RESEARCH ARTICLE OPEN ACCESS

Motion Based Automatic Garage Door Opener

Baina Kiran [1], L.Amarteja [2], Sk,Madarshareef [3],J.Bindhusekhar [4]
Department of Mechanical Engineering
Narayana Engineering College, Gudur
Andhra Pradesh – India

ABSTRACT

This proposed system uses a IR sensor to sense the human body movement near to the door. A human body emits infrared energy in the form of heat, which is detected by the PIR sensor from a particular distance. This project proposes a system of automatic opening and closing of door by sensing any body movement near the door. Proposed system will use a fabricated mini door mounted on the threaded screw to efficiently transfer motor power for achieving radial motion of door. The screw rotation moves the door in desired using threading. We use a switch to run the motor in desired direction for both way motion.

Keywords:- IR

I. INTRODUCTION

1.1 AIM OF THE PROJECT

The main objective of this project is to develop an Automatic Door opening system using IR sensors which will reduce the need of manual labor.

1.2 METHODOLOGY

According to our project requirements, the following modules are essential.

- Power supply
- 2 channel relay module
- Stepper Motor
- IR sensors

1.3 SIGNIFICANCE AND APPLICATIONS

Automatic door opening systems using IR sensors plays a very important role in domestic applications. The elimination of manual supervision adds up as an additional advantage for its usage. Its significance can be proved by considering the following specialties of kit designed.

1.3.1 RELIABILITY

Reliability is one such factor that every electrical system should have in order to render its services without malfunctioning over a long period of time. We have designed our kit using micro controller which is itself very reliable and also operates very efficiently under normal condition.

1.3.2 COST

The design is implemented at an economical price.the cost Is very less to install the project.

1.3.3 HASSLE-FREE MAINTENANCE

Automatic door opening systems using IR sensors offers a round the clock service which reduces the requirement of shifting watchmen.

1.3.4 SIMPLE TECHNOLOGY

This project uses a relatively simple technology, thus reducing the strain to a good extent**.**

II. METHODOLOGY

2.1 BLOCK DIAGRAM OF AN IR DOOR OPENING SYSTEM

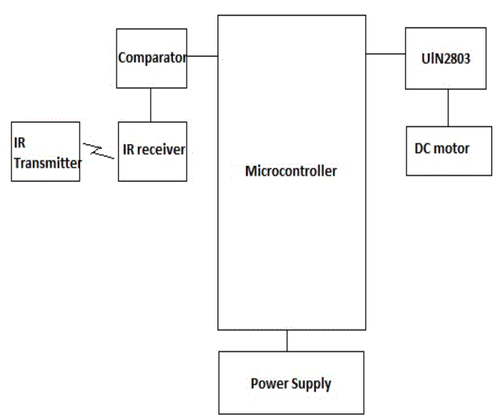

Fig-2.1 Block Diagram of IR Door Opening System

2.1 BLOCK DIAGRAM DESCRIPTION

The block diagram of the embedded security system consists of the following modules

a. IR Receiver

This project makes use of an infrared sensor module, which consists of an Infrared emitting IR receiver TSOP 1356. The output of IR receiver is connected to pin 1 of the microcontroller 8952.

b. IR Transmitter

Infrared (IR) transmitters and receivers are present in many different devices, though they are most commonly found in consumer electronics. The way this technology works is that one component flashes an infrared light in a particular pattern.

c. Microcontroller

This project employs the 8-bit microcontroller from ATMEL (AT89S52). The microcontroller in our security system is used for sending signals to the auto dialer and buzzer alarm.

d. Stepper motor

The stepper motor used here is for the movement of the door connected to it, through a particular specified angle in steps in precise positions.

e. Power supply

Supply of 230V, 50Hz ac signal from main supply board is given to a step down transformer. The transformer is selected such that its output ranges from 10V to 12V, used for the various components in the project, as per their needs.

III. DESIGN AND CONSTRUCTION

3.1 Infrared sensor

Infrared emitting diode:

A IR sensor measures the infrared levels radiating from objects in its field of view. The sensor used in this app note has a range of about six meters. IR sensors are able to sense motion, and are often used to detect whether a human has moved into or out of the sensor's range. They are small, inexpensive, low-power, easy to use, and resilient. They are commonly found in appliances and gadgets used in homes and businesses. They are often referred to as PIR, "Passive Infrared", "Pyroelectric", or "IR motion" sensors. All objects with a temperature above absolute zero emit HEAT in the form of radiation that is invisible to human beings because it is in the infrared region. The hotter the object is the more infrared radiation is emitted. The passive term in passive infra-red sensor refers to the fact that PIR sensors don't generate or radiate any energy for detection purposes. They work by detecting energy given off by other objects.

When a human passes in front of a IR sensor, it converts their body heat into an output voltage change and this triggers the detection. When an object is detected, the output pin of PIR sensor has a voltage level of 3.3v.

