

# Integrated Real-Time Intrusion Detection System Using IoT

Edison Lancy D'souza<sup>1</sup>, Roopa S<sup>2</sup>, Rohan D Salins<sup>3</sup>U.G. Student, Department of Computer Engineering, SDIT College, Mangalore, Karnataka, India<sup>1</sup>U.G. Student, Department of Computer Engineering, SDIT College, Mangalore, Karnataka, India<sup>2</sup>Associate Professor, Department of Computer Engineering, SDIT College, Mangalore, Karnataka, India<sup>3</sup>

**ABSTRACT:** The advent of Internet of Things is the network of physical objects or “things” embedded with electronics, software, sensors and network activity that enables objects to collect and exchange data. The IoT allows objects to be sensed and controlled remotely across existing network infrastructures, creating opportunities for more direct integration between physical world and computer based systems resulting in improved efficiency, accuracy and economic benefit. IoT with Raspberry pi has been implemented for Home security through embedded system and an interface has given to all cell phones which belong to members of home. RFID is a tracking technology used to identify and authenticate tags that are applied. Typical RFID tag includes microchip with radio antenna, mounted on substrate. This project has been developed by interfacing RFID, it gets disabled soon after the door is opened and enabled when door is closed, whenever any person enters the home, motion sensor senses the culprit and camera clicks the picture, so that an image along with an alert message is sent to server from which the owner get notified through their app. This project mainly focuses on reducing the wasteful use of resources. The security cameras installed are activated only when required, rather than enabling it all the time. Thus saving lot of energy and providing security.

**KEYWORDS:** Motion detection, ultrasonic sensors, Raspberry pi.

## I. INTRODUCTION

The advent of Internet of Things is the network of physical objects or “things” embedded with electronics, software, sensors and network activity that enables objects to collect and exchange data. The IoT allows objects to be sensed and controlled remotely across existing network infrastructures, creating opportunities for more direct integration between physical world and computer based systems resulting in improved efficiency, accuracy and economic benefit.

### Internet of things

The Internet of Things or IoT has been defined as “a development of the Internet in which everyday objects have network connectivity allowing them to send and receive data”. According to the research of Firm Gartner, 3.9 billion connected things were used in 2014 and by 2020 it is expected to be much more than that. At its core IoT is simplest it's about connecting devices over the internet letting them talk to us. The popular example is smart fridge what if your fridge could tell you it was out of milk, texting you if its internal cameras saw there was none left etc. IoT is more than smart homes and connected appliances;

However it scales up to include smart cities with connected sensors for everything from tracking parts monitoring corps. Here we have used RFID as such tracking device. All the data and automated use is more efficient .Which means we use less energy, many areas of IoT show such benefits.

### Raspberry pi

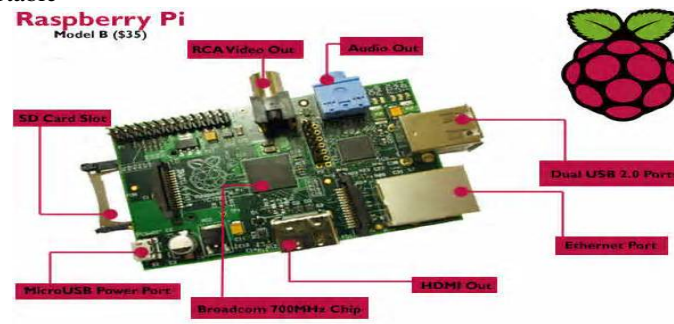
It is a credit card sized computer that plugs into your devices like monitors, televisions, keyboards etc. It is capable of performing as little computer which can be used in electronic projects and for many of things that our personal

# International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 5, May 2016

computers does, like spread sheets, word processing browsers, games and more. It is also a low cost credit card sized computer that would be portable



**Fig.2.1: RaspberryPi**

Figure 2.1 gives detailed picture of ports of RaspberryPi, where each port can be used for specific task. The Raspberry Pi 2 delivers 6 times the processing capacity compare to previous models. This second generation Raspberry Pi has an upgraded Broadcom BCM2836 processor, which is a powerful ARM Cortex-A7 based quad-core processor that runs at 900MHz. The board also features an increase in memory capacity to 1Gbyte. Raspbian is a free operating system based on Debian optimized for the Raspberry Pi hardware. Raspbian provides more than a pure OS: it comes with over 35,000 packages, pre-compiled software bundled in a nice format for easy installation on Raspberry Pi board.

