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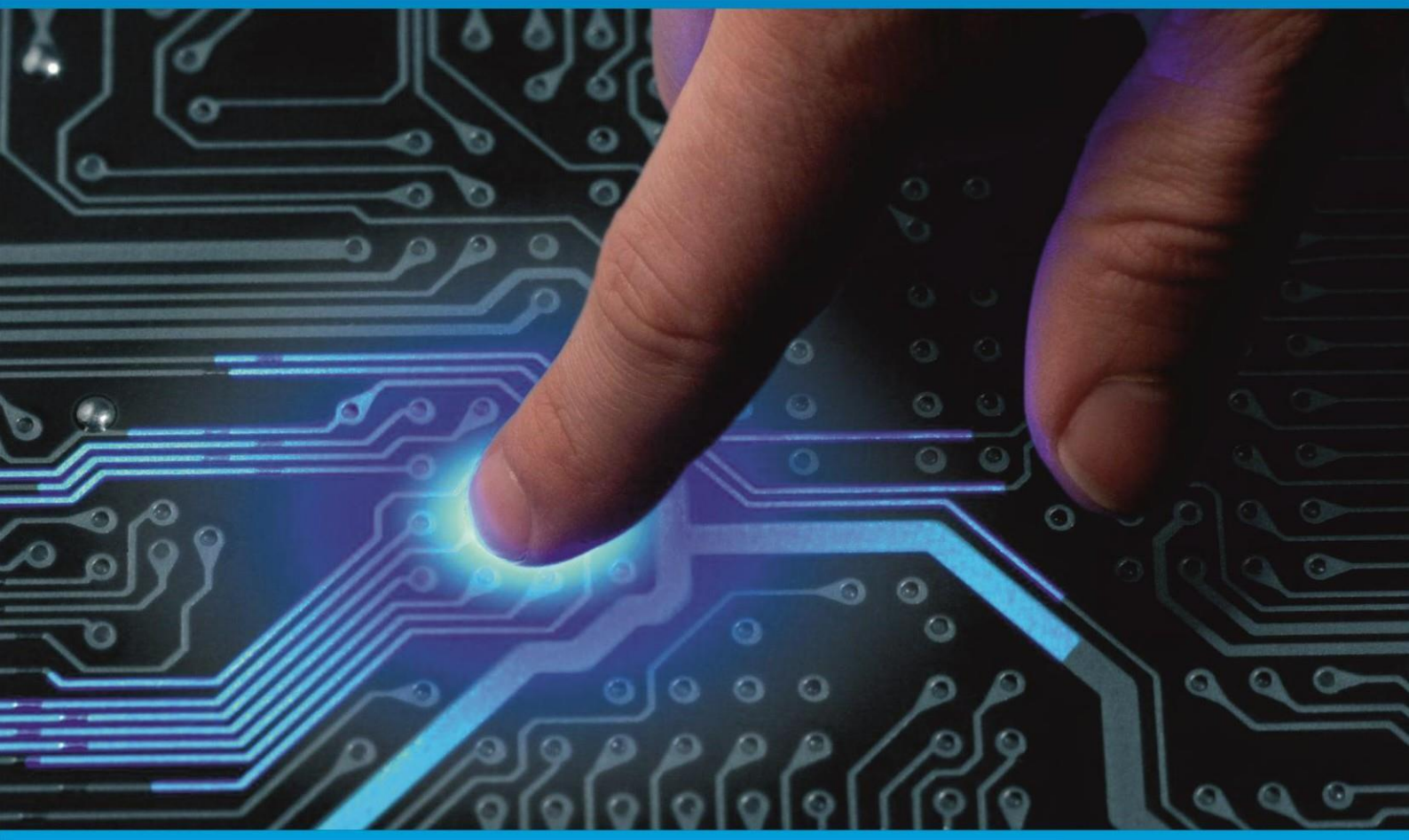

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Smart Home Security System Using Arduino

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ABSTRACT: Internet of Things (IoT) conceptualizes the idea of remotely connecting and monitoring real world objec ts (things) through the Internet [1]. When it comes to our house, this concept can be aptly incorporated to make it sma rter, safer and automated. This IoT project focuses on building a smart wireless home security system which sends ale rts 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 syste m over the similar kinds of existing systems is that the alerts and the status sent by the Wi-
Fi 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 Launchpad 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: Home Security, IOT, Motion Sensor, Gas sensor, Arduino.

