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Home Security using Embedded Platform – An Experimental Validation

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Abstract*: Home security using embedded systems which involves the detection of a movement or a motion which has always been very important in many of the researches. In the research work the process of interfacing a PIR sensor with a micro controller along with the Arduinocan be learned. The research work will interface an arduino with PIR module, blink a LED and beep a buzzer whenever a movement is detected. The following components will be needed mainlysuch as PIR sensor, buzzer, LED will be needed to build the research work. The embedded system is used for safety, performance; software is used for flexibility and capabilities.*

Keywords: Embedded systems, motion, movement, security, Passive Infrared sensor

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I. Introduction

Security is the main preference for everyone's livelihood and yes we need that too in the environment. The presentsociety now we are living is developing in all ways. That means it's also getting developed in some bad ways such as thefts, damages to ones properties. No matter how much a person earns, the main thing that matters is its preservance and also the security to that and one of the main securities can be our Home security and that can be done by simple things and that is home security provided using embedded systems .

The main concept ofhome security system isfor convenience and safety. Theresearch work is also about the rapidresponse given by the embedded system.That exactly means we can respond immediately for the intimation givenand we can save our belongings.Theresearch work is mainly about the rapid response which makestheto step more further and be used by many people .The main aim ofthe work is to present an embedded system that prevents thefts and loss or damage of our properties.

There are days where people tamed dogs for their security and now there is no more necessity of that. The research work is more trustworthy than dogs and there are no more other disturbances or inconvenience to others in the surroundings.The research work is very smart which helps a man by saving the time and being unworried for his properties and wealth.And yes, by the that person can definitely sleep happily without any tension since the is highly reliable.

II. Literature Survey

Every man needs smart work and also needed to be completed within time.Engineer needs to pick the segment according to the client necessity. Due to all the client requests are not rise to consequently they need to bargain with the current items.

Through itemized investigation of Home security using embedded applications.Different sensors are used for different purposes.Here a PIR sensor is used whereas the resistors can be used as many to indicate many cases.

Shopan dey, Ayon Roy and sandip Das, it is discovered that they have utilized Raspberry Pi module to associate ESP8266-01 module to the web. Through the module they are controlling different gadgets through page and furthermore through android application[1]. K.Venkatesan and Dr. U. Ramachandraiah in their paper have actualized Zigbee module in Arduino mega through which they are controlling gadgets[2].They have utilized different sensors for different purposes. Additionally they have given ongoing warning, criticism on web-server in which clients can perceive whats going on in their home.Along the other components an Arduino is introduced mainly where all the respective explained[3].The is not cost effective yet in addition end up being the least demanding one when it comes in terms of programming and further more usage.The home security using embedded systems has a great demand because of its simple design and working principle[5].In the research work the components, which work effectively are used.

III. System Design

In the research work the main components used are PIR sensor, Arduino.

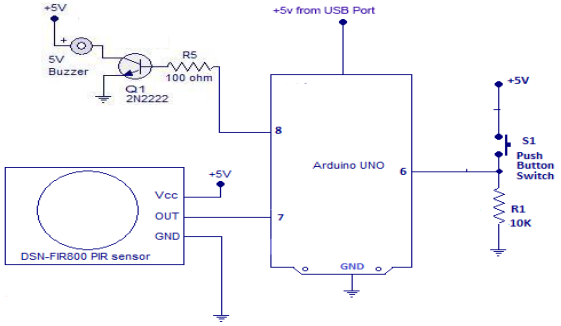

Fig.1 Block diagram

These are used for detecting motion or movement. The components used in theresearch work are

- Bread board
- PIR sensor
- Arduino
- LED
- Buzzer
- Resistors
- Jumper wires

The research work has very few interconnections.

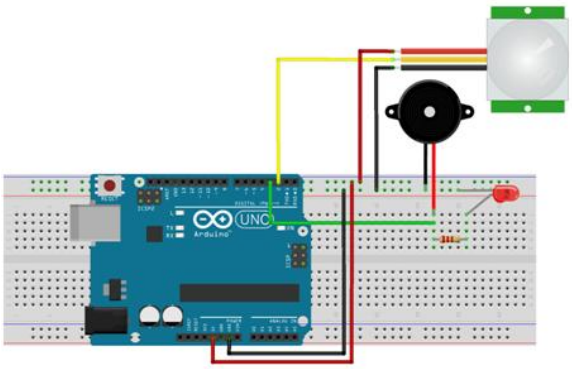

Fig.2 System design

Arduino: Arduino is an open source in electronics platform and easy to use for both hardware and software purposes. Such boards are capable to read the inputs like light on a sensor and turn it into an output like turning on a LED.

