR sensor, Vibration sensor. PIR sensor and Vibration sensor are again interconnected to each other. This is all about the transmitter section.

A PIR sensor, an engine, a small-scale controller, and a GSM module make up the transmitter component. Utilizing a PIR sensor, which is use movement, is one such thing. One PIR sensor will be turned "ON" whenever someone tries to remove the diamond setter from the jewels corner in the shopping mall. The system goes into standby mode when input power is given to it. However, thepreprogrammed warning message is immediately sent to the concerned mobile number when the connector terminals short circuit, which occurs when a person stepson the floor matand pushes the button.

4.2 ARCHITECTURE DESIGN OF PROPOSED SYSTEM

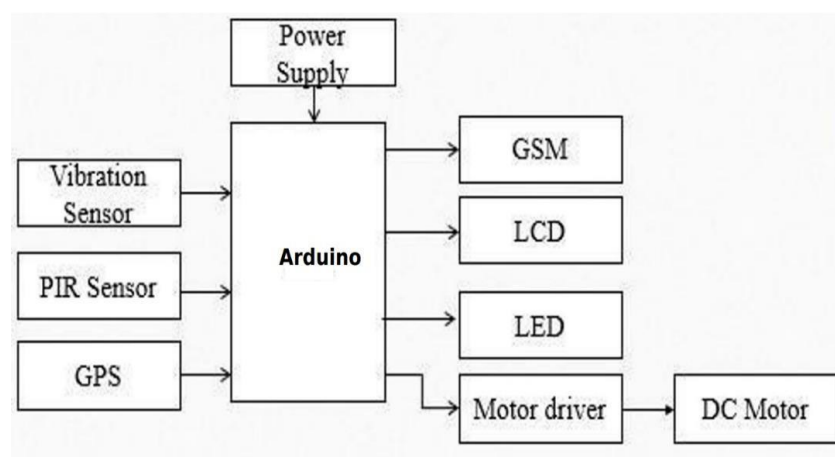


Fig. 4.2.1 Architecture Design

Arduino, vibration sensor, and PIR sensor are all components of the proposed system. I utilised a PIR sensor to find human movements. Shop vibrations are detected using vibration sensors. If any vibrations are detected, the door will close automatically using a DC motor, the LED will turn on, and a message will be sent to the appropriate person with the location using GSM. The appropriate individual will receive the alert if any human motion is detected. An Arduino microcontroller, a motion sensor, PIR and vibration sensors, GPS, an alarm, and a SIM900A-based GSM/GPRS modem make up the proposed security system. A 12VDC/2A power supply unit or battery is capable of supplying power to the complete system.

4.3 PROJECT MANAGEMENT PLAN

A plan is an essential component of any project, including the design and implementation of a theft alert and auto arresting system in jewelry shops. The plan outlines the key activities, timelines, and resources required to successfully complete the project. Below is a sample project management plan for this project:

Project Objectives: The main motive of the project are to design, build, and test a theft alert and auto arresting system in jewelry shops that can detect and send SMS to owners and providing real-time updates to emergency responders.

Project Timeline: The project timeline is broken down into the following phases:

Planning Phase (1 week): The task group will outline the endeavor's goals, dimension, and objectives at this point in time.. They will also develop a project management plan, identify project risks and mitigation strategies, and establish a communication plan.

Design Phase (3 weeks): In this time, the project team will design the hardware and software components of the robot, including the sensors, microcontroller, and GSM and GPS.

Implementation Phase (5 weeks): During this phase, the project team will build and assemble, program the microcontroller, and develop the GPS system.

Testing Phase (2 weeks): In this time, the project team will test the functionality and performance in a controlled environment.

Deployment Phase (2 weeks): This time, the project team will deploy in a real-world environment and test its functionality in a real world scenario.

4.4 ALGORITHM

Here's an algorithm flowchart for theft alert and auto arresting system in jewelry shop.