I. INTRODUCTION

Safety and security of any living or working place is one of the most primary concerns. The advancement of the technology has increased the safety and security along with their bel ongings. Internet of Things (IoT) become major interest as results of technology development and ind ustry revolution
4.0. Application of IoT has been widely implemented in every sector such as security systems, industry, farming, and medicine. Several studies have been developed a IoT-
based smart home such as home security system using internet of things. Previous study suggeste d to use Arduino Uno , module ESP wifi , dan reed sensor, however, in that study only applied sensor reed that placed in front off the door as a security system and users received notification i n smartphone after the door opened. This system still has a higher risk for criminalization . Another stu dy, used IoT-
based smart security and home automation system with sensor PIR installed at the entrance of the bu ilding, so that if there is a human movement , the sensor will trigger to input the microcontroller, the ow ner will get a notification through voice calls. This system can provide real action directly for owner to provide warning system by turning on the light and alarm so the owner using the keypad button t hat has been programmed previous. IoT based smart home using Blynk Framework , this system consists of three different isolated sub-
systems including relay module systems, GPS module systems and temperature sensors, as well as PIR se nsors and ultrasonic sensors to measure the water level in the connected tank using Nodemcu via Wi-Fi___33, and the interface using Blynk App . Whereas smart home design based on ethernet systems ca n protect homes and monitor home conditions such as humidity, temperature , gas leak and fire using se nsors that are integrated with the Arduino Mega microcontroller and Ethernet shield.

II. LITERATURE REVIEW

Design and Implementation of Security for Smart Home based on GSM technology was discussed by Govinda et al. (2014) that provides two methods to implement home security using IoT. One is using web cameras such that wheneve r there is any motion detected by the camera, it sounds an alarm and sends a mail to the owner. This method of detecti ng intrusion is quite good, albeit somewhat expensive due to the cost of the cameras involved in the process. The cam

eras need to be of good quality which means it should have a wide range and the picture quality should be high enoug h to detect movement. Also if you go for movable cameras such as dome cameras they will cost even more than the fi xed ones.

SMS based system using GSM was proposed by Karri and Daniel (2005) propose to use internet services to send mess ages or alert to the house owner instead of the conventional SMS. Jayashri and Arvind (2013) have implemented a fin gerprint based authentication system to unlock a door. This system helps users by only allowing the users whose finge rprint are authorized by the owner of the house. This system can also be used to monitor who all have used the sensor to gained entry into the house. The system is coupled with a few more home protection features such as gas leakage a nd fire accidents. Although a good system, fingerprint sensors are expensive and complex (as they need increased sens or resolution) to integrate into an IoT setup. Some experts also argue that only relying

on a fingerprint sensor is not wise as it is relatively easy to lift someone's fingerprints and replicate them, which is w hy it is always advised to use fingerprint scanners in a two factor authentication systems where an additional layer of s ecurity is available in the form of PIN, passcode, voice recognition, etc.

Some researchers proposed an idea of robust IoT home security system where a fault in of one component in the syste m does not lead to the failure of the whole system. The idea of using multiple devices which may or may not be direct ly compatible with each other but can be made to work in such a way that they can replace an existing component of t he system in case of a fault. In tandem to this, the model has the ability to use overlap between various devices which would result in preserving energy thus making the model more efficient. An example provided of the said model woul d use temperature sensor, WiFi module and a door sensor to replace a faulty camera. The authors are successful in an effort to demonstrate the given example. However such systems are useful for people with energy efficiency in mind a nd for those who need a high degree of robustness with their security systems and are willing to expend more money t han usual.

