

SMART HOME SHIELD

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Abstract— IOT (Internet of Things) based homes have become a reality today with several people integrating it while building houses. Security is vital for all the houses. The present and most commonly used IOT security modules are based on Bio-metrics, smartcard reader which can be easily duplicated or forged. This paper presents an idea to overcome these difficulties by offering an alternate and unique solution. The prototype described in this paper takes input in the form of user’s finger print as well as weight and height. Since weight is a varying input, the user’s weight is recorded and stored by the module along with the height before he/she leaves the house. This stored information is used to authenticate the user once he/she returns; his height, weights are scanned and cross checked with the information stored in the module.

Index Terms— Arduino, Biometrics, IOT, Sensors.

I. INTRODUCTION

The internet of things is one of the biggest buzzwords of 2017. Devices are getting smarter and smarter every day. With the rapid rise in technology and users for every device, security has become a main concern. This paper attempts to overcome the loopholes present in the current security system by offering a much better foolproof system. The system present in this paper takes height, weight and fingerprint as security parameters.

II. SYSTEM ARCHITECTURE:

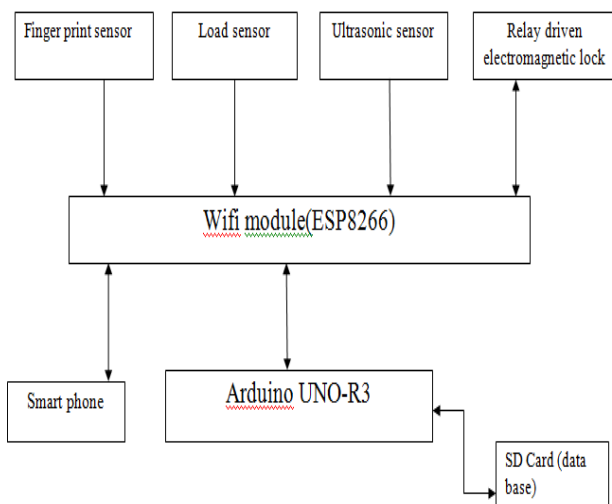


Fig.1: System Architecture

A. ULTRASONIC SENSOR

The ultrasonic sensor is used as a height scanner. The job of the ultrasonic sensor is to scan the height of the user at the time when he/she leaves the house and enters the house. It is based on measuring the properties of acoustic sound waves with the frequency higher the human audible range. Its working principles are:

- Time of flight (for sensing distance)
- Doppler effect (for sensing velocity)
- Amplitude attenuation (for sensing distance, direction)

The ultrasonic sensor contains two round ultrasonic speakers, one of the speakers transmits a 40 KHz sound wave which bounces on a solid surface and reflected rays are detected by the other speaker. The total time taken for this process to complete will give us the distance between the sensor and the object.

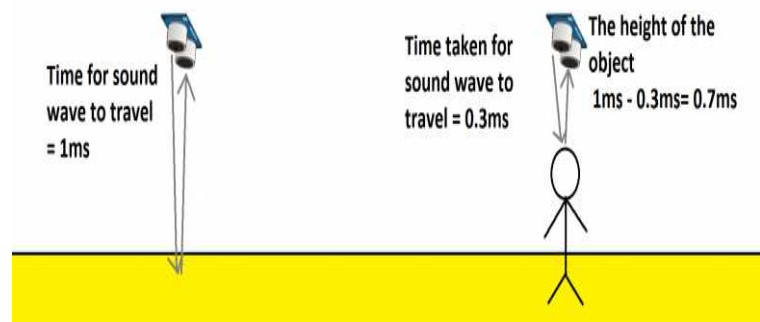


Fig.2: Measurement of height

This is subtracted from the distance between the sensor and the surface which gives the height of the person.

B. LOAD CELL

The load cell is used as a weight sensor. It is a transducer that creates an electrical impulse signal whose magnitude is directly proportional to the force being measured. The security system presented in this paper is based on the strain gauge load cell using wheat stone bridge configuration. The load cell measures the weight of the user based on the principle where the strain changes the electrical resistance in proportion to the load of the gauges, which provides an electrical value change that is calibrated to the load placed on the cell.



Fig.3: Load cell

C. FINGERPRINT SENSOR

The sensor scans the fingerprint of the user and stores it in the database which is used as the reference to verify the user when he/she enters the house.

The user's fingerprint are first scanned, analyzed and then stored in the code form on a secure database. Once the scan is complete, the system is ready to use.