Fig-3.1: IR sensor

There are five basic elements used in a typical infrared detection system: an infrared source, a transmission medium, optical component, infrared detectors or receivers and signal processing. Infrared lasers and Infrared LED's of specific wavelength can be used as infrared sources. The three main types of media used for infrared transmission are vacuum, atmosphere and optical fibers. Optical components are used to focus the infrared radiation or to limit the spectral response.

Optical lenses made of Quartz, Germanium and Silicon are used to focus the infrared radiation. Infrared receivers can be photodiodes, phototransistors etc. some important specifications of infrared receivers are photosensitivity, detectivity and noise equivalent power. Signal processing is done by amplifiers as the output of infrared detector is very small.

The sensitivity of the PIR sensor is at a distance of 6 to 10 meters. A careful positioning of the sensor enhances its operations. For example, the placement of the sensor in such a way that an intruder walks across its field of vision improves its performance as it is likely to detect motion as compared to the positioning such that an intruder walks straight towards the sensor.

IR SENSOR DETECTION AREA

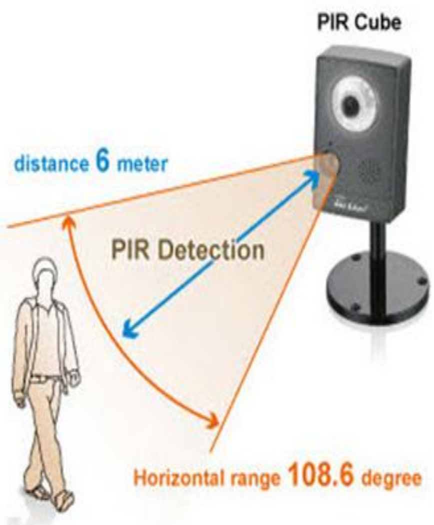

Fig: 3.2 PIR SESOR DETECTION AREA

The sensitivity of the PIR sensor is at a distance of 6 to 10 meters. A careful positioning of the sensor enhances its operations. For example, the placement of the sensor in such a way that an intruder walks across its field of vision improves its performance as it is likely to detect motion as compared to the positioning such that an intruder walks straight towards the sensor.

Elements of infrared detection system

A typical system for detecting infrared radiation is given in the following block diagram:

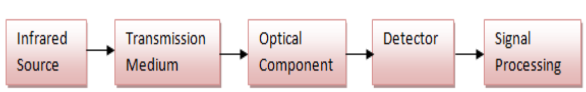

FIG:3.3 ELEMENTS OF IR DETECTION SYSTEM

1. Infrared Source

All objects above 0 K radiate infrared energy and hence are infrared sources. Infrared sources also include blackbody radiators, tungsten lamps, silicon carbide, and various others. For active IR sensors, infrared Lasers and LEDs of specific IR wavelengths are used as IR sources.

2. Transmission Medium

Three main types of transmission medium used for Infrared transmission are vacuum, the atmosphere, and optical fibers.

The transmission of IR – radiation is affected by presence of CO2, water vapor and other elements in the atmosphere. Due to absorption by molecules of water carbon dioxide, ozone, etc. the atmosphere highly attenuates most IR wavelengths leaving some important IR windows in the electromagnetic spectrum; these are primarily utilized by thermal imaging remote sensing applications.

- Medium wave IR (MWIR:3-5 µm)
- Long wave IR (LWIR:8-14 µm)

Choice of IR band or a specific wavelength is dictated by the technical requirements of a specific application.

3. Optical Components.

Often optical components are required to converge or focus infrared radiations, to limit spectral response, etc. To converge /focus radiations, optical lenses made of quartz, CaF2, Ge and Si, polyethylene Fresnel lenses, and mirrors made of Al, Au or a similar material are used. For limiting spectral responses, band pass filters are used. Choppers are used to pass/ interrupt the IR beams.

4. Infrared detectors.

Various types of detectors are used in IR sensors. Important specifications of detectors are

• Photosensitivity or Responsivity

Responsivity is the Output Voltage/Current per watt of incident energy. Higher the better.

• Noise Equivalent Power (NEP)

NEP represents detection ability of a detector and is the amount of incident light equal to intrinsic noise level of a detector.

- Detectivity (D*: D-star)

D* is the photosensitivity per unit area of a detector. It is a measure of S/N ratio of a detector. D* is inversely proportional to NEP. Larger D* indicates better sensing element. In addition, wavelength region or temperature to be measured, response time, cooling mechanism, active area, no of elements, package, linearity, stability, temperature characteristics.

5. Signal Processing

Since detector outputs are typically very small, preamplifiers with associated circuitry are used to further process the received signals.There are different **types of IR sensors** working in various regions of the IR spectrum but the physics behind *" IR sensors"* is governed by three laws:

1. Planck's radiation law:

Every object at a temperature T not equal to 0 K emits radiation. Infrared radiant energy is determined by the temperature and surface condition of an object. Human eyes cannot detect differences in infrared energy because they are primarily sensitive to visible light energy from 400 to 700 nm. Our eyes are not sensitive to the infrared energy.