Laser rays and LDR sensor are used to to detect intrusion using their movement was proposed in

2016. The way the system works is that a laser is focused towards a LDR sensor and the moment that the contact of l aser to LDR sensor breaks, the alarm connected to the sensor goes off alerting the neighbours and sends a SMS to the owner. This system solves the problem of covering the places which are out of range from the fixed cameras but faces the same difficulties which are faced with systems consisting of GSM modules to send text messages, which is that th e delivery of message is dependent

on network coverage. Also due to the nature of lasers being a straight beam, it can be avoided by intruders who know about the system and are capable of dodging the lasers, rendering the whole system useless.

|||. ARCHITECTURE

IOT and Arduino Based Home Security System uses four Sensors, namely, Temperature, Smoke, LPG and IR sensors. Data from these sensors is then sent to the Arduino, which has an inbuilt signal converter. Arduino then sends data ov er to the Wi-Fi module – ESP8266. ESP8266 is a chip used for connecting micro-controllers to the Wi-Fi network and make TCP/IP connections and send data. Data, which is sensed by these sensors, is then sent to the IO T. To elaborate

on the theft detection, we have connected a password module by which a user can enter the password. The door woul d open only if the password entered is correct. The IR sensor needs to be installed

on the door, which is, by default activated. If an individual enters the correct password, the IR sensor is de-activated for10 seconds and the buzzer won't turn ON. If somebody tries to enter the house without entering the pass word, i.e. by damaging the lock or

so, as soon as the person passes the IR sensor, the buzzer would be turned ON. The buzzer would be turned ON even if a wrong password is entered for consecutively

3 times. To demonstrate the door, we have used a DC motor. The buzzer will turn ON even when it detects incense st icks as well as a candle flame. Temperature and Smoke sensors are used for fire detection. As soon as the fire is detect ed, the signal will be sent to the micro-controller which will then send appropriate data to the LCD and the Wi-Fi module. Data is in turn sent to the website using the IOT module. Similarly, the LPG sensor is used for LPG gas le akage detection. The Pre-requisite for this project is that the Wi-Fi module should be connected to a Wi-Fi zone or a hotspot. This project is also implemented without the IOT module. In place of the IOT module, we have used a GSM module, by which an SMS is triggered.

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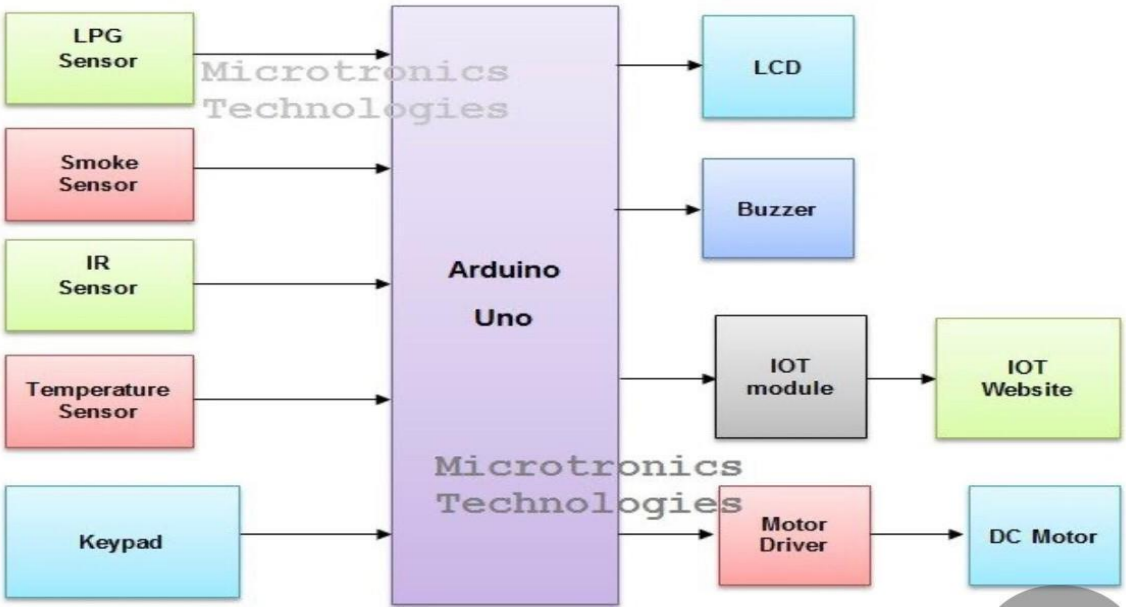

