

Home Automation Using Face Profiling

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Abstract - The project proposes home automation or smart home which is residential extension of building automation and involves the control and automation of lighting, heating, ventilation, air conditioning, appliances, and security. Proposed implementation of the system is for monitoring and controlling the home appliances using face detection technique. We are establishing the communication with electronic devices through face detection with the help of high webcam, raspberry pi platform. Basically, we are controlling home appliances via face profiling using raspberry pi as platform. System authentication is based on person's face. Face of the user is detected using camera at the door, whereas home appliances like lights, fan and door lock are controlled through program loaded in the raspberry pi. Here, raspberry pi act as interface between face profiling system and home automation system. An extra feature that enhances the security of the system by using sensor for intrusion detection. Database is loaded in the system as per the requirement of user. When the user enters in the room camera detect the face, then particular program for individual face profile in the raspberry pi processor is loaded. By this we provide an easily accessible and manageable more secure system.

Key Words: face detection, face recognition, raspberry pi, face profiling, home automation, etc.

1. INTRODUCTION

Home automation is nothing but a system that controls all electrical appliances present in a home or office. Home automation for the older and disabled will offer raised quality of life for persons. User can monitor and manage their home gate, various appliances and turn on/off the T.V without any human intervention. Despite these advantages, home automation has however received extensive approval and an attention owing to its high significance and complexity.

In fact, one of the major problems in this area is that these different systems are neither interoperable nor interconnected. The system can be use in several places like banks, labs and other sophisticated automated system, which reduced the hazards of unauthorized entry.

Face detection requires the identification of the corresponding pixels to such reference, which in this case consists of a small red circle. The detection system is based

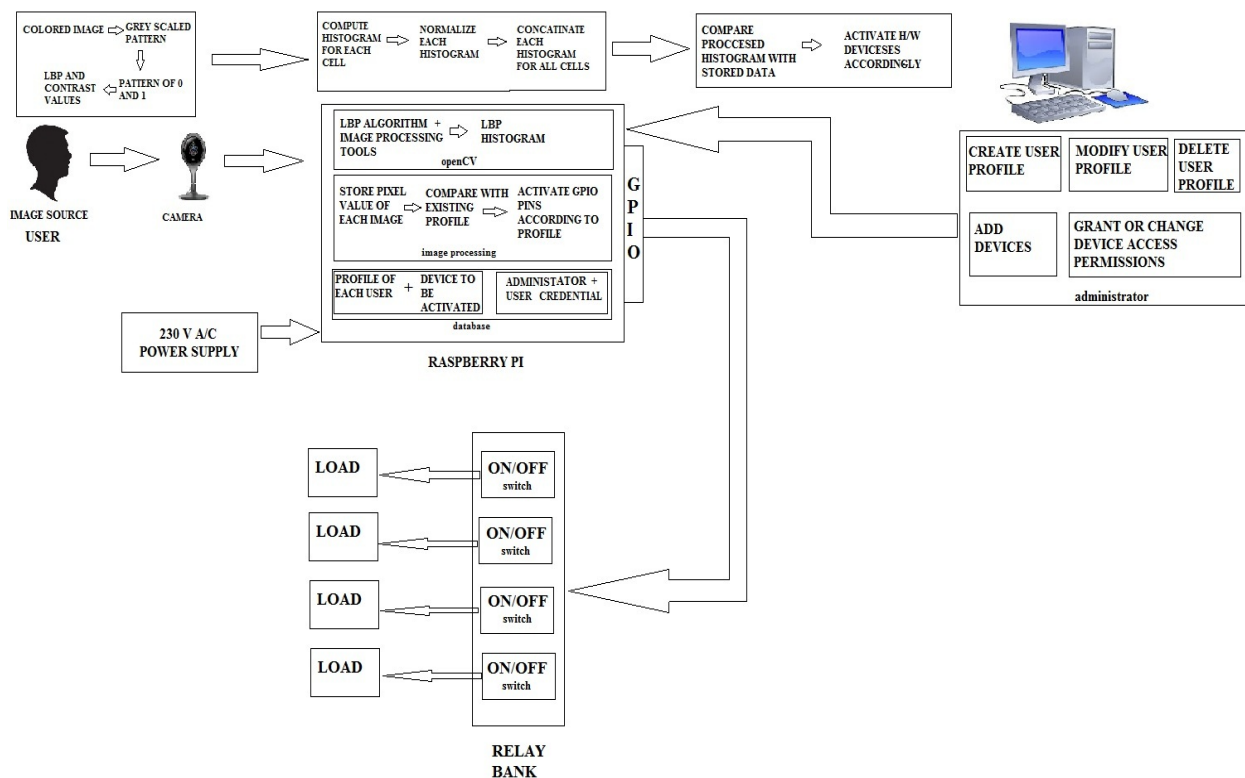
on Python programming, which runs on an embedded Raspberry pi system, which has a camera to capture images. The raspberry has an embedded Linux operating system called raspbian. It has installed the machine vision library developed by Intel and called OpenCV. The important reason to develop this system is to save time and man power along with maintaining security and convenience.