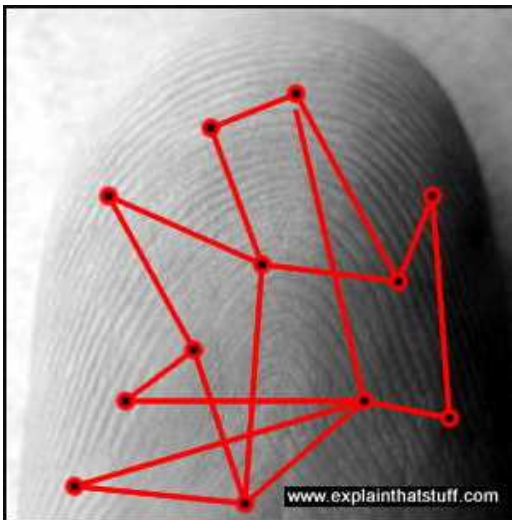


Fig.4: Finger print

Anyone who wants to gain access has to put their finger on the scanner, the scanner takes their fingerprint and checks it against all the fingerprints in the database stored during initial scan and decides whether the person is entitled to gain access or not.

D. RELAY DRIVEN ELECTRO MAGNETIC LOCK

The lock used in this security system based on electromagnetic relays. After the height, weight and finger print matches, the signal is sent to the relay driven lock. When the current starts flowing through the coil, the relay gets magnetized which causes a short circuit and the door gets unlocked.

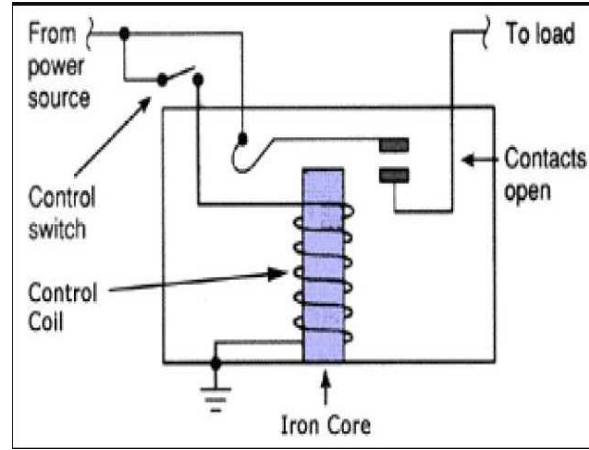


Fig.5: Working of relay

III. WORKING PRINCIPLE

The security system in this paper features a 3 fold security entry. It features a fingerprint scanner and a system which measures the height and weight of the user before he/she leaves the house. The height and weight is measured once more when the user returns

to the house. Entry to the house is granted only when these values match the values before leaving the house. The measurements of the other family members can also be stored and is linked along with their respective fingerprint.

The height of the user is measured using an ultrasonic sensor; the sensor measures and transmits the height of the user to the system wirelessly through the WIFI module. The weight of the user is measured using a load cell which measures the weight and transmits it to the system similarly using the WIFI module. Since weight is uncertain and volatile, plus or minus 2-3 kgs is acceptable before and after exiting the house.

These values are crosschecked along with the fingerprint once the user returns and entry is granted if they are a perfect match. The database in the system uses 128-bit Advanced Encryption Standard(AES)to secure the data. .To override this system incase if the owner is not available, a master code is generated in the user's smart phone and sent to the owner so that the other person and use that code to enter the house.

TABLE 1: SAMPLE DATA

| | Inside | | Outside | |
|---------------|------------|------------|------------|------------|
| | Height(Cm) | Weight(Kg) | Height(cm) | Weight(Kg) |
| Fingerprint A | 170 | 60 | 170 | 61 |
| Fingerprint B | 165 | 58 | 165 | 57 |

A. FEATURES

1. High speed data accuracy in verifying the height, weight and finger print scan.
2. Storage of multiple values of data.
3. Identification and verification of height ,weight and

finger print from the valued stored in the database(memory card)

4. Arduino UNO R3 the ATmega328 chip is an open source working platform which provides convenient power consumption and built in voltage regulation.
5. Data is highly secured using Advanced Encryption Standard Algorithm.

B. LIMITATIONS

The lock will not open until the data matches with the ones in the data base. Power shut down would make it difficult for the door to open. While the weight is being measured, the user should not carry any additional load.

IV. EXTENSIONS TO MAIN PROJECT

1. The users face can also be detected using image processing, making the system more secure.
2. Appropriate algorithms can be introduced to make the inputs more precise and to handle secondary weights like bag.

V. CONCLUSION AND FUTURE ENHANCEMENT

The efficient way to face the existing problems is to use the smart access control systems. As there is a tremendous advance in the technology, it brings a paradigm shift in the personal and professional life .IOT can make our life easier by transforming the way we work and play.

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