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IOT Based Home Security System Using Raspberry Pi

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ABSTRACT: The latest leap in the digital world is the Internet of Things. It has led the Digital World to an awe. The Internet of Things (IoT) is the network of inter-connected objects able to collect and exchange data over the World Wide Web. IoT has started superseding the conventional ways of doing basic to complex tasks. It aims at taking the existing passive data to a whole new level of active network. What if your security systems were this smart too? What if it can send you the image of the person at your doorstep? Our project aims to achieve just that using Raspberry Pi. The system aims at providing the image of the person coming even close to the door. It tends to substitute the conventional video monitoring system which consumed a lot of power and data. This project reduces that by taking a picture whenever someone comes to the proximity of the door. This helps in saving the time as well as the data.

KEYWORDS: IOT, Raspberry Pi, Home Security.

I. INTRODUCTION

This project is a step towards the idea of Home Automation and Security. With the increasing penetration of the digital world into smart objects, the basic and conventional methods of various home appliances like refrigerator, Air Conditioner, etc. are taking a whole new, revamped alteration. Many a times, a problem arises that parents are not at home with their kids and a visitor arrives. That person may be the courier guy or the home delivery boy or a person from your friend. This is where the system can come into use.

The problem with conventional systems is that it is either always on or it gives the information only when the bell is pressed. But with the system presented here the owner or the parent will get the info even when the person is close by to the gate or the bell. This gives additional security features to the security system and gives the residents more time to prepared if there is a threat.

Though IOT has abundant benefits, there are flaws in the IOT governance and implementation level. The key observations are that, there is no standard definition worldwide also universal standardization is required at the architectural level and technology changes from vendor to vendor and hence requires interoperability.

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II. SYSTEM OVERVIEW

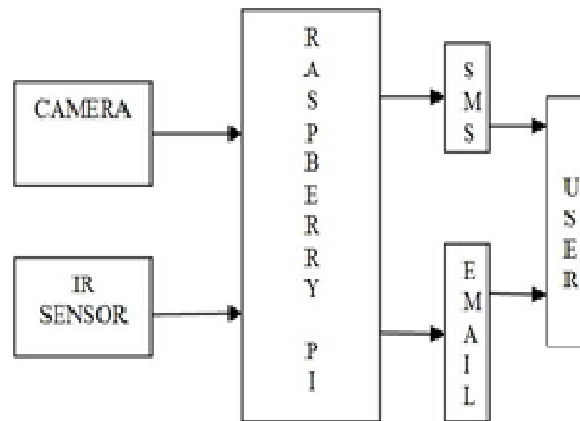


Fig.1. Block diagram of system

RASPBERRY PI 3 MODEL B

We have Raspberry pi which acts as a main controller of our system and small in size, is an open source and its flexible platform for experimentation. Since it is an open source, changes can be made to it as and when required. The raspberry pi runs an Rasbian OS and is programmed using Python 3. One can install various different softwares for different purposes. We have used model B of raspberry pi which uses system on chip(Soc) BCM2835. It comes with 1 GB of RAM memory and does not have any storage drive but uses SD card for booting and long term processes, external storage devices can be added through the USB port which includes an ARM11 microcontroller having clock frequency of 1 GHz.



Fig.2. Raspberry Pi 3 Model B

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USB Camera:

- ▶ USB camera module used in this system which is directly plugs into usb port of the Raspberry pi.
- ▶ This camera comes with 5 megapixels with CMOS sensor.
- ▶ It has 30 fps frame rate and compatibility with 98/2000/XP/WINDOWS7 operating systems.
- ▶ It's power consumption is 160mW.



Fig.3. USB Camera

IR Transmitter:

Infrared Transmitter is a light emitting diode (LED) which emits infrared radiations. Hence, they are called IR LED's. An IR LED very much looks like a normal LED; we can't see the radiation emitted by it. There are different types of infrared transmitters depending on their wavelengths, output power and response time.



Fig.4. IR Transmitter

An infrared transmitter can be made using an infrared LED, a power supply and current limiting resistor.

IR Receiver:

Infrared receivers are also called as infrared sensors as they detect the radiation from an IR transmitter. IR receivers come in the form of photodiodes and phototransistors. Only infrared radiations are detected by Infrared Photodiodes and thus different from normal photo diodes. The picture of a typical IR receiver or a photodiode is shown below.