Start

Initialize system components(sensors, alarm, door lock)

While True:

- Wait for motion detection signal from the sensor.
- If motion detected:
 - Capture images of the area using camera.
 - Analyze the images to detect suspicious movements.
 - If suspicious behavior detected :
 - Activate the alarm to alert the staff and customers.
 - Send an alert message to the security personnel.
 - Lock the shop entrance doors to prevent the suspect from leaving.
 - Record the incident and store the images for later review.
 - Wait for confirmation from the security personnel.
 - If confirmation received:
 - Release the door lock and reset the system.
 - If confirmation not received:
 - Wait for a time out period.
 - If confirmation still not received :
 - Call the police and report the incident.
 - If suspicious behavior not detected:
 - Continue monitoring for motion detection signal.

This flowchart represents the basic algorithm logic for a theft alert and auto arresting system in jewelry shops. It includes the key steps of motion detection, images, alarm

generation, automatic door locking, confirmation and police reporting. The algorithm can be customized and optimized based on the specific requirements of the jewelry shop and the available hardware and software components.

4.5 STANDARDS

IEEE 255	Standard Letter Symbols for Semiconductor Devices, IEEE-255-1963
IEEE 829	Software Test Documentation
IEEE 830	Software Requirements Specifications
IEEE 1233	System Requirements Specification
IEEE 1275	Open Firmware
IEEE 2050	RTOS for embedded systems standard
IEEE2413	Standard for an Architectural Framework for the Internet of Things (IoT)
IEEE 1471	System Architecture

4.6 CONSTRAINTS AND TRADEOFFS

- Cost affordability is also a challenging task.
- People accepting model is a challenge.
- GPS should be kept in an unknown area such that the theft should not identify
- Attaching GPS to the item is also a challenging.

The possible trade-offs that can be faced with utilizing this tool are as below:

Cost of implementation:

With the usage of GPS and GS, the overall cost of initializing and implementing the model will be slightly elevated.

4.7 DEPLOYMENT SETUP OF PROPOSED MODEL

To design and implement an theft alert and auto arresting system in jewelry shops, the following Development and Deployment Setup can be used:

Hardware components

Arduino or similar microcontroller board

Sensors (PIR, Vibration etc.....)

Motor driver and motors

Power supply (battery or adapter)

Software components:

Programming language (Python, C++, etc.)

IoT platform (such as Arduino IoT Platform)

Development and deployment process:

Gather hardware components and assemble the robot.

Write the code for controlling the movements and collecting data from the sensors.

Set up the IoT platform and configure the Raspberry Pi or Arduino to connect to it.

Deploy the system to the target environment and test its functionality.

This chapter tells or describes about the implementation details like how we are going to implement this model based on our requirements. Mainly, in this chapter we are going to see the deployment setup of the proposed model and also how are going to give connections to the model. Below, is the Deployment setup of proposed model that we have implemented.

CHAPTER 5

RESULTS AND DISCUSSION

Details regarding the experimental findings of the suggested method are provided in this section. With an Arduino board and GPS, the locking of jewelry store doors has been implemented effectively. The design's various modules communicate effectively without interfering with one another. All requirements and parameters are met during design. Before realizing the hardware, software tools like arduino ide, proload to dump the source code into the microcontroller, and orcad lite for the schematic diagram were used to generate the software code.

