



AUTOMATIC HOME SECURITY SYSTEM AND DOOR LOCKING CONTROL WITH GAS LEAKAGE DETECTION USING RASPBERRY PI

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Abstract -Home security is becoming increasingly prominent features on mobile devices. The necessity of security is increasing these days, ranging from thefts, burglary, accidents, LPG gas leakage and fire detection etc, which all are important aspects of a Home security system. The main aim of this paper is to develop an advanced method of Security system with the application of Raspberry Pi 3(RPi) through web camera. Web camera captures a image ,if the image captured has a difference with the reference image, it will send an Gmail and an alarm is raised using buzzer. Web camera is interfaced with raspberry pi 3 through USB port. An algorithm for the same has been developed using the python environment which is by default provided by Raspberry Pi 3. Gas leakage can be detected using MQ5 gas sensor, which is interfaced with Raspberry Pi 3. The results show an efficiency of the algorithm employed to perform a Security system.

I. INTRODUCTION

Nowadays, theft is the major problem faced by the society. In this project, when an unauthorized person enters the house, camera placed in the house will capture the image of that person and send an Gmail to user. Control signal is generated and the door will be locked automatically using Raspberry Pi 3. The Raspberry Pi 3 has a inbuilt Bluetooth and Wifi connection, an account is created and the user number and the mail id are uploaded using the python language. Web camera will continuously take a image, if there is no change, it will overwrite the image, if there is any change, it will send an Gmail to

user and the gas leakage is detected using MQ5 gas sensor. Raspbian is a free operating system based on Debian optimized for the Raspberry Pi hardware. Python is a high-level general purpose programming language. Because code is automatically compiled to byte code and executed. The existing system has the passive infra-red (PIR) sensor, door sensor, GSM, which are interfaced with a controller. USB web camera can produce image or recording videos for surveillance purposes. Generally a home security system alerts the inmates in terms of alarms, thereby keeping their valuable things safe from intruders. The features of home security may offer more functionality to protect property and to detect crime. The difficulties faced by the current home security system is providing information pertaining to the situation to the user while being away from the home is tried to overcome in this project.

II. RELATED WORK

This security system used the advanced version of the raspberry pi and the python language. Web camera is interfaced with the Raspberry Pi through USB port. Raspberry Pi has inbuilt wi-fi and Bluetooth. It has a Broadcom BCM2837 System on Chip module. It has a ARM Cortex A-53 processor (ARMv8 instruction set).The existing method of security system consists of PIR sensor, Doorsensor and GSM which are interfaced with a microcontroller. If any motiondetects, the microcontroller will send a



message or a call to authorized person. Closed-circuit television (CCTV) cameras can produce images or recordings for surveillance purposes, and can be either video cameras, or digital still cameras.

DISADVANTAGES

- Interfacing of various modules makes the hardware complex.
- The user has no command over the device.

III. PROPOSED SYSTEM

In this system, we interface a camera to ARM Cortex A-53 processor, web camera will take a continuous image and compare the images. If the image is same, it will overwrite the previous image. If the image is different it will send the image through Gmail. Control signal is generated and the door will be locked automatically.

The security system includes automatic door locking control using raspberrypi3. It consists of raspberry pi 3, power supply, USB web camera, motor driver, dc motor, buzzer, gas sensor. Here a 230v to 12v step down transformer is used to supply power to the bridge rectifier. The rectifier IN4001 is used to convert AC to DC. The pulse rating DC obtained is filtered using 1000uf capacitor. The voltage regulator is used to regulate the voltage the voltage to 5v is then given to buzzer. The 1k ohm resistor in the buzzer circuit is used to limit the current. The alarm sound is obtained when the intruder intruder. It is interfaced to raspberry pi using jumper wire. The capacitor in the rectifier circuit allocates 12v t. gas A gas sensor is been interfaced to raspberry pi to detect any leakage of gas. The raspberry pi used here has inbuilt wifi and bluetooth module. It uses maximum of 4 to 5v for its working. The raspberry pi3 is interfaced to USB camera which constantly captures pictures and overwrites for the same images. On recognition of change in the images captured, a message is been sent to the user through email. The motor inturn helps in locking the door with the help of shaft on receiving false indication.