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Fig.5. IR Receiver

Different types of IR receivers exist based on the wavelength, voltage, package, etc. The wavelength of the receiver should match with that of the transmitter whenever used in an infrared transmitter – receiver combination.

III. PROGRAM FLOWCHART

The algorithm automatically generates mask image without user interaction that contains only text regions to be inpainted. The system continuously reads IR sensor values. As soon as an intrusion is detected the sensor gives the signal to the Raspberry Pi which then turns on the camera, takes the image through it and then sends it to the Email address of the user. This also sends a message to the user about the presence of a visitor at the door.

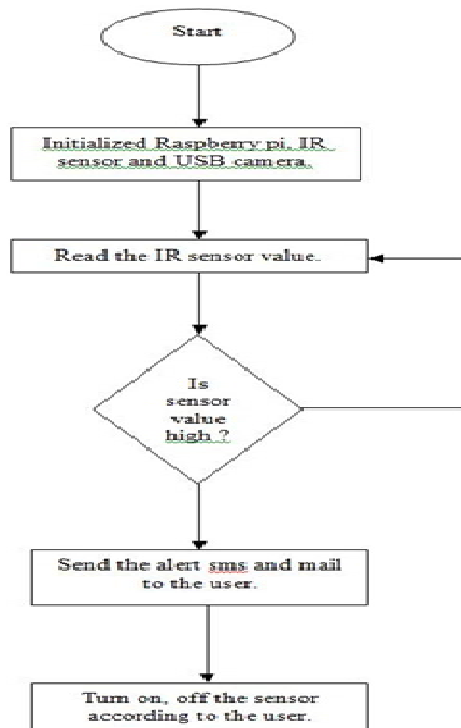


Fig.6. Flowchart of system

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IV. HARDWARE IMPLEMENTATION

The sensors interfaced to the raspberry check for the presence of another person. As soon as it is detected, the python window shows that someone is near to the door. This passes the message to camera which in turn takes a snap of the person at the door. The frame is captured without a delay. The image is processed and then sent to the owner's e-mail ID.

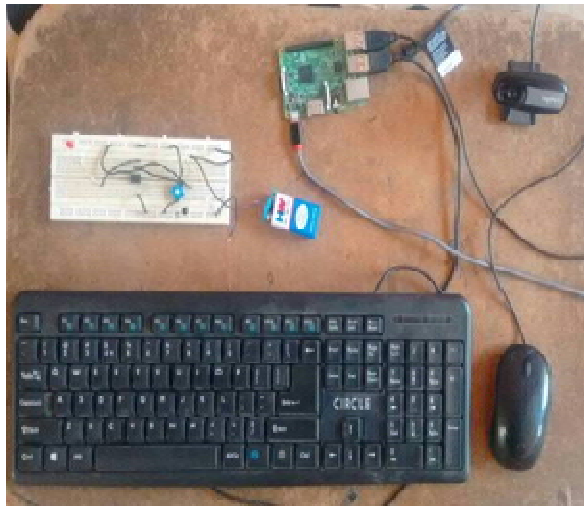


Fig.7. System and its connections

V. CONCLUSION

The Security system overcomes some of the problems of the video monitoring system and gives some advantages over them in terms of the power and then data saved. IOT has been gradually bringing an ocean of technological changes in our daily lives, which in turn helps to making our life simpler and more comfortable, though various technologies and applications. This system successfully completes the requirements of a Home Security System with an affordable price. Also it's modification to attain the mentioned future prospects can be acquired without much hassle.

VI. FUTURE SCOPE

- Remote Monitoring of homes can be possible.
- Can be modified to theft alert system.
- Both way voice call system over LTE can be integrated.
- Face detection can be implemented for better assistance.

A significant add on to the system will be an android mobile app which encapsulates all functionalities. The app gives user control over required forms of notifications using preference settings. Moreover, using the potential pi-cam module, live video stream capturing the front of the door can be transmitted to the user on demand. With gradual maturity of raspberry pi security protocols, the proposed system can also be used for night surveillance.

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BIOGRAPHY



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