

## Design and Construction Smart Home System using RFID, FOSS and Mobile Application

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**Abstract:** Home based system has been designed and construction using mobile phones. The platforms having Android to automate a Wi-Fi module interfaced with micro controller that controls smart devices. This study presents an integrated smart home to improve the quality of human's life by proficiency a flexible and comfortable. There for an intelligent controlling system is design and construction for many home appliances through the smartphone Android application. Several required components installed and connected for the design such as temperature sensor, fire sensor, smoke detection sensor and relays with other devices. This means worked together via. controller to regulator the home system which programmed by using Proteus Software. All the results obtained and monitored using smart mobile phone.

**Key words:** SHS, Wi-Fi, sensors, RFID, Android mobile, smart mobile

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### INTRODUCTION

The main concept of this study is to design home automation and security for disability people and old age, those who are unable to control home appliances and to give an indication when there is any dangerous. A smart home is which it provide flexibility, comfort and safety. Wherein, the android controls the electricity and heat, lighting, air conditioning and fire as well as the alarm systems, etc (Bhoyar, 2015).

The ability for automatically or remotely control the parameter is offered an individual everywhere at the home. So, there is a specific function can perform such as a home appliance (device or instrument) when that are designed, especially, an electrical device (Chandramohan *et al.*, 2017). Different studies have been approach to address smart home and automaton system. (Goncalves and Carvalho, 2013 and Ramya *et al.*, 2017) these studies are about Ethernet Shield were used, a few sensors just temperature sensor and door sensor. However, other study used Bluetooth and just relay (Caldo *et al.*, 2015).

We are aim at this project to reconstruct an integrated home in terms of safety, home temperature control and intelligent control via. the smartphone. We will connect several sensors to control the home system by connecting them by Arduino and controlling via. smartphone. Firstly, we will intersection the fire and humidity sensors to conserve the protection of the house. Secondly, we located the RFID sensor with the servo both of them research together to mechanism the entrance of the house which indemnifies the welfare of the house.

Additionally, there is another sensor to switch the temperature sensor on or off condition as required. On the other hand, a smoking sensor adjustable to protect the environment from pollution in side the home as well as alarm classification. Finally, a device for evaluating current and voltages to be measured and cutoff the electricity by the smartphone (Chandramohan *et al.*, 2017; Al-Tabatabaie and Hama, 2017).

### MATERIALS AND METHODS

**Smart home system overview:** This study consist of a brief explanation about the design necessity and the method. In this study the system is worked as a remote unit control access. All appliances such as the ultrasonic sensor, the motion sensor, the light sensor, the LED and the thermal sensor that are sending a signal or message to the device as well as to check the condition. For example, on, off condition. This means if we absence and essential requirement to control an device to change the condition before returning to the home.

The illustration of the method as presented in Fig. 1. Projected element strategy of the study includes two central processes, the software programs interface and the hardware for diverse procedures. However, the attendant is a standard scheme with a Wi-Fi card is settled up. The resolution of the associated is to achieve and mechanism uncertain structure modules which are supported the hardware interface units to perform their specified tasks (through triggers) and reported the server to events that are triggered (from sensors). The design of the smart home mainly includes the following elements.