B. HARDWARE DESIGN

The hardware of proposed system include raspberry pi 3, power supply, USB web camera, motor driver, dc motor, buzzer, gas sensor.

Raspberry Pi used: Built on the latest Broadcom 2837 ARMv8 64bit processor, the new generation Raspberry Pi 3 roughly 50% faster than the Pi 2 and more powerful. With built-in wireless and Bluetooth connectivity, it becomes the ideal IoT ready solution. It has 1GB of LPDDR2-900 SDRAM, 40 GPIO pins, Ethernet port, 4 USB ports, Full HDMI port, Combined 3.5mm audio jack and composite video, Camera interface (CSI), Display interface (DSI), Micro SD card slot (now push-pull rather than push-push), Video Core IV 3D graphics core.

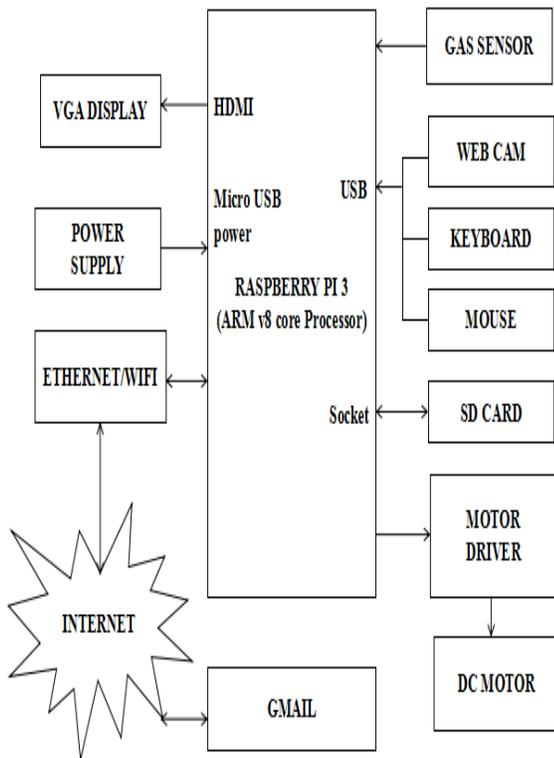


Figure 1. Block diagram of proposed system

A. Constructional Details



Figure 2. Raspberry Pi 3 module

Sensor used in the system: The MQ5 is used in gas leakage detecting equipment in consumer and industry application, this sensor is suitable for detecting LPG, natural gas, coal gas. Avoid the noise of alcohol, cooking fumes and cigarette smoke. The sensitivity can be adjusted by potentiometer. The specifications are Power supply needed is 5V, Interface type: Analog, Pin Definition: 1-Output 2-GND 3-VCC, High sensitivity to LPG gas, natural gas, town gas, Small sensitivity to alcohol, smoke. Fast response, Stable and long life, Size: 40x20mm. [3] discussed about a system, GSM based AMR has low infrastructure cost and it reduces man power. The system is fully automatic, hence the probability of error is reduced. The data is highly secured and it not only solve the problem of traditional meter reading system but also provides additional features such as power disconnection, reconnection and the concept of power management.

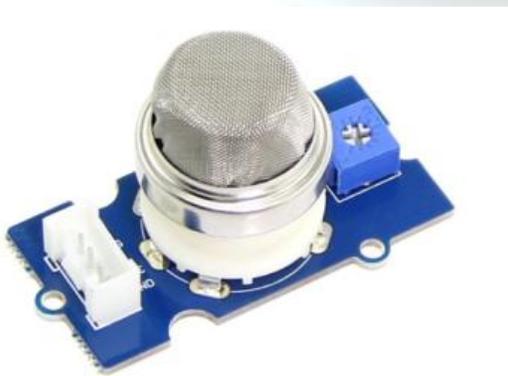


Figure 3. MQ5 Gas sensor

Camera used: A webcam is a video camera that feeds or streams its image in real time to or through a computer to a computer network. When "captured" by the computer, the video stream may be saved, viewed or sent on to other networks via systems such as the internet, and emailed as an attachment. When sent to a remote location, the video stream may be saved, viewed or on sent there. Unlike an IP camera (which connects using Ethernet or Wi-Fi), a webcam is generally connected by a USB cable, or similar cable, or built into computer hardware, such as laptops.

