Real Time based Human Identification and Security Alert System Using Raspberry Pi

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Abstract:- Face detection is concerned with finding whether or not there are any faces in a given image and, if present, returns the image location and content of each face. The system takes images of people, analyze, detect and recognize human faces using image processing algorithms. The system can serve as a security system in public places like banks, malls, universities, and airports etc., It can detect and recognize a human face in different situations and scenarios. We present an interesting IoT based security alert system, in which the system detects the presence of an intruder and sends an email containing the pictures of an intruder as an attachment which are captured and is triggered by raspberry pi. Raspberry Pi is used to control the whole system, and also authorized persons will get the personal message notification and emergency call.

Keywords: IOT, Security System, Raspberry Pi, Image Processing

1. INTRODUCTION
Now days, automation plays a crucial role in all work places and living homes. Presently automation techniques are implemented either using microcontroller or computer. Microcontroller cannot run multiple programs at a time. We can achieve this with the computer, but using the computer is very expensive for this purpose and consumes much power [1]. The Raspberry Pi is a single board computer and it can be used to overcome these problems. Simply, the Raspberry Pi system functions like a computer; it contains GPIO and USB ports [2].

Home Security Systems are a need of the modern days house. It is possible to design a simple home security solution by using Raspberry Pi and utilizing the power of Internet of Things. The home security system designed in this paper is a simple and easily installable device built using Raspberry Pi 3, Web Cam and Ultrasonic Sensor [3]. The Raspberry Pi 3 Model B + comes equipped with on-board Bluetooth (BLE) and Wi-Fi (BCM43438 Wireless LAN), so, it can be easily connected with a Wi-Fi Router to access a cloud service. The device designed in this paper can be installed at the main entrance of a house.

The home security system designed in this paper, though being simple, is a powerful application. The user can keep surveillance of his house from anywhere, any time and always by just installing this small device at the main entrance. Many such devices can also be installed to further add security layers [6]. The entrance of any intruder can be detected and alerted by the Email on the smart phone, and then the user is free to take appropriate action like calling police, informing law enforcement etc.

2. PROPOSED SYSTEM:
According to the analysis of various common researches, the IoT based security alert systems are designed in such a way to alert the user based on the motion detection of an intruder which is sensed by an ultrasonic sensor deployed at the entrance of the system which when detected, triggers the Raspberry Pi to command the HD camera to capture the picture at the moment of the intruder detection. The images so captured by the HD camera are saved in the SD card or an USB pen drive which is inserted or connected to the Raspberry Pi and are sent as an attachment to the user’s registered mail ID with the date and time of the image capture as the name of the picture. At the same time theft catching unit will be enabled, this unit contains Chloroform spray, virtual door and electric shock.

Fig.1 Schematic Diagram of Security System using Raspberry Pi

➢ Ultrasonic Sensor
The working of the ultrasonic sensors is quite simple and they are easy to interface with the microcontroller. The sensor module has 4-pins out of which Pin-1 and Pin-4 are +Vcc and Gnd respectively. Pin-2 is Trigger and Pin-3 is Echo pin.

When a High pulse of 10us is applied at TRIG pin, the ultrasonic transmitter sends 8 consecutive pulses of 40 kHz frequency. As the Eighth pulse is sent the ECHO pin of the sensor becomes HIGH. Now when the ultrasonic waves reflect from any surface and are received by the receiver, the ECHO pin becomes LOW. The time it takes to leave and return to sensor is used to find the distance from the reflecting surface [8].

➢ GSM-GPRS Module
GSM-GPRS module is used to establish communication between a computer and a GSM-GPRS system. Global System for Mobile communication (GSM) is an architecture used for mobile communication in most of the countries. Global Packet Radio Service (GPRS) is an extension of GSM that enables higher data transmission
rate [10]. GSM/GPRS module consists of a GSM/GPRS modem assembled together with power supply circuit and
communication interfaces (like RS-232, USB, etc) for computer. The MODEM is the soul of such modules.

- **Web Camera**
A webcam is a camera that connects to a computer. It captures either still pictures or motion video, and with the
aid of software can transmit its video on the Internet in real
time. Today most webcams are either embedded into the
display with laptop computers or connected to the USB or
FireWire port on the computer. Here it is used to capture
the picture of an intruder to send an email to the
authorized person.

- **Chloroform**
Chloroform is a man-made by- product formed when
chlorine is used to disinfect water. It is a colorless liquid
with a pleasant, non-irritating smell and a slightly sweet
taste. Here we are using this chloroform unit, to
unconscious the intruder.

- **Virtual Door**
The virtual door is used to lock the intruder in case of theft
detection.

3. EXPERIMENTAL DESCRIPTION

- **RASPBERRY PI 3B+**
The Raspberry Pi 3 Model B+ is the latest product in the
Raspberry Pi 3 range, boasting a 64-bit quad core processor
running at 1.4GHz, dual-band 2.4GHz and 5GHz wireless
LAN, Bluetooth 4.2/BLE, faster Ethernet, and PoE
capability via a separate PoE HAT. The dual-band wireless
LAN comes with modular compliance certification,
allowing the board to be designed into end products with
significantly reduced wireless LAN compliance testing,
improving both cost and time to market. The Raspberry Pi 3
Model B+ maintains the same mechanical footprint as both
the Raspberry Pi 2 Model B and the Raspberry Pi 3 Model
B.
The Raspberry Pi 3 Model B+ is the latest product in the
Raspberry Pi 3 range.
- Broadcom BCM2837B0, Cortex-A53 (ARMv8) 64-bit
  SoC @ 1.4GHz
- 1GB LPDDR2 SDRAM
- 2.4GHz and 5GHz IEEE 802.11.b/g/n/ac wireless
  LAN, Bluetooth 4.2, BLE
- Gigabit Ethernet over USB 2.0 (maximum throughput
  300Mbps)
- Extended 40-pin GPIO header
- Full-size HDMI
- 4 USB 2.0 ports
- CSI camera port for connecting a Raspberry Pi camera
- DSI display port for connecting a Raspberry Pi touch
  screen display
- 4-pole stereo output and composite video port
- Micro SD port for loading your operating system and
  storing data
- 5V/2.5A DC power input
- Power-over-Ethernet (PoE) support (requires separate
  PoE HAT).

- **ARDUINO MICROCONTROLLER**
The Arduino Integrated Development Environment - or
Arduino Software (IDE) - contains a text editor for writing
code, a message area, a text console, a toolbar with buttons
for common functions and a series of menus. It connects to
the Arduino and Genuine hardware to upload programs and
communicate with them.

4. RESULT ANALYSIS
Finally, by using the above technique, we can get the
information about the intruder through email and can get
security alert through messages and calls. And the advantage
over this method is that the intruder can be locked by the
virtual door, electric shock and by the chloroform unit.

5. CONCLUSION
We designed the System which reduces human efforts and
provide security. Proposed system is cheap, reliable and
components are easily available. It is also portable and easily
upgradable. System provides Security for home, office and
commercial places convinience security and energy
efficiency for user. Raspberry Pi-3Model B+ operates and
controls motion detector and cameras for capturing the
image of the guest. The security level is increased due to the
usage of Raspberry Pi-3Model B+ which sends the images
to the user and also we have included Arduino and GSM to
send message and phone calls. It has in built capabilities of
connecting to external devices. Raspberry pi proves to be
smart economic and efficient platform for implementing the
home security system and for automation. Two advantages
provided by the system is that, Necessary action can be
taken in short span of time.

6. REFERENCE
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