2. Stephan Boltzmann Law

The total energy emitted at all wavelengths by a black body is related to the absolute temperature as

3. Wein's Displacement Law

Wein's Law tells that objects of different temperature emit spectra that peak at different wavelengths. It provides the wavelength for maximum spectral radiant emittance for a given temperature. The relationship between the true temperature of the black body and its peak spectral existence or dominant wavelength is described by this law.

$$\lambda_{max} = k/T = 2898/T \quad \text{OR} \quad \lambda_{max} T = 2898$$

The world is not full of black bodies; rather it comprises of selectively radiating bodies like rocks, water, etc. and the relationship between the two is given by emissivity (E).

$$\text{EMISSIVITY} = \frac{\textit{Radiant emittance of an object}}{\textit{Radiant emittance of a black body at same temperature}}$$

Emissivity depends on object color, surface roughness, moisture content, degree of compaction, field of view, viewing angle & wavelength.

There are two types of infrared sensor based on its function:

- Thermal Infrared sensor:
- Quantum infrared sensor

-These are the types of infrared sensors based on the working mechanism:

- Active Infrared Sensors
- Passive Infrared sensors

Active infrared sensors

Active infrared sensors are the types of infrared sensor that emit infrared radiation which is later received by the receiver. The IR is emitted by a IR Light Emitting Diode (LED) and received by photodiode, phototransistor or photoelectric cells. During the process of detection, the radiation is altered, between process of emission and receiving, by object of interest. The alteration of radiation causes change in received radiation in the receiver. This property is used to generate desired output with help of associated electronic circuit.

There are two types of Active infrared sensors

Break beam sensors

These types of Active IR sensor have emitter and receiver placed in such a way that the IR emitted by the emitter falls directly in to the receiver. During the operation, IR beam is emitted continuously towards the receiver. The flow of IR can be interrupted by placing an object between the emitter and receiver. If the IR is transmitted but altered then receiver generates output based on the change in radiation. Similarly if the radiation is completely blocked the receiver can detect it and provide the desired output.

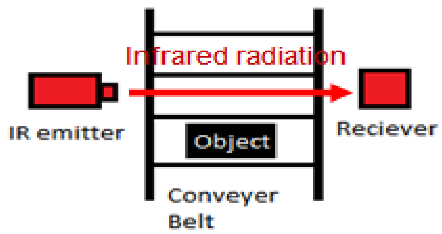

Fig:3.4 Break Beam Sensor

Furthermore advanced use of these types of sensors can be to acquire different shape and surface profile of objects.

Reflectance sensors

These types of sensors use reflective property of IR. The emitter emits an IR beam which is reflected by the object. The reflected IR is the detected by the receiver. The object causes change in the property of the reflected IR or the amount of IR received by the receiver varies. The degree of change is dependent on the reflectance of the object. Thus detecting the change in amount of received IR helps in figuring out the properties of object such as surface geography and reflectance.

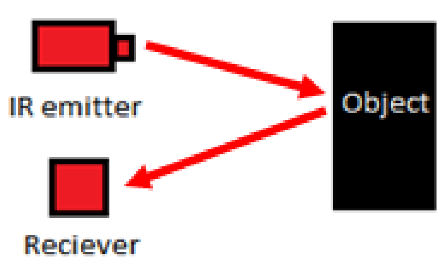

Fig:3.5 Reflectance sensor

Passive Infrared Sensor

Passive infrared sensors detect the infrared radiations from outer source. When an object is in a field of view of a sensor it provides a reading based on a thermal input. It does not generate any infrared. There are different kind of Passive infrared sensor.

- Thermal passive infrared sensor
- Thermocouple thermopie and Bolometer
- Pyroelectric infrared senor

Pyroelectric infrared sensor(PIR)

Working Principle

The infrared sensor has its detecting area. Multizonal Fresnel lens array is associated covers the pyroelectric transducer. This lens is Plano convex lens that are designed to collect the infrared radiation from the different spatial zones. Fresnel lens are made up of material that can transmit infrared range of 8µM to 14µm. This lens dose not view the space in continuous fashion, the detection pattern of sensor is fan shaped .It views as a discrete beams or cones.

The gap between the cones increases with the distance and it is inversely proportional to the sensitivity of the sensor.The PIR sensors have two pins 1 and 2 they are activated when a radiation source passes is in the field of view. Pins are wired as opposite input. Pin 1 activates when radiation source come across the Pin 1 which is positive zone and the sensor values goes up.

When the radiation source continues towards Pin 2 which is negative zone the value drops and the value comes to 0, this activity causes the net positive effect on the sensor value.