IoT with Raspberry Pi has been implemented for Home security as embedded system the main aim of this project is to provide security, android app will be used here so that an interface has given to all cell phones which belong to members of home. RFID (Radio Frequency Identification) is a tracking technology used to identify and authenticate tags that are applied. Typical RFID tag includes microchip capable of carrying 2000 bytes of data, with radio antenna, mounted on substrate. This project has been developed by interfacing RFID, it gets disabled soon after the door is opened and enabled when door is closed, when the system gets enabled sensor starts sensing whenever any person enters the home, ultrasonic motion sensor senses the intrusion soon after it senses all the device gets activated immediately camera clicks the picture, so that an image along with an alert message is sent to cloud from which the owner gets notified through their app. This project mainly focuses on reducing the wasteful use of resources. The security cameras installed are activated only when required, rather than enabling it all the time. Thus saving lot of energy and providing security in an efficient manner.

## II. RELATED WORK

Home security system can be described as introduction of technology within the home environment to provide convenience, security and energy efficiency to its occupants. Adding intelligence to home environment can provide increased quality of life for the people. There has been a significant increase in home automation in recent years due to higher affordability and advancement in Smart phones and tablets which allows vast connectivity. With the introduction of the Internet of Things, the research and implementation of home security are getting more popular. Much of the research attention has been given for security purpose. Various wireless technologies that can support some form of remote data transfer, sensing and control such as Bluetooth, Wi-Fi, RFID, and cellular networks have been utilized to embed various levels of intelligence in the home.

The existing system consists of camera for capturing images which has been installed and has to work 24\*7 so that each and every event is recorded, it is checked only after sometime whenever owner is free.

- Only when the owner checks recordings he comes to know about who has entered.
- There may be huge loss due to this.

# International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

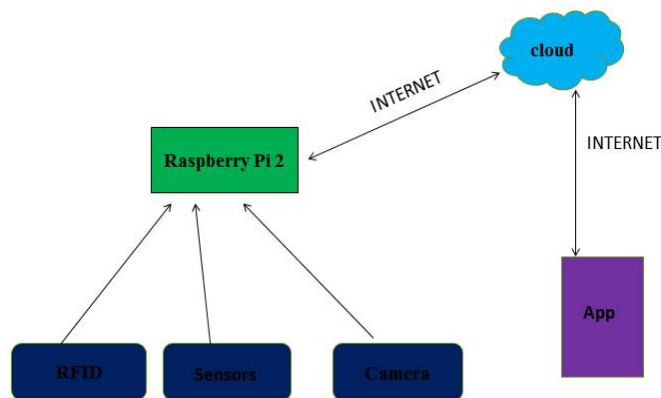
Vol. 5, Issue 5, May 2016

We in this project define and solve challenging problems faced in existing system and establish a set of strict features like involving sensors, alarms, sending message and mainly internet connectivity to the security system for providing immediate alerts to authorized people so that there is less probability of loss.

### Advantages:

- Whenever an intruder has entered the house, the sensors identify and update the cloud which can be accessed by the authorized clients through applications provided.
- There are less chances of loss compared to the existing system.
- Saves resources.

### III. SYSTEM FRAME WORK AND DESIGN



The Security system consists of different components which are dedicated for different aspects of Home security. Each component is used for following purposes as shown below;

- ❖ Raspberry Pi: It is a low cost credit card sized computer that would be portable, which acts as heart of this project.
- ❖ RFID(Radio Frequency Identification): Electronic reader by means of radio waves, used for enabling and disabling the system.
- ❖ Sensor: Device that detects and responds to some type of input, here in our project intrusion occurred will be detected.
- ❖ Camera: Lens that is capable of capturing images, soon after ultrasonic sensor senses intrusion camera gets activated and captures multiple images.

### IV. EXPERIMENTAL RESULTS

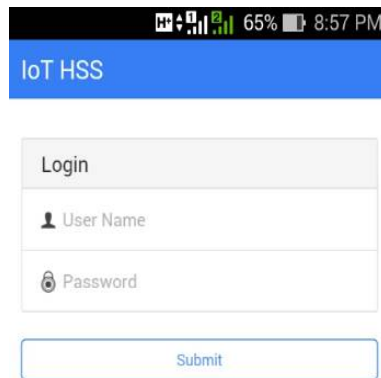
Implementation details and results related to the aspects of home security are discussed here;

Home security system, capable of motion & disturbance detection at any point with security system having notification alerts containing picture, was implemented to allow real time monitoring of the home anywhere and anytime. The Raspberry Pi based home security system was built using Wi-Fi module, obstacle sensor, USB camera (web cam)and internet access point. Upon activating the system, sensor senses around 200cm(which can be altered) and then "System is Armed" When an object moves within the range of sensor, a signal is sent to the RPi, which initiates the webcam. Webcam clicks 4 different images which is stored onto database. At same time the captured images are forwarded as alert messages to authenticated user as shown in figure(c).