Fig.1. block diagram

IV. WORKING

The smart home promises a futuristic home experience where everything you need is just a simple voice command aw ay, even when you're far from home. There are some very cool gadgets that let you do a lot with home automation, m any of which are incorporated into home security systems. These include smart doorbells, smart locks, smart cameras, smart thermostats, smart lights, and smart smoke alarms. One of the most common and security-
focused components of a smart security system are smart doorbell cameras. These incorporate a small camera in the d oorbell button. When someone rings the bell—or approaches the door, depending on the system—
the doorbell sends an alert to your phone and activates the camera, letting you see a clear picture of who's there, no m atter where you happen to be. Smart locks are great not only for security but also for convenience, often allowing you to forego keys entirely. What makes them smart is their ability to communicate with your smartphone via Wi-
Fi or Bluetooth, allowing you to lock and unlock your door from anywhere. Many also automatically lock and unlock when they detect your phone approaching
so that you can come and go without ever having to worry about whether the door is locked. Smart cameras take the t raditional security camera concept and turn the dial up to eleven. These cameras incorporate Wi-
Fi connections that allow them to be viewed and controlled remotely using a smartphone app. Many can also upload t he footage to the Cloud for storage, eliminating the need for a potentially complicated on-
site storage setup. The last common home automation feature of a security system is the humble smoke alarm. This de vice takes the traditional smoke alarm and brings it into the digital age, with Wi-
Fi connectivity and the ability to communicate and pinpoint exactly where a fire is located. The really nice thing about these alarms is that they can send the alerts to your phone
so you can be aware of any issues even when you're away from home. You can also easily silence them in the event of a false alarm—
who hasn't set off their smoke alarms at least once while cooking? Top picks in this category include the Nest Protect and the First Alert Onelink. Both detect carbon monoxide in addition to smoke and alert you in a human voice rather t han a screeching alarm tone.