2. PROPOSED SYSTEM ARCHITECTURE

Every user who is familiar with existing automation system are based on voice recognition and image detection. So we can think of proposed system that add more security and feature advancement. Proposed system is designed in such a way to overcome drawbacks and disadvantages of existing system. Proposed system provides more reliability and security.

Primary objective of proposed system is to design cost effective and open source home automation system which can be generalized for various home and outdoor environments. The predicted system provides great flexibility by connecting all modules to system database. This in turn reduces development cost and adds flexibility of features and system configuration. Proposed system make use of wired connection between camera, raspberry pi and appliances. It has installed the machine vision library developed by Intel and called OpenCV. The important reason to develop this system is to save time and man power along with maintaining security and convenience.

Block diagram of proposed system is shown in Fig. 1. Camera is low cost image capturing unit that we can apply at home. It gets triggered when image is detected. When it captures image, it sends coordinates to raspberry pi through wired connection. Raspberry pi processes the input coordinate and matches them with existing coordinates in the database. According to matched coordinate profile is activated by sending signals to relay switch through GPIO pins. An extra feature that enhances the security of the system by using sensor for intrusion detection.



3. SYSTEM COMPONENTS

A. Sensor and Camera Interfacing

Passive Infrared (PIR) sensor has been used to detect human. The PIR sensors are tuned to detect when a human being or an animal arrives in their proximity.

The IR sensor module is easy for operation. IR sensors detect infrared light, which is used to turn ON/OFF of lights.

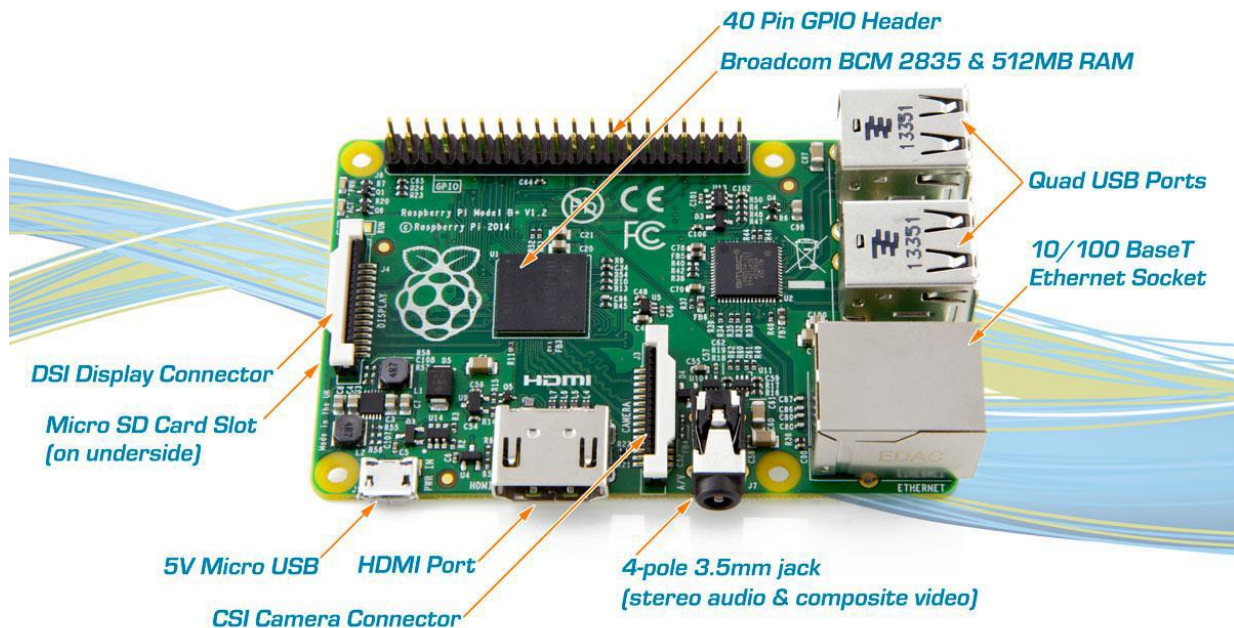
A camera is used in this system which play an important role in face detection and face recognition.