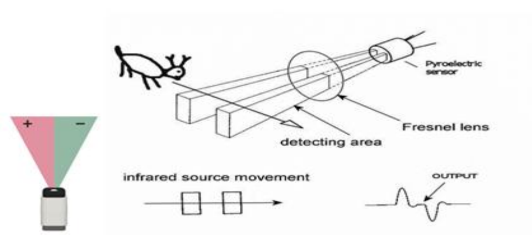

Fig:3.6 principle of PIR sensor

The radiation strikes pryoelectric films that are made of lithium tantalite. It is dielectric (insulator) in nature so its surface area charges when it is strike by radiated infrared. It has electrodes which gather the charge. The produced charge is measured with FET (Field effective transistor) device that is inbuilt in sensor. Among 3 pins in the FET pin 3 is grounded about 100k and pin 2 is feed into a stage amplifier having signal condition circuits.

The amplifier avoids the high frequency noises above 10Hz. The signal produced is in the range of 1mVpp that is a small voltage around a DC signal. The power source of 3 to 15 volt is required for the FET supplied through Pin 1.Externtal resistor is connected to pin 3 and pin 2 which converts the FET current to voltage. Pin 2 of a FET is followed by Amplifier and comparator. To improve the accuracy of sensor dc offset (dc offset is an undesirable character, it causes waveform not to be 0) is eliminated by PIR incorporation of ac-coupled amplifiers. Comparator is an extremely sensitive device comparing the voltages or currents and gives outputs a digital signal which is larger.

FEATURES

- Extra high radiant power and radiant intensity and high reliability
- Low forward voltage
- Suitable for high pulse current operation
- Peak wavelength = 940nm
- Good spectral matching to Si photo detectors.

APPLICATIONS

- IR remote control units with high power requirements
- Free air transmission systems
- Infrared source for optical counters and readers
- IR source for smoke detector

IR RECEIVER

Many different receiver circuits exists on the market. The most important selection criteria are the modulation frequency used and the availability in you region. TSOP 1356 series are miniaturized receivers for IR remote control systems. The demodulated output signal can directly be decoded by a microcontroller. It is standard IR remote control receiver series, supporting all major transmission codes.

In the picture above you can see a typical block diagram of an IR receiver. The received IR signal is picked up by the IR detection diode on the left side of the diagram. This signal is amplified and limited by the first two stages. The limiter acts as an AGC circuits to get a constant pulse level, regardless of the distance to the hand set. As you can see only the AC signal is sent to the Band Pass Filter. The B.P.F is tuned to the modulation of the handset unit. Common frequencies range from 30 kHz to 60 kHz in consumer electronics. If the modulation frequency is present, the output of the comparator will be pulled low. There are many different manufactures of these components on the market. And most devices are available in several versions each of which are tuned to a particular modulation frequency. The amplifier is set to a very high gain. Therefore the system tends to start oscillating very easily. Placing a large capacitor of at least 22 microfarads close to the receiver's power connections is mandatory to decouple of 330 ohms in series with the power supply to further decouple the power supply from the rest of the circuit.

Infrared receivers can often be found in consumer products such as television remote controls or infrared ports such as PDAs, laptops, and computers. They are also present in devices such as home theatres, cable or satellite receivers, VCRs, DVD and Blu-Ray players and audio amplifiers. Infrared receivers can also be found in the industrial, military, aerospace and photography markets.

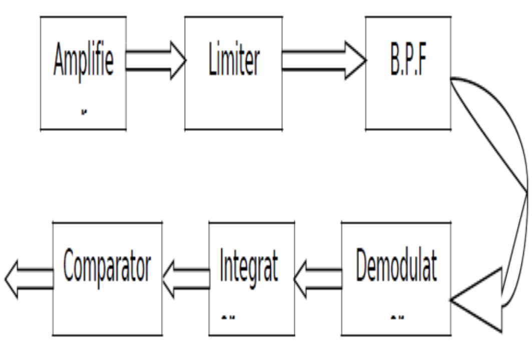

Fig-3.7: Block Diagram of an IR receiver

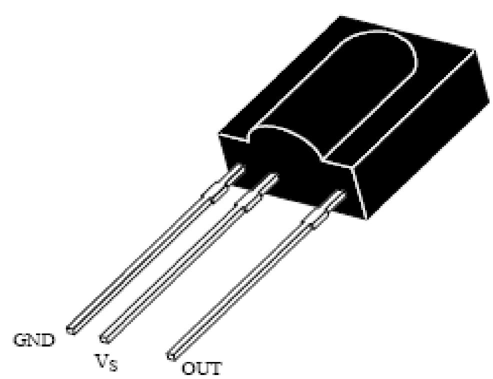

Fig-:3.8 IR Receiver (TSOP 1356)

