

IoT Based Visitor Sensing Smart Doormat

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Abstract: The door mat notification function of the home security system is served by the suggested system. To create multiple functional systems like industrial automation, fire detection, and safety control, this system may be simply modified. The visitor outside the door is detected by the suggested system. By taking a visitor's picture, an email will be sent right away to the owner. The most crucial element in any security system is authentication. The primary device for authentication and email visitor notification in the proposed system is an Android phone. The suggested solution stores visitor photos both online and offline so the owner can access the visitor's past year history. The accuracy of this system is 97%, with 3% of errors. It could happen as a result of a network issue. Therefore, the total system is resilient and has a bright future for a variety of applications.

Keywords: Cloud, email, the Internet of Things, and smart doormat

I. INTRODUCTION

Without opening the door, it is challenging to determine who is outside. It takes a lot of time to open the door or keep an eye on the person who is outside the door while we are working in the kitchen or performing vital office tasks. Additionally, it is necessary to let servants or known individuals into the house if we are travelling beyond the state or country. By pressing a single button, this technology enables you to quickly determine who is at your door and whether to let them in or not. The importance of home security in today's culture necessitates the use of a system that offers adequate protection around-the-clock. Although there are many security systems on the market, many are not cloud-connected. Communication requires the use of the media, which has a wide variety. Since the internet has the greatest global communication media reach, using technology like the Internet of Things is simple. It uses a cloud server that is situated far away. Data is saved and retrieved by handheld devices on this cloud server. In the architecture we envision, one device will save data in the cloud, and another will retrieve that data. Therefore, this technology is quick and easy to use in comparison to other technology. The system is additionally transformed into a CCTV and used for home surveillance.

II. METHODOLOGY

2.1 Block Diagram

The suggested system is composed of numerous components, including a Raspberry Pi, camera, piezoelectric sensor, ultrasonic sensor, and Ethernet connection. The adapter can provide the 5V power source that Raspberry Pi needs. Additionally, it sports a unique camera with a 5, 8 MP resolution. This camera is directly connected to the Raspberry Pi's camera port. For the purpose of providing instructions to the user in picture format, a CCTV camera was attached to a Raspberry Pi.

For internet access, an Ethernet cable needs to be attached to the Ethernet shield on the Raspberry Pi. For detection, we put an ultrasonic sensor to a distance of 100 cm. Additionally, we employed a piezoelectric sensor to provide information to the door mat. There are 40 GPIO pins on the Raspberry Pi that can be used to connect various sensors. The Raspberry Pi's gpio pins are connected to the electric buzzer.

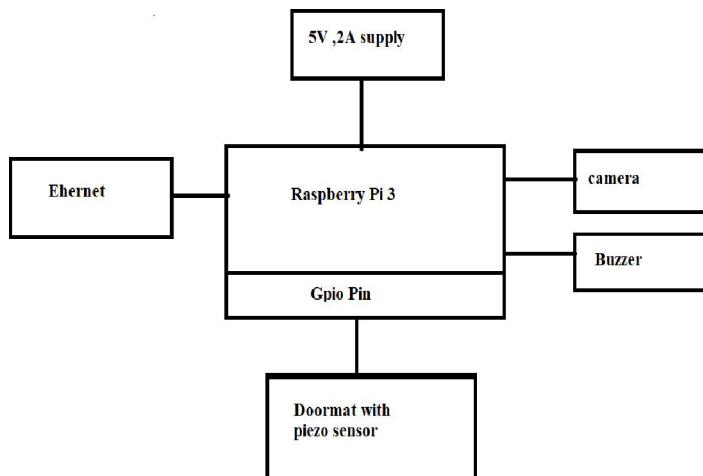


Fig.1: System block diagram

2.2 Prototype of Hardware

A. RaspberryPi

The Raspberry Pi 3 is a key component of the proposed system. It features 4 USB ports that may be used to connect a mouse, keyboard, and pen drive. It also has an Ethernet compliant connection that can be used to connect an Ethernet cable. The 40 GPIO pins on the Raspberry Pi 3 allow us to attach a variety of sensors, including ultrasonic, air, temperature, and moisture sensors. The Raspberry Pi has two unique slots where we can attach the Pi camera and touch screen display.