Processor used: The ARM Cortex-A53 is the most power-efficient superscalar processor. The Cortex-A53 is a microarchitecture implementing the ARM v8-A 64-bit instruction set designed by ARM holdings. The Cortex-A53 is a superscalar processor capable of dual issuing some instructions. It is available as SIP core to licensees, and is marketed by ARM as either a stand alone, more energy-efficient alternative to the most powerful Cortex-A57 microarchitecture, or to be used alongside a more powerful microarchitecture in a big.LITTLE configuration.

Motor driver: L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC. Dual H-bridge Motor Driver integrated circuit (IC), it is designed to provide bidirectional drive currents of upto 600mA at voltages from 4.5V to 36V. It is designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current / high-voltage loads in positive supply applications.

Dc motor: A machine that converts dc power into mechanical energy is known as dc motor. Its operation is based on the principle that when a current carrying conductor is placed in a magnetic field, the conductor experiences a mechanical force. The direction of the force is given by Fleming's left hand rule. When the armature of a d.c. motor rotates under the influence of the driving torque, the armature conductors move through the magnetic field and hence an e.m.f. is induced in them. The induced e.m.f. acts in opposite direction to the applied voltage V (Lenz's law) and is known as back or counter e.m.f. The presence of back e.m.f. makes the d.c. motor a self-regulating machine. Back e.m.f. in a d.c.



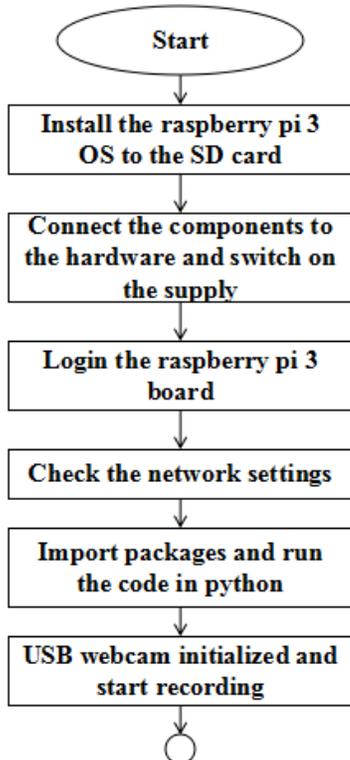
International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 4, Special Issue 19, April 2017

motor regulates the flow of armature current i.e., it automatically changes the armature current to meet



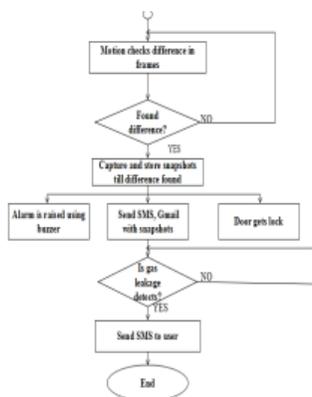
Figure 4. Dc motor

the load requirement



C. SOFTWARE DESIGN

The software design of our system is shown in fig. Which is a program flowchart of our proposed system. In the proposed system python language is used for



Raspberry Pi 3. The desired functions and instructions are performed sequentially according to the flow chart.

Advantages of proposed system:

- Required LESS power supply
- FAST processing speed

● Fig 5. Flowchart for software

Limitation of proposed system:

- Required LESS hard ware line

This system needs to be monitor always the internet bills are paid in due time to be connected with their homes.

IV. CONCLUSION

This system can be used in several places like banks, hospital, labs and other sophisticated areas and automated system which dramatically reduces the hazards of unauthorized entry. Evidence can be given to the security department if any robbery issues occurs. The system needs to be monitor always that the internet bills are paid in due time to keep connected with own house.

V. FURTHER APPLICATION

- Internet of households where we can attach other devices of house with internet
- Industrial automation and control through internet
- Automated fire exist system can be built
- Improvement in security issues in highly restricted areas

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