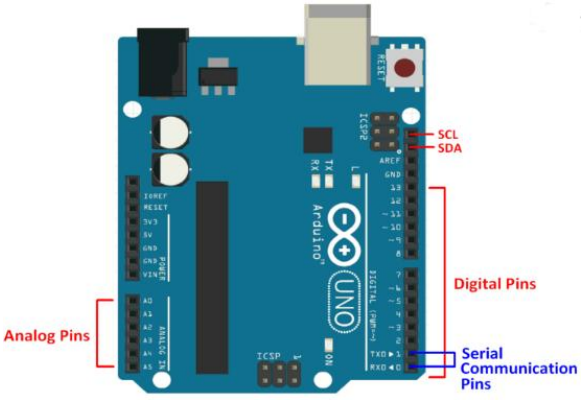

Fig.3 Arduino UNO board

Arduino is called as the mini computer. In such cases an errorless code is uploaded which satisfies the required condition. To use an arduino one should know about its digital and analog pins.

PIR Sensor: A passive infrared sensor (PIR) is an electronic sensor. PIR sensor is used in security alarms and automatic Lighting applications. The PIR sensor has two slots in it; each slot is made of special material that is sensitive to IR.

Fig.4 PIR sensor

When a warm body like a human or animal passes by, sensor first intercepts one half of the PIR sensor that causes a positive differential change between two halves.When the warm body leaves the sending area, the reverse happens, there by the sensor generates negative differential change .The sensor detects the movement within 10 meters from the sensor .Equipment is small, inexpensive, low power consumption, easy to use.

The PIR sensor operates only in two levels either high or low. There are three terminals: power, signal and ground. Power is to get an input supply. Signal is connected to arduino (to one of the digital pins) and ground is grounded as usually. Change in heat levels indirectly increases the voltage level. If nothing is observed the sensor remains in same state.

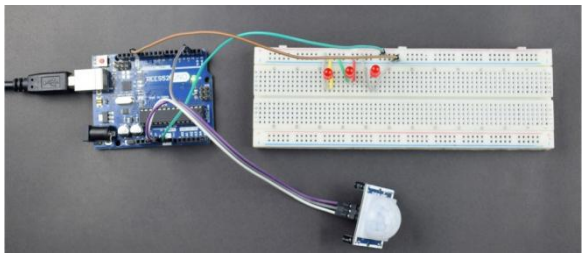

Fig.5 Connections on the breadboard

Buzzer: Buzzer is also called a Beeper, which is an audio signaling device. Buzzer is an alarming device and also an executor.

Fig.6 Buzzer

By connecting all the components of the research work with proper polarities the output is seen that when a human being passes through that device an audio signal comes out as an output so that if a person passes through the device that makes the owner cautious.LEDs can be used to symbolize and the resistors are also used where the resistor and LEDs are connected.

In the developed societies now, all of us care about the security of our properties.The research work is a remedy for such a need where Home security alarm system is used to detect movement. The PIR sensor detects the change in heat signatures which changes the voltage levels of the device. Whenever there is an obstacle the voltage level hikes and send it as a signal to the arduino we connected and the buzzer turns ON based on the condition. By thethe owner is cautioned and the task of the device is done.

The research work has improved product quality and optimizes the use of system resources.Mass production is very easy.

IV. Implementation

Implementation is carried out in two ways. One method is implemented using tinker cad website and another implementation is using real time hardware

Implementation using Tinker cad:
Using tinker cad the connections are given as per the circuit diagram in the software. By applying the certain values, the response is obtained and it denotes that there is some obstacle or there is someone and there is a sound .from the buzzer.

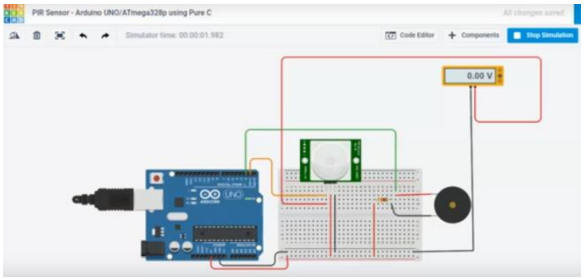

Fig.7 Using tinker cad

Real time implementation using hardware:

On the breadboard, the respective connections are given. There are three pins for the sensor where the first and third pins are connected on the breadboard with led and the output that is the second pin is connected to the arduino.The input pins are given from the arduino to the sensor. The pin2 on the arduino is connected to the sensor. The pin1 that is the output pin connected to the buzzer.On the arduino the voltage pin that is the 5V pin is connected as the voltage pin on to the breadboard.Pin 3 is given to the buzzer.