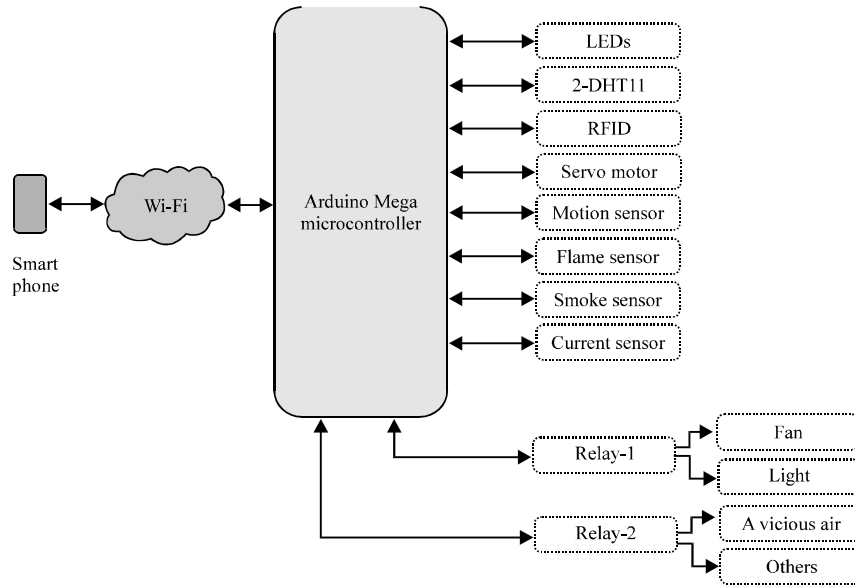


Fig. 1: Block diagram



Fig. 2: Arduino Mega 2560

**Arduino Mega 2560:** The Arduino Mega 2560 is a microcontroller made of the ATmega2560 which contains on 54 digital input/output pinches, fifteen of them can be used as PWM productions. And sixteen pins can be configured for analog inputs signal. In addition to, four (UARTs) hardware serial ports with a 16 MHz crystal oscillator and a USB connection as well as a power jack and an ICSP header that used to control the link among sensors and Android as displayed in Fig. 2.

**ESP8266 Wi-Fi:** ESP8266 is a 3V Wi-Fi element usually used on behalf of (IOT) Internet of Things applications. The supply voltage is about 3.6 V that must be use for join with Arduino. As shown in Fig. 3

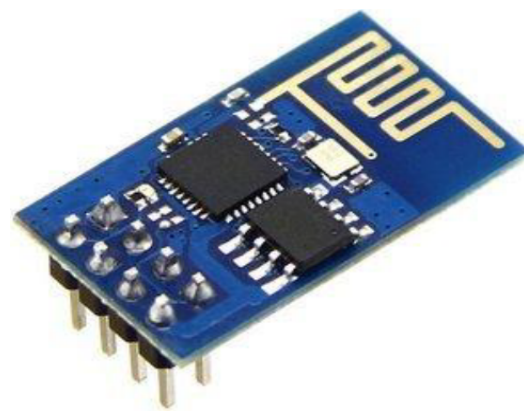


Fig. 3: ESP8266 Wi-Fi

**RFID:** RFID is an contraction for “radio-frequency identification” is made up of multiple smaller logic module can be configured for combination logic programmed in RFID chips which are avoid a reader radio waves. Using to open the door by digital data as shown in Fig. 4.