Fig.2: RaspberryPi3

We also need an 8 GB memory card to install the OS and save the software. Raspberry Pi can be used as a music player. It contains a 3.5 mm audio connector for connecting headphones and home theatre systems. In addition to designing a separate power circuit for it, the Raspberry Pi features a power slot that may be used to connect a 5V, 2A charger. The Raspberry Pi features an HDMI connector that we can use to connect it to an external desktop or projector.

B. Pi Camera

There is a camera slot on the Raspberry Pi. The Raspberry Pi's camera slot and the Pi camera are directly connected. There are 5 MP and 8 MP camera options. The system makes use of a 5 MP camera. Compared to utilizing a web camera, using a Pi camera on a Raspberry Pi is simpler because it has an inherent command for it. We must enable the camera in the Raspberry Pi configuration before we can use this camera. At the center, a camera is mounted above the door.



Fig.3: Pi Camera

C. Piezoelectric Sensor

Here, we use piezoelectric sensors, which convert the piezoelectric effect into electric impulses to monitor acceleration, force, and pressure which then alerts by turning on the buzzer.



Fig. 4: Piezoelectric Sensor

Therefore, there is no need for a doorbell when guests come because the doormat can recognize guests and alert them on their behalf. The built-in Piezo sensor allows the Mat to constantly check for changes in pressure caused by objects or people standing or sitting on it. And it's not just a doormat. It is a weight-sensitive layer of smart foam that can be placed under your doormat or pretty much anywhere else in your house when pressure-sensitive reactions are required.

2.3 Flow Diagram of the Proposed System

This is the system's flow procedure. Every activity happens in order. Person detection is done initially using a piezoelectric sensor. The buzzer will sound and an image will be taken if a visitor is found.

The owner's email is then sent with the taken image. Additionally, with the aid of the piezoelectric sensor, a buzzer will sound if theft is discovered.

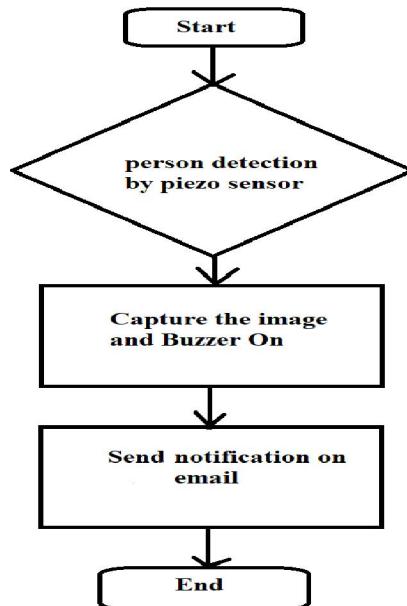


Fig. 5: Flow diagram of system

III. EXPECTED RESULTS

Therefore, using the Internet of Things (IoT) and the Raspberry Pi 3 module, we will construct a visitor sensor smart doormat that will allow us to detect visits automatically. Additionally, we will receive data via a piezoelectric sensor and email notifications on our mobile devices. Therefore, whether we are at home or not, we can immediately detect theft and protect ourselves from it. Additionally, we have the option of keeping visitor records in picture format.

IV. APPLICATIONS

- Home security and surveillance.

- Automatic Door Open & Close System.
- Locker Security with face recognition.
- Gate Automation with visitor count and notification.
- Fire Detection with notification to the fire brigade.

V. CONCLUSION

The proposed technology secures the house by emailing notifications and using the cloud. As a result, everyone in the globe can receive a visitor notification and decide whether to permit or prohibit visitors. This technology is highly sustainable and may be used in high-security areas like offices, industries, malls, and other places.

REFERENCES

- [1]. Rui Antunes, and Frederico Grilo Helder Adão, "Web-Based Control & Notification for Home, "International Journal of Computer, Electrical, Automation, Control and Information Engineering, vol.2, no.1,2008.
- [2]. J. C. Augusto and C. D. Nugent, "Smart homes can be smarter," Springer, pp.1-15,2006.
- [3]. J. J Greichen, "Value based home automation or today's market," IEEE Transactions on Consumer Electronics, vol.38,no.3,pp.34-38,Aug1992.
- [4]. F. and Floerkemeier, C Mattern, "From the Internet of Computers to the Internet of Things.," Springer, pp. 242-259,2010.
- [5]. D.-M. Han and J.-H. Lim, "Design and implementation of smart home energy management systems based on zigbee," Consumer Electronics, IEEE Transactions, vol. 56, no. 3, pp.1417-1425,2010