BLOCK DIAGRAM OF TSOP 1356

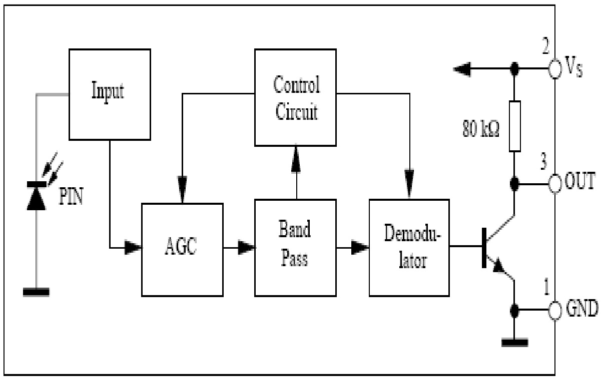

Fig-:3.9 Block diagram of TSOP 1356

FEATURES

- Phone detector and preamplifier in one package
- Internal filter for PCM frequency
- TTL and CMOS compatibility
- Output active is low
- High immunity against ambient light
- Continuous data transmission possible.

3.2 2 CHANNEL RELAY MODULE

The relay has two outputs-normally open and normally closed (NO and NC). When the IN1 or IN2 pin is connected to ground, NO will be open and NC will be closed, and when IN1 or IN2 is not connected to ground the opposite occurs. .

1. Connect an LED and 220 ohm resistor in series between the NO pin (the right pin) on the terminal block on one of the relays and ground, then connect a 5V power source to the common pin (the left pin) on one of the relays. Nothing will happen (yet).
2. Next connect a toggle switch or button between ground and one of the middle two pins on the header strip on the relay module. The middle-left one corresponds to the left relay, and the middle-right one corresponds to the right relay. Connect the rightmost pin to 5V and the leftmost pin to ground.
3. When the switch is flipped or the button is pressed, either IN1 or IN2 will become connected to ground. The relay should make a loud click and the LED should turn on. A microcontroller can also be used to control IN1 and/or IN2 and cause the relay to trip.There is a second 1x3 (2.54mm pitch) pin header for supplying the "relay side" of the board with 5V. At delivery, a jumper is present on this header selecting the 5V signal from the 1x4 pin header to power the relays. **For default operation**, don't change this jumper!

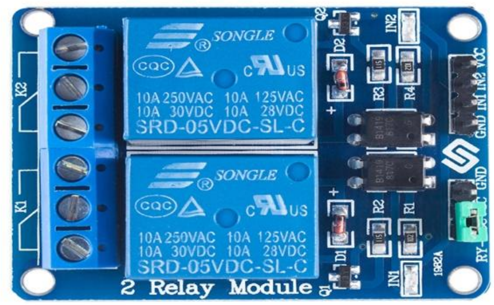

FIG:3.10 2 CHANNEL RELAY MODULE

The pins of the 1x3 pin header are marked on the PCB:

- RY-VCC - This is the 5V required for the relays. At delivery, a jumper is present on this and the adjacent (VCC) pin.
- VCC - This is the 5V VCC supplied on the 1x4 pin connector.
- GND - Connected to 0V pin of 1x4 pin header.

If opto-isolation is required, an isolated 5V supply should be used. For normal operation, a jumper between pins 1 and 2 selects the 5V signal from the 1x4 pin header. This means both the "input side", and "relay side" use the same 5V supply, and there is no opto-isolation.

FEATURES:

- High current relay, AC250V 10A, DC30V 10A.
- 2 LEDs to indicate when relays are on.
- Works with logic level signals from 3.3V or 5V devices.

3.3 D.C MOTOR

A stepper motor is an electromechanical device which converts electrical pulses into discrete mechanical movements. The stepper motor is used for position control in applications like disk drives and robotics. The name stepper is used because this motor rotates through a fixed angular step in response to each input current pulse received by its controller. In recent years, there has been a widespread demand of stepper motors because of the explosive growth of computer industry. Their popularity is due to the fact that they can be controlled directly by computers, microprocessors and programmable controllers.

Stepper motors are ideally suited for situations where precise position and speed control are required without the use of a closed-loop feedback. When a definite number of pulses are supplied, the shaft turns through a definite known angle. This fact makes the motor well suited for open-loop position control because no feedback is to be taken from the output shaft. Every stepper motor has a permanent magnet rotor also known as shaft surrounded by a stator poles. The most common stepper motors have four stator windings that are paired with a center-tapped. This type of stepper motor is commonly referred to as a four phase stepper motor. The center tap allows a change of current direction in each of two coils when a winding is grounded, there by resulting in a polarity change of the stator.

The shaft or spindle of a stepper motor rotates in discrete step increments when electrical command pulses are applied to it in the proper sequence. The direction of the rotation is determined by the stator poles. The stator poles are determined by the current sent through the wire coils. As the polarity of the current is changed, the polarity is also changed causing a reverse motion of the motor .The sequence of the applied pulses is directly related to the direction of motor shafts rotation. The speed of the motor shafts rotation is directly related to the frequency of the input pulses and the length of rotation is related to the number of input pulses applied.