# International Journal of Innovative Research in Science, Engineering and Technology

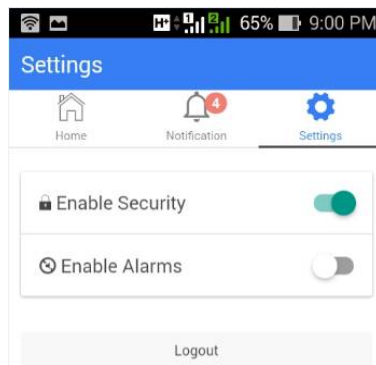
(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 5, May 2016



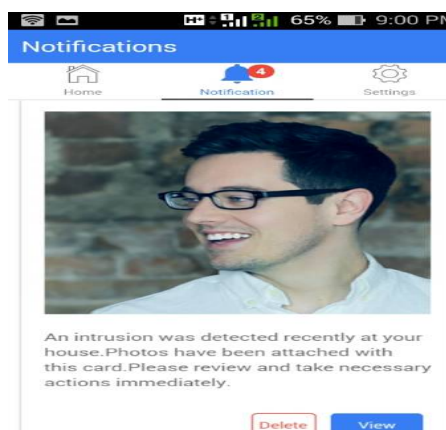
(a)

Figure (a) represents a verification screen in which authentication is done by logging in by credentials such as username and password, by submitting these credentials if they are authorized, will be further moving for next screen for enabling security system.



(b)

To activate the security system, mobile app has to be enabled. Figure (b) indicates the status of security system. In which “enable security” system option will be provided once we click this security system will be enabled.



(c)

# International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 5, May 2016

At last we will be obtaining this screen in which there are three options such as home, notification and setting. In the notification option, alert messages will be displayed along with the 4 images captured by webcam.

## V. CONCLUSION

In this project we investigate the problems arise in the existing systems such as loss of power, extra monitoring and wastage of time, since it works throughout the day then also some security problems may arise. We implement software, sensors and network activity that enable's objects to collect and exchange data. The IoT allows objects to be sensed and controlled remotely across existing network infrastructures, creating opportunities for more direct integration between physical world and computer based systems resulting in improved efficiency, accuracy and economic benefit.

We define and solve challenging problems faced in existing system and establish a set of strict features like involving sensors, alarms, sending message and mainly internet connectivity to the security system for providing immediate alerts to authorized people so that there is less probability of loss.

### Future enhancements:

- An extra interface can be given through android app to nearest police station and also to the neighbours for further security purposes.
- Apart from this further intelligent algorithms can be developed for the purpose of home automation.

## REFERENCES

- [1] Laur I., "Microcontroller based home automation system with security", International Journal of Advanced Computer Science and Applications, vol. 1, no. 6, pp. 60-65, 2010.
- [2] N. Sriskanthan and Tan Karande, "Bluetooth Based Home Automation Systems," Journal ofMicroprocessors and Microsystems, 2002, Vol. 26, pp. 281-289
- [3] Kwang Yeol Lee & Jae Weon Choi, "Remote- Controlled Home Automation System via BluetoothHome Network" in SICE Annual Conference in Fukui, 2003, Vol. 3, pp. 2824-2829
- [4] S. Ok and H. Park, "Implementation of initial provisioning function for home gateway based on openservice gateway initiative platform", The 8th International Conference on Advanced CommunicationTechnology, pp. 1517-1520, 2006.
- [5] Mitchell, Gareth. "The Raspberry Pi single-board computer will revolutionise computer science teaching [For &Against]." Engineering & Technology 7.3 (2012): 26-26.
- [6] J. Bray, C. F. Sturman, "Bluetooth 1.1: Connect without Cable", Pearson Education, edition 2, 2001.
- [7] IEEE 802.15™: Wireless Personal Area Networks (PANs). Available online: <http://standards.ieee.org/about/get/802/802.15.html> (accessed on 1 January 2015).