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Smart Home Security System

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***Abstract*: Internet of Things (IoT) conceptualizes the idea of remotely connecting and monitoring real world objects (things) through the Internet]. When it comes to our house, this concept can be aptly incorporated to make it smarter, safer and automated. This IoT project focuses on building a smart wireless home security system which sends alerts to the owner by using Internet in case of any trespass and raises an alarm optionally. Besides, the same can also be utilized for home automation by making use of the same set of sensors. The leverage obtained by preferring this system over the similar kinds of existing systems is that the alerts and the status sent by the wifi connected microcontroller managed system can be received by the user on his phone from any distance irrespective of whether his mobile phone is connected to the internet. The microcontroller used in the current prototype is the TI-CC3200 Launch pad board which comes with an embedded micro-controller and an onboard Wi-Fi shield making use of which all the electrical appliances inside the home can be controlled and managed.**

***Keywords*: Smart Home Security System**

1. Introduction

Today, the increase in demand of service over the internet necessitated the data collection and exchange in efficient manner. In this sense internet of things (IOT) has promised the ability to provide the efficient data storage and exchange by connecting the physical devices via electronic sensor and internet. The IOT has created the revolution all over the world and fascinatingly it has become integral part of life. Hence, this paper utilizes Arduino fundamentals and some sensor to ease the way we control our homes appliances. This is achieved by interfacing sensors like flex sensor, accelerometer sensor, magnetic sensor, flame sensor with microcontroller based system like Arduino UNO. The values from the sensor change the status of our appliances and the status of appliances can be seen on the cloud platform. An important factor to consider when we talk about home automation is Security. Home security is a very important feature of home automation and maybe the most crucial one. Home security made drastic changes in the past few decades and continue to advance much more in the coming years. Previously home security systems meant having an alarm that would go off when somebody would break in but a smart secure home can do much more than that. Therefore, the main objective of our work is to design a system which can alert the owner and others of an intruder break-in by sending a notification to their smart phones. The owner will also have the ability to stop or start the alarm remotely using just his smart phone. This system will help the users to safeguard their homes by placing the system on the doors or windows and monitoring the activity through their smart phones. There has been an unprecedented growth in the number of devices being connected to the Internet since past few years. All these devices connected to the internet are part of the IoT infrastructure which can that allows these devices to send and receive data among each other. This is why it is beneficial to use such an existing infrastructure for designing the proposed security system. An alarm system that sounds the buzzer is of no use when a user is not present in the home to take action. When the owner is away communicate with each other. The IoT network consists of embedded electronics, sensors and software from their home, they want to be assured that their home is protected by intruders and thieves while they are gone. This is why the proposed system keeps the owner informed in the real time about the security status of their home. The designed system informs the user as there is a break-in so that the user can take necessary actions.

2. Specification of components

1) Arduino UNO Board

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, Figure 2: Arduino UNO Board A USB connection, a power jack, an ICSP header, and a reset button. Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED.

2) 5V Relays

One of the most useful things you can do with an Arduino is control higher voltage (120-240V) devices like fans, lights, heaters, and other household appliances. Since the Arduino operates at 5V it can't control these higher voltage devices directly, but you can use a 5V to switch the 120-240V current

and use the Arduino to control the relay. A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal. 5v Relay. The Arduino can be programmed to turn on the relay when a certain event occurs, for example when the temperature of a thermistor gets higher than 30° C. Or when the resistance of a photo resistor drops below 400 Ohms. Almost any sensor can be used to trigger the relay to turn on or off.

3) Fire Sensor

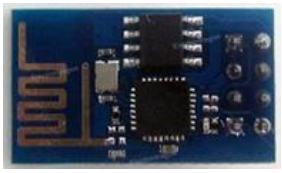
Fire sensor A flame sensor "senses" a weak DC signal from the AC power sent to the ignitor which via the phenomenon of flame rectification in which the polarity of power sent through a flame is rectified to DC. This sensor is used in our experiment to detect the fire in the house and then send an alert through buzzer.

4) Buzzer

An electric buzzer consists of an outside case with two pins to attach it with power and ground inside is a piezo element which consist of a central ceramic disc surrounded by a metal often with often bronze vibration disc. When current is applied to the buzzer, it causes the ceramic disc to contract or expand. In this the buzzer is used to make the sound to alert if anything occurs in the home.