Fig-: 3.11 D.C MOTOR

While a conventional motor shaft moves freely, stepper motor shaft moves in a fixed repeatable increment which helps in precise positioning. This repeatable fixed movement is possible as a result of basic magnetic theory where poles of the same polarity repel and opposite poles attract. The stepper motor converts digital signals into fixed mechanical increment of motion. It thereby provides a natural interface with the digital computer.

It is a synchronous motor such that the rotor rotates a specific incremental number of degrees for each pulse input given to the motor system. A stepper motor's shaft has permanent magnets attached to it. Around the body of the motor is a series of coils that create a magnetic field that interacts with the permanent magnets. When these coils are turned on and off, the magnetic field causes the rotor to move.

As the coils are turned on and off in sequence the motor will rotate forward or reverse. These motors can provide accurate positioning without the need of position feedback sensors when compared to other motors. The position is known simply by keeping track of the input step pulses. Usually, position information can be obtained simply by keeping count of the pulses sent to the motor thereby eliminating the need of expensive position sensors and feedback controls Stepper motors are rated by the torque they produce, step angle, steps per second and the number of teeth on rotor. The minimum degree of rotation with which the stepper motor turns for a single pulse if supply to one wire or a pair is called step angle. The minimum step angle is always a function of the number of teeth on rotor i.e., the smaller the step angle the more teeth the rotor possesses. Steps per complete revolution = Number of phases (coils) x Number of teeth on rotor Smaller the step angle, greater the number of steps per revolution and higher the resolution or the accuracy of positioning obtained. The step angles can be as small as 0.72˚ or as large as 90˚.

The motor speed is measured in steps per second. Steps per second = (Revolution per minute x steps per Revolution)/ 60 Stepping motors have the extraordinary ability to operate at very high speeds (up to 20,000 steps per second) and yet to remain fully in synchronism with the command pulses, when the pulse rate is high , the shaft rotation seems continuous. If the stepping rate is increased too quickly, the motor loses synchronism and stops. Stepper motors are designed to operate for long periods with the rotor held in a fixed position and with rated current flowing in the stator windings whereas for most of the other motors, this results in collapse of back emf and a very high current which can lead to a quick burn out. A stepper motor is a special kind of motor that moves in individual steps which are usually 0.9 degrees each. Each step is controlled by energizing coils inside the motor causing the shaft to move to the next position. Turning these coils on and off in sequence will cause the motor to rotate forward or reverse. The time delay between each step determines the motor's speed. Steppers can be moved to any desired position reliably by sending them the proper number of step pulses.

3.4 RF ID MODULE:

WORKING OF RF ID MODULE:

RFID Reader Module, are also called as interrogators. They convert radio waves returned from the RFID tag into a form that can be passed on to Controllers, which can make use of it. RFID tags and readers have to be tuned to the same frequency in order to communicate. RFID systems use many different frequencies, but the most common and widely used & supported by our Reader is 125 KHz.

An RFID system consists of two separate components: a tag and a reader. Tags are analogous to barcode labels, and come in different shapes and sizes.

The tag contains an antenna connected to a small microchip containing up to two kilobytes of data. The reader, or scanner, functions similarly to a barcode scanner; however, while a barcode scanner uses a laser beam to scan the barcode, an RFID scanner uses electromagnetic waves.

To transmit these waves, the scanner uses an antenna that transmits a signal, communicating with the tags antenna. The tags antenna receives data from the scanner and transmits its particular chip information to the scanner.

FIG:3.12 RF ID MODULE

FEATURES:

- ❖ The keys to unlock your car door.
- ❖ The automatic deduction of payment while using toll booths;
- ❖ Building access systems;
- ❖ Payment cards, student ID cards and even Passports
- ❖ Wireless sensors & mesh networks.

APPLICATIONS:

- ❖ Inventory management.
- ❖ Controlling access to confined areas.
- ❖ Personnel tracking.
- ❖ Supply chain management.
- ❖ ID badging.
- ❖ Asset tracking.
- ❖ Counterfeit forestalling (e.g., in the pharmaceutical industry

3.5 LEAD SCREW:

It is a screw used as a linkage in a machine, to translate motion into linear motion. Because of the large area of sliding contact between their male and female members, screw threads have larger frictional energy losses compared to other linkages. They are not typically used to carry high power, but more for intermittent use in low power actuator and positioned mechanisms. Common applications are linear actuators, machine slides (such as in machine tools), vises, presses, and jacks.

FIG: 3.13 LEAD SCREW

Advantages:

- Large load carrying capability
- Compact
- Simple to design
- Easy to manufacture; no specialized machinery is required
- Large mechanical advantage

- Precise and accurate linear motion
- Smooth, quiet, and low maintenance
- Minimal number of parts
- Most are self-locking

The disadvantages are that most are not very efficient. Due to the low efficiency they cannot be used in continuous power transmission applications. They also have a high degree of friction on the threads, which can wear the threads out quickly. For square threads, the nut must be replaced; for trapezoidal threads, a split nut may be used to compensate for the wear.