B. Raspberry Pi

The Raspberry Pi is a low cost, credit card sized single board computer developed by raspberry pi foundation. Raspberry pi is controlled by a modified version of Debian Linux optimized for the ARM architecture.

Here we are using model B plus. The Raspberry Pi has a Broadcom BCM2837 system on a chip (SoC), which includes an ARM Cortex-A53 processor, Video Core IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded to 512 MB. The raspberry pi may be operated with any generic USB computer keyboard and mouse.

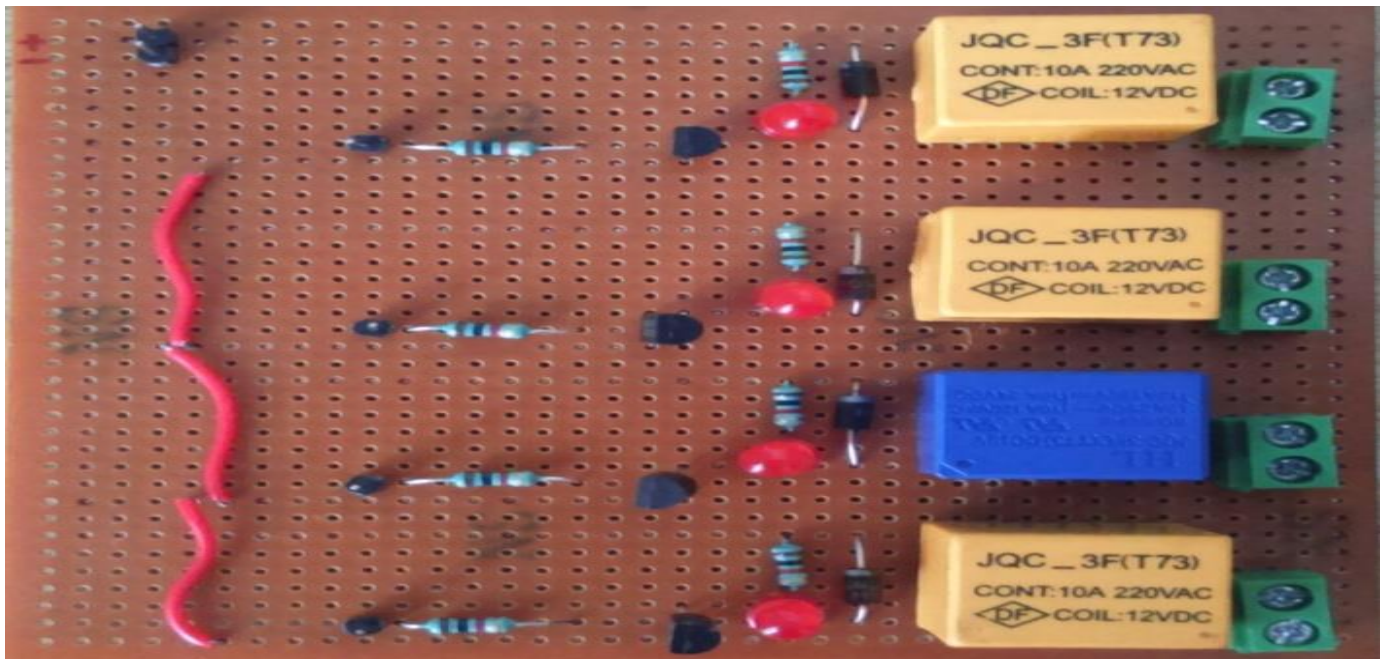
It may also be used with USB storage, USB to MIDI converters, and virtually any other device/component with USB capabilities. Other peripherals can be attached through the various pins and connectors on the surface of the Raspberry pi.



C. Relay Circuit

A Relay is electrically operated switches, which allow low power circuits to switch a relatively high voltage or current on/off. For a relay to operate a suitable pull in and holding current should be passed through its coil. Relay coils are designed to operate from a particular voltage often its 5V or 12V.

The function of relay driver circuit is to provide the necessary current energize the relay coil, when a LOGIC 1 is written on the PORT PIN thus turning on the relay. The relay is turn off by writing LOGIC 0 on the port pin. In our system four relays are used for device control.



4.CONCLUSIONS

In this paper, we have implemented the new home automation system and system features to meet the user automation requirements.

This system contains Raspberry Pi as controlling platform so the system has all advantages of it. They are very useful in order to utilize the power effectively and also in a secured manner.

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