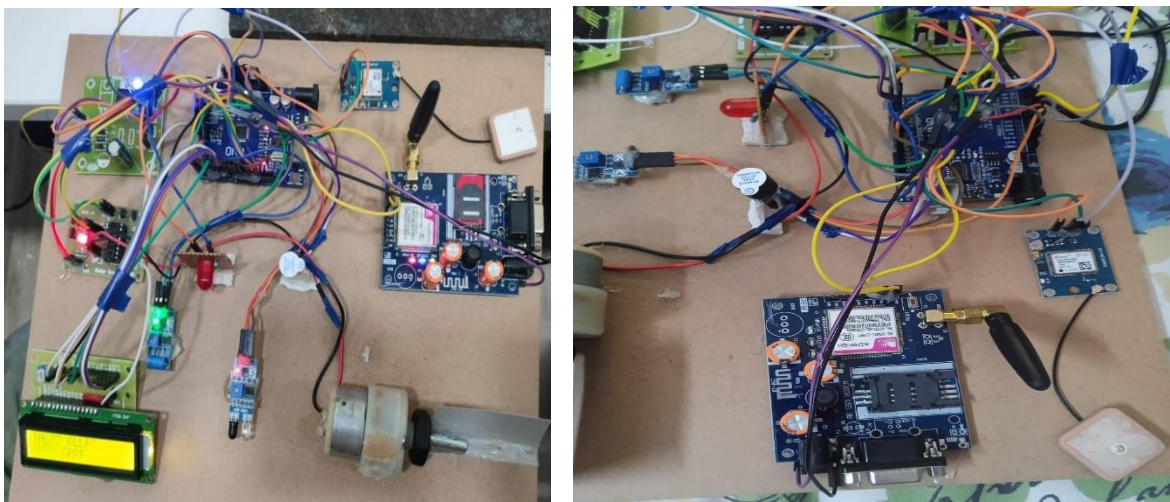


Fig. 5.1 Implementation of theft alert system

All programmers should communicate with the poor vision user using the same controls in order to provide a positive user experience. All apps should have a consistent interface for the user to move between views. Finding controls that are appropriate for both low vision users and sighted people is the first step in making this achievable. Both blind and sighted people seem to be able to use a button-type control. However, in order to suit the needs of low vision users, other elements like toolbars, segmented controls, tables, or data pickets would need to be modified. At this point, new controls for users who are blind could also be developed.

The next step is to develop usability tests for those controls after we have specified them. The tests are employed to examine how a low vision user engages with a particular control. We can assess a user's ability to navigate between views, recognise controls, and interact with them during a usability test.



Fig. 5.2 Location details received

The definition and testing of these controls will provide users with the necessary user experience to enable them to recognise view components and move through any app of the portal with ease. The usage of or another TTS (text to speech) library would be a compliment to an accessible design that is practical. The final phase is to begin designing the portal apps once we have all the components required to create a strong low vision user app. Below are a few examples of mobile apps that will be available. The majority of these apps are classic ones had been updated to accommodate users who are blind or visually challenged.

In this project, we have developed a model which is very useful for real time applications in jewelry shops, banking systems and in shopping malls. This model is very useful for the shop owners to and helps them to prevent jewelry robberies. The model is very efficient and working model has good efficiency but it has some setbacks or drawbacks.

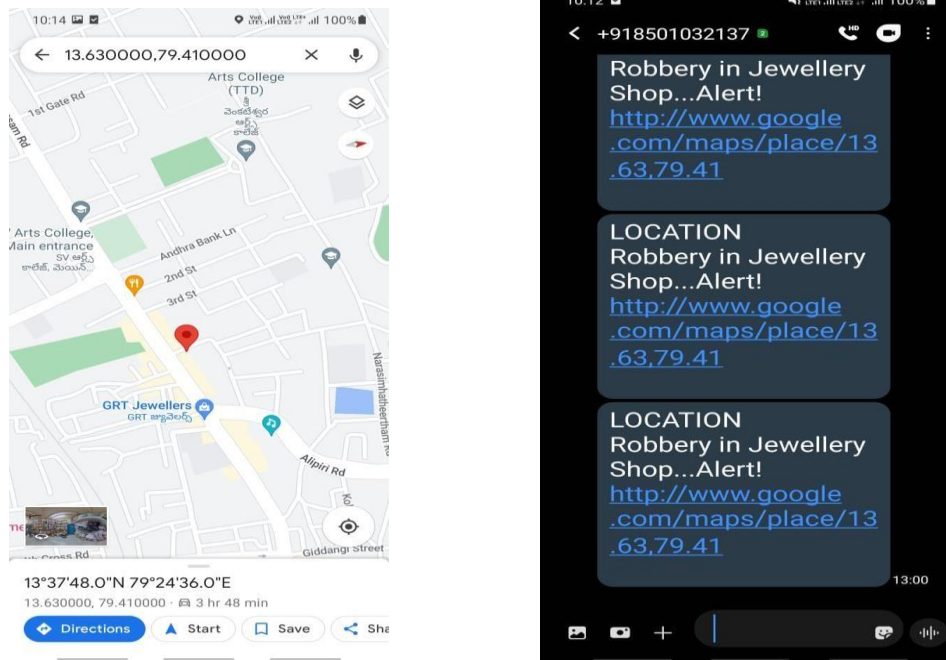


Fig. 5.3 Alert Message and location details

Contacts: The user will be able to browse his contact list with this app.

Finding a certain contact in the list will be simpler with voice over and special gestures.