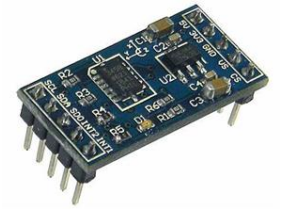
5) WI-FI Module

The ESP8266 Wi-Fi module is a self-contained SOC with integrated TCP/IP protocol stack that can give any micro controller access to your Wi-Fi network. The ESP 8266 is capable of either hosting an application or offloading of all Wi-Fi networking functions from another application processor.



6) Accelerometer

Accelerometers are the devices that measures acceleration which is the rate of change of the velocity of an object. They measure in meters per second squared (m/s^2) or in G forces (g). The values are represented in X, Y and Z coordinates. These values are used to control the rotation of motor. Figure 6: Accelerometer The structure of the accelerometer sensor has a mass attached to a spring which has fixed outer plates and moves along one direction. So when an acceleration is applied in any of the direction, the capacitance between the plates and the mass will change. The accelerometer sensor will measure this change in capacitance which corresponds to an acceleration value.



7) DC Motor

DC motors themselves are very simple; any basic DC Motor will have two leads that can be directly attached to a battery or power supply of sufficient capacity. The side of the motor that is connected to the positive of the power source will determine which way the motor rotates. We will be going a step further than this and using a motor controller called an H-Bridge. Rather than having to unplug the motor to reverse it, this clever chip allows us to reverse the polarity to the motor using logic level signals from a microcontroller. The motor can be run in each direction on command. The chip does all of the heavy lifting and can be directly connected to the DC motor and the Arduino.

8) Motor Driver

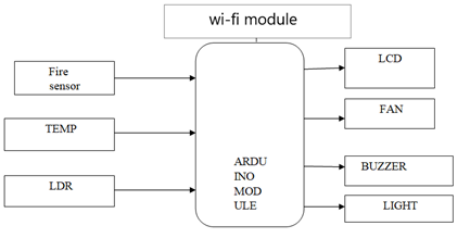
Drivers are not used only for motors. They are used for any device that usually draws more than 50-100 mA. Maximum current of microcontroller output (typically 10-20mA) is not

enough to drive motor coil. Connecting motor directly to microcontroller will damage microcontroller output transistor. Arduino IDE The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software. It runs on your computer, used to write and upload computer code to the physical board.

9) Temperature Sensor

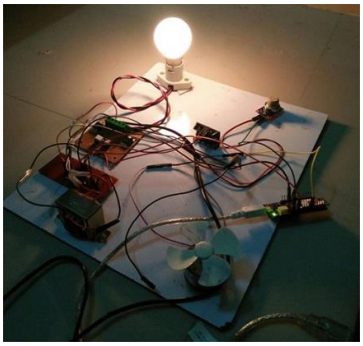
The Temperature Sensor LM35 series are precision integrated-circuit temperature devices with an output voltage linearly proportional to the Centigrade temperature. The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling. The LM35 device does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°C over a full −55°C to 150°C temperature range.

3. Block diagram



4. Experimental setup of home automation setup

This paper basically consists of three important parts i.e. sensing, monitoring, and controlling system. The first part sensing is done by sensors like flex sensor, accelerometer etc. the monitoring task is done by the cloud platform and the controlling part is done by our microcontroller unit i.e. is Arduino UNO. The sensors, appliances and Wi-Fi module are interfaced with Arduino UNO. The value of sensors brings a change in the status of our appliances. The flex sensor depends on the gestures of our fingers to control the appliances. The accelerometer controls the opening and closing of door. The magnetic sensor alerts us if the door lock breaks. The flame sensor alerts us if there is fire in the house. The status of our appliances are uploaded on the cloud platform and the user can see the status on his laptop and smartphone as well. The Arduino UNO controls the appliances on the basis of value given by sensors.



5. Conclusion

The IOT facilitates Number of benefits to the society and from our paper we can provide and prove the strength of IoT that is capable to contribute the services for the purpose of building vast no.of applications and help to implement them on the public platform. This design provides moderate and less expensive way of sensing, monitoring and controlling system in the field of domestic and as well as industrial standard to implement IOT. At a final note, we conclude that IOT leads to become universal in every aspect. This paper will be very beneficial in our normal day to day life and will bring much needed innovation in his fast changing world of technology where people prefer to have control over things using the smartphones which will bring ease to their routine life.

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