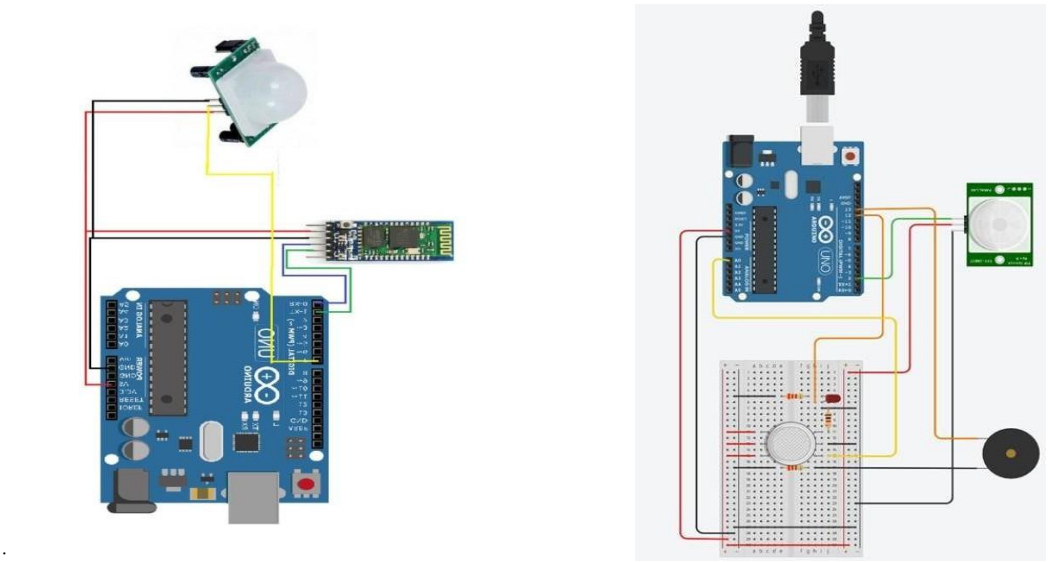

Fig.2. Circuit Diagram

MOTION SENSOR

There is a jumper behind this module. If you move the jumper to L position, the sensor will 'toggle' (change st ate) whenever motion is detected. This is unlikely to be of much use in a practical applications. This mode is ca lled non-triggering or Single Triggering mode.

Moving the jumper to the H position will result in the more usual sensor logic. The sensor will turn on when motion is detected and turn off a while after the last motion is detected. This sensor will reset the tim er (which would otherwise turn the output off) each time motion is detected; this would be applicable, for exam ple, for room occupancy lighting control where you don't want the lights to blink off while the unit resets. This is called Retriggering mode. (or repeatable trigger mode).

There are also two potentiometers behind this module. By changing the SENSITIVITY potentiometer, you can reduce or increase the sensitivity of the sensor (clockwise increase), and also by changing TIME potentiometer the output delay after movement detection will be changed.

Fig.3. Motion sensor

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GAS SENSOR

The MQ-2 smoke sensor is sensitive to smoke and to the following flammable gases:

- LPG
- Butane
- Propane
- Methane
- Alcohol
- Hydrogen

The resistance of the sensor is different depending on the type of the gas.

The smoke sensor has a built-
in potentiometer that allows you to adjust the sensor sensitivity according to how accurate you want to detect gas.

The voltage that the sensor outputs changes accordingly to the smoke/gas level that exists in the atmosphere. T he sensor outputs a voltage that is proportional to the concentration of smoke/gas.

In other words, the relationship between voltage and gas concentration is the following:

- The greater the gas concentration, the greaterthe output voltage
- The lower the gas concentration, the lower the output voltage

Fig.4. Gas sensor

V. APPLICATION, FEATURES & ADVANTAGES OF SMART HOME SECURITY SYSTEM

Security being the main intent of the project, the most important application of this system is any domestic security. B y using this project, a person will be intimidated about any incident likely to be caused by fire, theft, LPG gas – REMOTELY.

This project can be used at Restaurants, Industries, Manufacturing units, Banks, etc.

The main advantage of this system is that it is fully automated. Once installed, it does not require any kind of human i nteraction. Also, it is very cost-effective.

IOT and Arduino based Home Security System can be enhanced to identify fingerprints as opposed to a password usin g a keypad.

Additionally, we can have a voice announcement system that would send out vocal instructions regarding any of the f our hazardous conditions detected by Smoke, Temperature, IR and LPG gas sensors.

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VI. OBJECTIVES

The main advantage of this system is that it is fully automated. Once installed, it does not require any kind of h uman interaction. Also, it is very cost-
effective. IOT and Arduino based Home Security System can be enhanced to identify fingerprints as opposed to a password using a keypad.

VII. CONCLUSION

With the advancement in technology, the number of electronic devices in our day-to-day Life has increased to make life simpler. So there is necessity to construct a trustable Remote System that will easil y control all these devices from a distance will not only reduce the complexity of handling the number of devices simu ltaneously, but also save power. This report presents overall design of Home Automation and Security System. This is an IoT based project. After research, we make a successful prototype. Using the Ethernet and microcontroller technol ogy we design a Home Automation System where the entire electrical item will be controlled. Using the internet peopl e can also monitor room temperature, Gas occurrence in kitchen, detect human in room through the user friendly Web Application and also makes a
sms notification system. Comparing to others this system is low cost, attractive user friendly interface which is platfor m independent and it's very easy to install. After implementation of all functions, the system is tested in different stag es and it works successfully as a prototype.

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