SMS: The user can send SMS messages to his contacts quite easily with this software. Alarm: This app allows you to set the date, time, and alarms.

GPS Location: This simple App will inform the user about his location: street number, city.

A specific API will be created to assist developers in adding their own apps to the mobile portal. The low vision mobile app portal capabilities included in this API will make it easier for developers to create apps for low vision consumers. For the optimal user experience, design for usability is a fundamental tenet.

CHAPTER 6

CONCLUSION AND FUTURE WORK

This chapter tells about the conclusion and future work of the proposed model. Based on the final output of the we can conclude that this system is very helpful in shopping malls, theatres , banks etc....In this future this system can be implemented on different platforms like IoT, Raspberry pi etc.....In this way this system can be updated or upgraded on different platforms. So, this all about the conclusion and future work of our proposed system or model.

6.1 CONCLUSION

We have developed a really effective design that will be the greatest in the future. The security will be boosted when technology is used to prevent robberies in all business areas. PIR and vibration sensors, which are used by shopping mall owners to detect the majority of robberies in their stores, are incredibly sensitive sensors to detect even the smallest human activity. This design is highly effective and will be very helpful in the future. Jewelry Tracker helps law enforcement find and apprehend offenders, retrieve stolen goods, and discourage future crime in the case of a robbery future crime in the case of a robbery. So, finally by doing this project we understood that when an item in jewelry shop is theft or stolen by anyone easily we can identify by using this system. This system has number of advantages and applications.

More easy, which is felt as soon as one is seated. And also it is inexpensive and a better approach that can be employed with current techniques. Security and protection will be available by using this system .By using this system we can have reduced human interaction and also full automation of stock control procedures and checks the data frequently and also decreased shrinkage due to better theft alerts. Jeweler's use this tried-and-true technique to safeguard rings, watches, and chains. Numerous models are put out to address the issue of jewellery theft. The same concepts are suggested for security systems in cars and homes. Though the aforementioned models are not perfect, they do help with the aforementioned issue.

This system can be used in different applications like in shopping malls, jewelry shops, banks and in theatres etc.. In this way this system has different applications.

6.2 FUTURE WORK

The theft alert and auto arresting system in jewelry shops provides an innovative solution for detecting and identifying while also monitoring the area for changes in conditions. However, there are several areas where future work could be done to improve the system and its capabilities.

Integration with IoT platforms: Currently, the system relies on transmitting data to the cloud using MQTT. In future work, the system could be integrated with other IoT platforms, such as Amazon Web Services or Google Cloud, to enable more advanced data analytics and machine learning capabilities.

Enhanced environmental monitoring: While the we can monitor with the help of sensors, future work could be done to add additional sensors that can detect other environmental conditions.

Scalability: While the current implementation is designed for a single system, future work could be done to enable multiple to work together to tackle space in jewelry shops.

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APPENDIX

Source code

```
#include <TinyGPS.h>

static const uint32_t GPSPBaud = 9600;

TinyGPS gps;

float flat, flon;

#include<LiquidCrystal.h>

LiquidCrystal lcd(2, 3, 4, 5, 6, 7);

#define vibration 8

#define ir_sensor 9

#define motor1 10

#define motor2 11

#define buzzer A0

#define led_red 12

String msg;

void setup() {
  Serial.begin(9600);
  lcd.begin(16,2);
  Serial.begin(GPSPBaud);
  Serial.print("GPS ");
  Serial.println(TinyGPS::library_version());
  Serial.println("Ready to Start");
  Serial.println();
  delay(1000);
  pinMode(vibration, INPUT);
  pinMode(ir_sensor, INPUT);
  pinMode(motor1,OUTPUT);
  pinMode(motor2,OUTPUT);
  pinMode(buzzer,OUTPUT);
  pinMode(led_red,OUTPUT);
  digitalWrite(motor1, LOW);
  digitalWrite(motor2, LOW);
}
```

```

void loop() {
  bool newData = false; unsigned long chars;
  unsigned short sentences, failed;

  // For one second we parse GPS data and report some key values for (unsigned
  long start = millis(); millis() - start < 1000;)
  {
    while (Serial.available())
    {
      char c = Serial.read();
      // Serial.write(c); // uncomment this line if you want to see the GPS data flowing if
      (gps.encode(c)) // Did a new valid sentence come in?
      newData = true;
    }
  }

  if (newData)
  {
    // float flat, flon; unsigned long age;
    gps.f_get_position(&flat, &flon, &age); Serial.println("LAT=");
    Serial.println(flat == TinyGPS::GPS_INVALID_F_ANGLE ? 0.0 : flat, 6);
    Serial.println(flat);
    Serial.println(" LON=");
    Serial.println(flton == TinyGPS::GPS_INVALID_F_ANGLE ? 0.0 : flon, 6);
    Serial.println(flton);
    Serial.print(" SAT=");
    Serial.println(gps.satellites() == TinyGPS::GPS_INVALID_SATELLITES ? 0 :
    gps.satellites());
    Serial.println(" PREC=");
    Serial.print(gps.hdop() == TinyGPS::GPS_INVALID_HDOP ? 0 : gps.hdop());
    Serial.println(" ");
  }
}