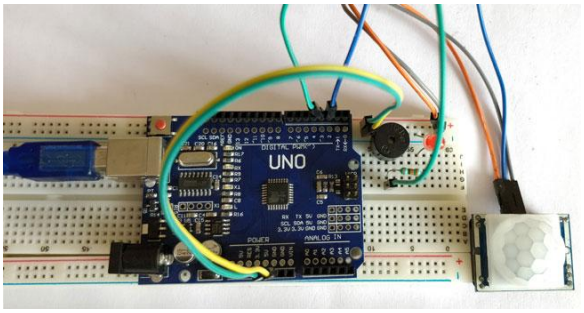

Fig.8 Realtime implementation

There is a inbuilt LED driven by digital pin 13.At the pin 13 when the value is high, the LED is ON. When the value is less, the LED is OFF.The pins present are connected as inputs and outputs.Some of the pins are connected as the input pins whereas some of the pins are connected as output pins.
The research work definitely provides great security and is trustworthy.
The research work is a new way to secure the home.

- The research work is not expensive and hence the can be used by anyone.
- The research work encourages digital security.
- The research work reduces the rate of robbery.
- Theresearch work can be mainly implemented in the places where treasures and costly things are kept alone.
- The research work can be used for protection of one's self.
- The research work can definitely help farmers for agriculture.
- That means in the field of agriculture we can implement the research work.

- The research work has great modes of implementation.

V. Result

When the components with correct polarities are placed on the bread board, the motion is detected.The motion is detected and hence we are intimated by the sound and the light produced by the output components. The LED will glow and the buzzer sounds.By this the person gets alert and he can take the action and stop the resulting situations.

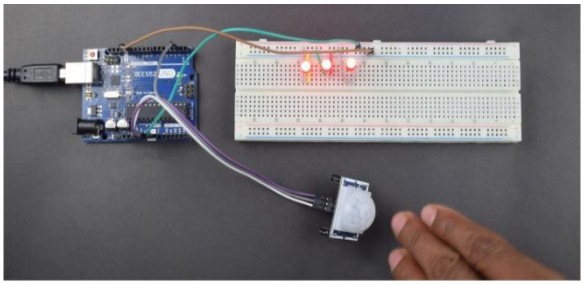

Fig.9 LEDs glowing when the motion is detected

The LED, Buzzer's light and sound respectively makes the owner of the home to be alert and be alert from anonymous attacks, robberies and the security is provided.

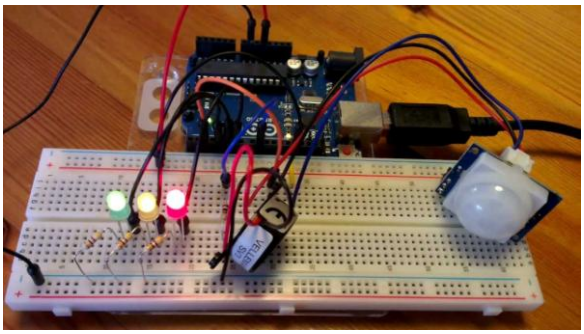

Fig.10 Rapid response when the motion is detected.

When done in tinkercad the ouput is obtained when a motion is detected.The buzzer starts producing sound which sends us the message that someone has come or there is something near and we should get alert.

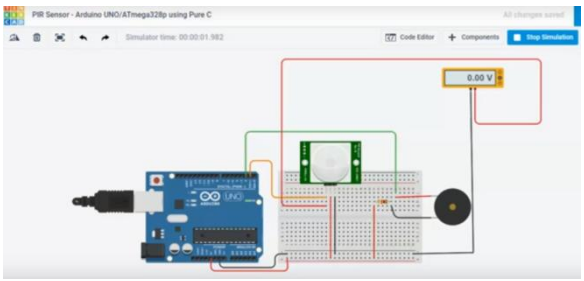

Fig.11 Using tinker cad buzzer sound can be heard.

VI. Conclusion

The research work helps us by providing security and we can always be ready to save ourselves by getting the information and responding to that. There is no need of getting worried about our belongings, as these are under the observation of the system.These security systems play an important role and provide security for the people and for the homes. By the research work one can protect their belongings, take care of their properties and can stay safe and protected.

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