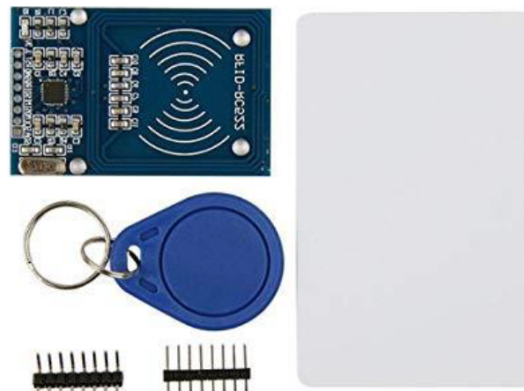


Fig. 4: RFID

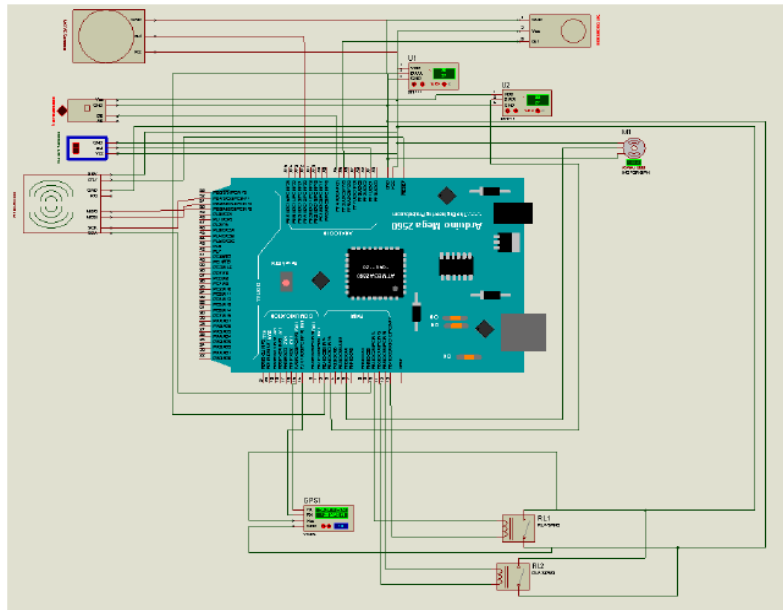


Fig. 5: Home system planning programmed by using Proteus Software

**DHT11 and flame detector:** The DHT11 processes comparative humidity. Humidity is the quantity of liquid vapor in air and measures temperature with a surface fixed to temperature sensor which built into the component. As well as we installed a fire detector which is a sensor can consider to identify and reply to the attendance of a flame or fire, tolerating flame recognition.

**Smoke sensor and motion sensor:** Smoke sensor is an slab can be configured for combinational a smoke detector and fire alarm together in spite of the size and the demission is very small. However, a motion sensor is used for safety the home system which is the main scheme that distinguishes at what time everybody can arrive or pass through the home.

**Servo motor, relays and A 10 amps current sensors:** Servo motor is utilized in many applications. Size small but container a big sock with energy-efficient. Using to open the door automatically. Then relays are changed to open and close circuits electronically. Next. ACS712 module can measure AC or DC current oscillating from +5A to -5A, +20A to -20A and +30A to -30A. Figure 1, the schedule of the design such as ecological watching using the temperature, humidity as well as the smoke sensors. It also deals with switching to regulator the lighting, fans/air conditioners and other home appliances associated to the relay system, additionally, system is the interference between the recognition and detection

via. motion sensor and all logical controller units from the Android smart phone application or web application.

**Operation of SHS:** The operation of Smart Home System (SHS) depend on the user that should be contained Android operating system based mobile phone. The operation of the system is varied by using software to draw the schematics and simulated the circuit in the real time. Design can also develop to use for fingerprint door look by Arduino. In contrast, Fig. 5 should be seen the hole construction of design that considers the hardware of our design where is the main part of drawing is the Arduino Mega 2560 that presents the heart of completing process. So, all sensors that are described above section should sent their data into systems, so that, the microcontroller shall process that data to implement duties or sends some order for servo motor, RFID, etc.

Further, software and hardware module that the designed system is consisting of that one deals Android mobile smart phone through Wi-Fi shield after one is concerning with equipment used in the designed system.

Finally, installing this application on actual Android mobile and an Android application is required to be performed in order to operate the system due to the Android smart phone is selected to be used. More than, the operating system will be clearing below section that explains the completing processing.

## RESULTS AND DISCUSSION

Results have been examined to regulator the system inside the home for adjusting by the smartphone. Firstly, in Fig. 6, we linked the gate via servo motor and RFID where servo motor will control the mobile via. the button opens and closes the door as for RFID will control the door via. radio waves through a digital surface-based identification card where RFID signals are sent and the door is opened. In Fig. 7 we have attached a motion sensor inside the house where it has to operate and a person enters the house. The motion sensor is activated the alarm device to protect the house.