```

```
delay(2000);  
}
```

```
lcd.clear();  
lcd.setCursor(0, 0);  
lcd.print("THEFT ALERT &");  
lcd.setCursor(0, 1);  
lcd.print("AUTO ARRESTING");  
delay(800);  
lcd.clear();  
lcd.setCursor(0, 0);  
lcd.print("IN JEWELLERY");  
lcd.setCursor(5, 1);  
lcd.print("SHOP");  
delay(800);
```

```
digitalWrite(buzzer, LOW);  
digitalWrite(led_red, LOW);  
digitalWrite(motor1, LOW);  
digitalWrite(motor2, LOW);  
int vib=digitalRead(vibration);  
Serial.print("VIB:");  
Serial.println(vib);  
// delay(1000);  
int IR=digitalRead(ir_sensor);
```

```
Serial.print("ir_sensor:");  
Serial.println(IR);  
// delay(1000);
```

```

if (IR==0){

digitalWrite(buzzer, HIGH);
digitalWrite(led_red, HIGH);
Serial.print("THEFT");

lcd.clear();
lcd.setCursor(0, 0);
lcd.print("THEFT ALERT!!!");
digitalWrite(motor1, HIGH);
digitalWrite(motor2, LOW);
delay(200);
digitalWrite(motor1, LOW);
digitalWrite(motor2, LOW);
delay(3000);
digitalWrite(buzzer, LOW);
digitalWrite(led_red, LOW);
msg = "Robbery in Jewellery Shop...Alert!";
SEND();
delay(1000);
digitalWrite(motor1, LOW);
digitalWrite(motor2, HIGH);
delay(200);
digitalWrite(motor1, LOW);
digitalWrite(motor2, LOW);
}
if (vib==1){
digitalWrite(buzzer, HIGH);
digitalWrite(led_red, HIGH);
Serial.print("THEFT");
lcd.clear();
lcd.setCursor(0, 0);
lcd.print("THEFT ALERT!!!");

```

```

digitalWrite(motor1, HIGH);
digitalWrite(motor2, LOW);
delay(200);

digitalWrite(motor1, LOW);
digitalWrite(motor2, LOW);
delay(3000);
digitalWrite(buzzer, LOW);
digitalWrite(led_red, LOW);
msg = "Robbery in Jewellery Shop...Alert!"; SEND();
delay(1000);
digitalWrite(motor1, LOW);
digitalWrite(motor2, HIGH);
delay(200);
digitalWrite(motor1, LOW);
digitalWrite(motor2, LOW);
}
else{
digitalWrite(motor1, LOW);
digitalWrite(motor2, LOW);
}

}

void SEND()
{
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Message sending...");
  Serial.println("AT"); delay(800);

  Serial.println("ATE0");
  delay(800);

```

```
Serial.println("AT+CMGF=1");
delay(800);
Serial.println("AT+CMGS=\"+918688969117\"");
delay(800);
Serial.println("LOCATION");
Serial.println(msg);
Serial.println("http://www.google.com/maps/place/" + String(flat) + "," + String(flon));
delay(800);
Serial.write(26);
Serial.println("Message sent..");
lcd.clear();
lcd.setCursor(0, 0);
lcd.print("Message sent...");
delay(1000);
}
```