3.6 SUPPORTING FRAME:

Dimensions: 61cm×45cm
Material: Iron

Iron is a chemical element with symbol Fe (from Latin: ferrum) and atomic number 26. It is a metal in the first transition series. It is by mass the most common element on Earth, forming much of Earth's outer and inner core. It is the fourth most common element in the Earth's crust. Its abundance in rocky planets like Earth is due to its abundant production by fusion in high-mass stars, where it is the last element to be produced with release of energy before the violent collapse of a supernova, which scatters the iron into space.

FIG:3.14 SUPPORTING FRAME

3.7 12 VOLTS BATTERY:

Batteries are typically made of six galvanic cells in a series circuit. Each cell provides 2.1 volts for a total of 12.6 volts at full charge. Each cell of a lead storage battery consists of alternate plates of lead (cathode) and lead coated with lead dioxide (anode) immersed in an electrolyte of sulfuric acid solution. The actual standard cell potential is obtained from the standard reduction potentials. This causes a chemical reaction that releases electrons, allowing them to flow through conductors to produce electricity. As the battery discharges, the acid of the electrolyte reacts with the materials of the plates, changing their surface to lead sulfate. When the battery is recharged, the chemical reaction is reversed: the lead sulfate reforms into lead dioxide. With the plates restored to their original condition, the process may be repeated.

specifications

- Physical format: batteries are grouped by physical size, type and placement of the terminals, and mounting style.[
- Ampere-hours (A·h) is a unit related to the energy storage capacity of the battery. This rating is required by law in Europe.
- Cranking amperes (CA): the amount of current a battery can provide at 32 °F (0 °C).Cold cranking amperes (CCA) is the amount of current a battery can provide at 0 °F (−18 °C).
- Modern cars with computer controlled fuel-injected engines take no more than a few seconds to start and CCA figures are less important than they were in the days of carburetors.
- Hot cranking amperes (HCA) is the amount of current a battery can provide at 80 °F (26.7 °C).
- The rating is defined as the current a lead-acid battery at that temperature can deliver for 30 seconds and maintain at least 1.2 volts per cell (7.2 volts for a 12-volt battery).
- Reserve capacity minutes (RCM) is a battery's ability to sustain a minimum stated electrical load; it is defined as the time (in minutes) that a lead-acid battery at 80 °F (27 °C) will continuously deliver 25 amperes before its voltage drops below 10.5 volts.

3.15 12 VOLTS BATTERY

IV. WORKING

Human detection:

Human detection part of the project entirely depended on the program responsible for the subtraction of any background noises. The PIR sensor responsible for the detection of motion adjusts itself to the infrared signature of its surroundings and keeps watching for any changes. In the absence of motion, the LED indicator will remain dim, and the program will continue updating the surroundings. If the sensor detects movement, the frame for motion detected will be the input frame to the process of human detection, and consequently, the motion detection indicator will light up.

Our aim is to design flexible and economical system. In this system whenever the infrared sensor senses the obstacle and the signal is sent to the microcontroller. Then the microcontroller sent the signal to the stepper motor as in which the door is opened. In this particular application.

When there is no obstacle, the TSOP receive no signal and their output is high which is connected to port 1. When there is an obstacle the signal gets reflected and TSOP receives that and its output goes low. If the door is intact, there will be proper transmission and reception between the IR transmitter and IR receiver and the output of the IR receiver will be logic high. Whenever the door is opened, the link between the IR transmitter and IR receiver is obstructed and the IR sensor detects the obstacle.

The output of the IR receiver will go to logic low now. The output of the IR receiver is connected to the P1.0 of the microcontroller. Thus the microcontroller will be constantly monitoring the output of the receiver.

The sensing signal is fed to a 8051 microcontroller to function a door motor via motor driver IC. Interrupt indications are used through limit switches to avoid the motor’s locked rotor condition. When someone approaches the door, the IR energy sensed by the PIR sensor changes and activates the sensor to open and close the door automatically. The infrared radiation detected by the sensor generates an electrical signal that can be used to activate the system.

An individual PIR sensor detects changes in the amount of infrared radiation impinging upon it, which varies depending on the temperature and surface characteristics of the objects in front of the sensor. When an object, such as a human, passes in front of the background, such as a wall, the temperature at that point in the sensor's field of view will rise from room temperature to body temperature, and then back again. The sensor converts the resulting change in the incoming infrared radiation into a change in the output voltage, and this triggers the detection. Objects of similar temperature but different surface characteristics may also have a different infrared emission pattern, and thus moving them with respect to the background may trigger the detector as well.