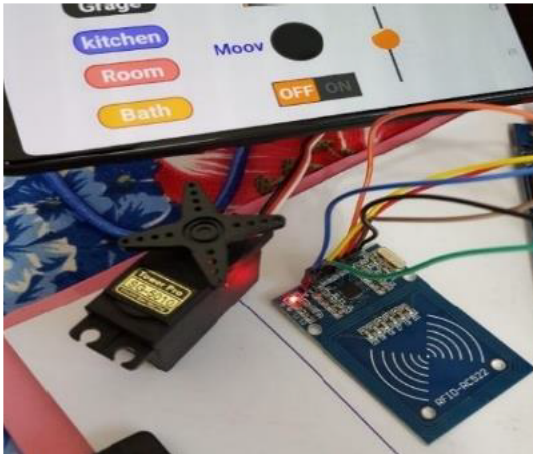


Fig. 6: Servo motor and RFID



Fig. 7: Motion sensor

Secondly, in Fig. 8 we connected the fire sensor to set up in the kitchen with the designer when the temperature of the room reaches 60° the fire sensor operates the fire and extinguish it through the fire ball. In Fig. 9 we used the smoke sensor which location depended on designer this has a degree of smoke for a certain amount to provide alarm too. In addition to, we used the DHT11 sensor which is measured the humidity and the



Fig. 8: Fire sensor

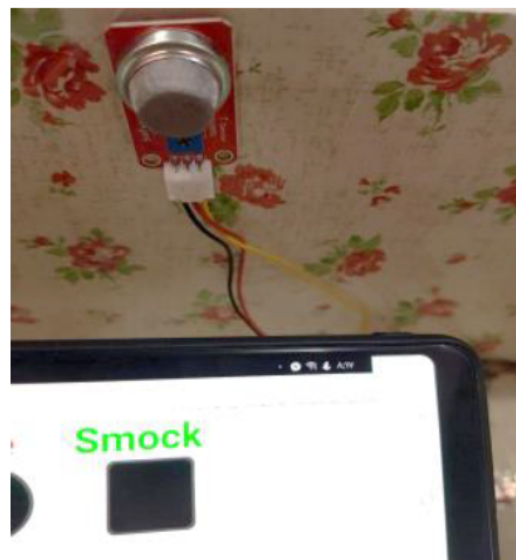


Fig. 9: Smoke sensor

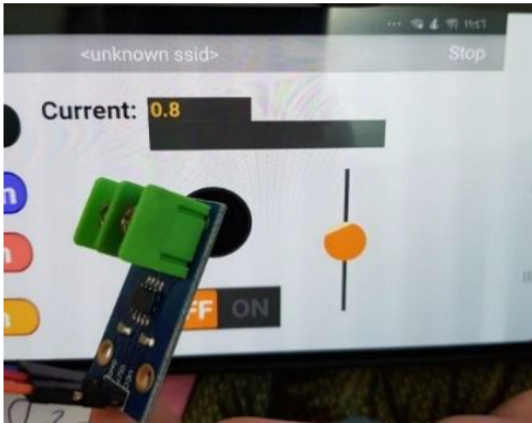


Fig. 10: Current sensor

temperature of the smart home at suitable degree. In order to control the operator of the cooling system for monitoring the temperature as well as the humidity. Furthermore, we have set up relays to control high-voltage home appliances by opening and = closing home equipment. Finally, we are connected the sensor to measure the amount of current for the desired value as shown in circuit diagram in Fig. 10.

### CONCLUSION

Home system using Android Mobile creates the handicapped/old aged people more comfortable for accommodations. This study offers normal impression in order to contrivance numerous home-based appliances and deliver a respectable safety using Android phone/tab. Both of them (Android and Arduino) offer together with Free Open Source Software (FOSS) Therefore, the whole operation fee is actually inexpensive and it is reasonable by a public. Regarding for the development technology in this field we selected Android standard to produce assistance for all societies. So that, several tools can be

useful for industry monitoring controlling systems by using (Arduino Mega 2650) to cooperate with the android phone and conduct the motion to control other surrounded devices/sensors.

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