V. RESULTS AND DISCUSSION

5.1 PHOTOGRAPHIC VIEW:

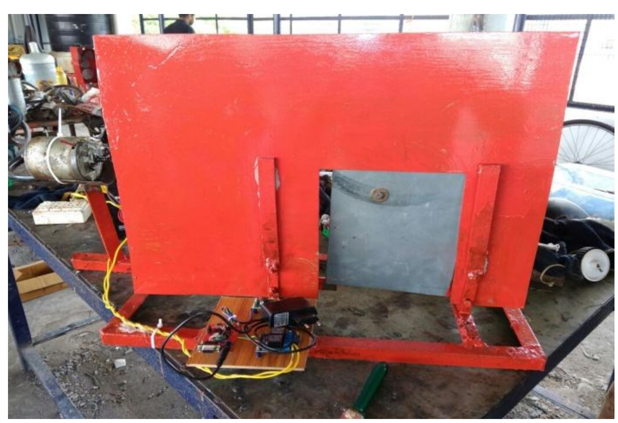

FIG:5.1 MODEL OF PROJECT

The project "MOTION BASED AUTOMATIC GARAGE DOOR OPENER" was designed to automated security access system for domestic and industrial applications. The system makes use of a microcontroller. The output from PIR sensor is fed as input to the PIC microcontroller. The PIC microcontroller will continuously monitors the output from PIR sensor and generates logic low or high. The output generated from PIR sensor is used to control the DC motor. The system uses temperature sensor for the monitoring the room temperature. If the temperature is high then the door will be open.

VI. FUTUREWORK AND DEVELOPMENT

In this PIR based security system we have used low power, low cost PIR sensor that are easy to interface with other components. By using this system this system we were able to reduce the power consumed and memory space of the system. Currently we have used only one webcam in our project which could only capture the area facing to it. The system may not work if the intruders enter from other side. The software developed for the recording of the video captured by the webcam is experimented only with a webcam connected to the system also there was some delay in recording video captured by webcam.

Considering all above points, the following are our future works set to improve the system:

- Work on to reduce the delay time in recording the video captured by webcam.
- Use more than one webcam and integrating these webcams with the system.
- Work on the software to record videos many webcams installed.
- Automatic courtesy lights that turn on when the door opens and automatically turn off after a preset time delay
- A remote lockout feature, which turns off the radio receiver while one is on vacation or away for an extended time.
- The availability of accessories has increased, including such features as wireless keypads, key chain remotes, and solenoid-operated deadbolts to lock the door itself.
- An integrated carbon monoxide sensor to open the door in case of the garage being flooded with exhaust fumes.
- Door activation over the Internet to allow home owners to open their garage door from their office for deliveries.

Our project "MOTION BASED AUTOMATIC GARAGE DOOR OPENER" is mainly intended to automated security access operations using a mobile phone. The mobile phone present in the system uses auto answer function to lift the call. Each key in the mobile phone transmits two tones with different frequencies when pressed. These transmitted frequencies are decoded using DTMF decoder and the decoded value is fed as input to micro controller which in turn operates Stepper Motor to which the Open/close of Door. The input value to the micro controller will be checked and respective operation of that key will be performed like Open/close of Door. When the user enters the wrong password then the system automatically sends alerting SMS messages to the predefined authority number. The main disadvantage of this project is that the person who is operating the door doesn't know the status of the door whether it is opened or closed. This drawback can be eliminated by introducing a GSM module, through which intimation on the status of operated door can be sent.

VII. CONCLUSION

This project gave an insight into designing of an automated door just by using IR sensors. This helped in reducing the cost spent in construction of automated doors. The proposed system can be developed by interfacing a counting arrangement to count the entry and exit of people at a specific place. This can be accomplished by interfacing an EEPROM to store the data when there is no power. Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully designed and tested.

REFERENCE

[1] Ricardo Tesoriero, Jose A.Gallud, Maria D.Lozano, Vitor M.R. Penichet "Tracking Autonomous Entities using RFID Technology", MAY2009.

[2] Potamitis, I., Georgila, K., Fakotakis, N., & Kokkinakis, "An integrated system for smart-home control of appliances based on remote speech interaction", Sept. 1-4, 2003\

[3] Conte, G., & Scaradozzi, "Viewing ho me automation systems as multiple agents systems",

[4] Ciubotaru-Petrescu, B., Chiciudean, D., Cioarga, R., & Stanescu, "Wireless Solutions for Telemetry in Civil Equipment and Infrastructure Monitoring", May 25-26, 2006.

[5] Alkar, A. Z., & Buhur, "An Internet Based Wireless Home Automation System for Multifunctional Devices", 2005.

[6] A.K.Ray and K.M.Bhurchandi,"Advanced microprocessor and peripherials",TMH,2000.

[7] Raj Kamal,"Microcontrollers Architecture,programming ,Interfacing and system Design,pearson edition, 2005