MICRO PROJECT REPORT

ON

HOME AUTOMATION

A report submitted in partial fulfillment of the requirements for the Award of Degree of

BACHELOR OF TECHNOLOGY

IN

INFORMATION TECHNOLOGY

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MOTIVATION OF THE WORK

Home automation can be defined as a mechanism removing as much human interaction as technically possible and desirable in various domestic processes and replacing them with programmed electronic systems.

At its very basic, home automation means automatic and electronic control of household utilities, security devices and appliances. An integrated approach to home automation implies the user and associated home appliances communicate with one another efficiently.

The wireless network approach towards IoT based smart homes offers seamless, cost-effective and scalable solutions which can be easily maintained and preserved.

Managing all of your home devices from one place. The convenience factor here is enormous. Being able to keep all of the technology in your home connected through one interface is a massive step forward for technology and home management.

Home automation helps with improved appliance functionality. Smart homes can also help you run your appliances better.

Home automation allows us to be more mindful of your power usage. For example, one can save on energy bills by reducing the length of time that lights stay on, or by lowering temperatures when one leaves a room.

It results in numerous other benefits as security and continuous monitoring of our homes, provision of timely health-care and medical services to the elderly, energy conservation and addresses entertainment, comfort and lifestyle aspects also.

Ultimately it is a system that aims to heighten quality of life with the automation of household appliances that may be controlled over the Internet.

OBJECTIVE

Nowadays, we have remote controls for our television sets and other electronic system, which have made our lives really easy. The main objective of this project is to implement a low cost, reliable and scalable Home Automation System that can be switched on and off according to the distance calculated by the distance sensors. This project will be useful for conserving electricity and providing convince to the user. This project is to automatically switch on or off an electrical appliance connected to it in accordance to the distance of the object with the sensor.

This system is super-cost effective and can give user to control and electronically device connected to it, without even spending for a remote control.

Time is just as valuable to everyone. New technologies being introduced save our time efficiently. IOT plays a major role in this field. The Smart Home Automation project uses IOT to create a system which is both time efficient and cost efficient.

PROPOSED METHODOLOGY

A Smart Home Automation System is an IOT based system. The coding was done in Python language.

The internet of things, or IoT, is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.

The components used to create this project are as follows: -

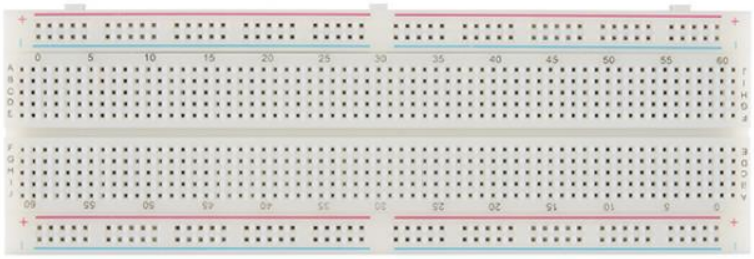
- **Raspberry Pi 3**

A Raspberry Pi is a credit-card sized computer originally designed for education, inspired by the 198I BBC Micro. Creator Eben Upton's goal was to create a low-cost device that would improve programming skills and hardware understanding at the per-university level. In 2006, early concepts of the Raspberry Pi were based on the Atmel ATmega644 micro-controller. Its schematics and PCB layout are publicly available.

The hardware required for basic user of raspberry pi is much same as the desktop PC. It requires a Display with HDMI Port Connectivity as display output or a touchscreen display through DSI Port (i.e., Display serial interface) where it works as both input and output. We also need a Keyboard and mouse to use as input devices. The Keyboard and Mouse should be USB as Raspberry Pi does not have any PS2 Port.

Other than this two things Audio device or Internet connectivity are optional thing Audio device is important as speech recognition and audio output are added in the system. The standard Power Supply required for Raspberry Pi is 5V, 2A DC Power Supply Through a AC to DC Adapter. But the requirement of Raspberry Pi is not actually 2A. It is the maximum amount of power that requirement if all ports are consuming energy. Otherwise for the home automation system 800mA is enough.

- **Breadboard**



An electronics breadboard is actually referring to a solderless breadboard. These are great units for making temporary circuits and prototyping, and they require absolutely no soldering.

For those new to electronics and circuits, breadboards are often the best place to start. Another common use of breadboards is testing out new parts, such as Integrated circuits (ICs).

- **Ultrasonic sensors**

The HC-SR04 ultrasonic distance sensor measures distance by sending out a 40kHz pulse of sound and then listening for the echo. It has 4 pins: Vcc, GND, Trig and Echo. Trig triggers a pulse and Echo gives a pulse whenever an echo is heard.

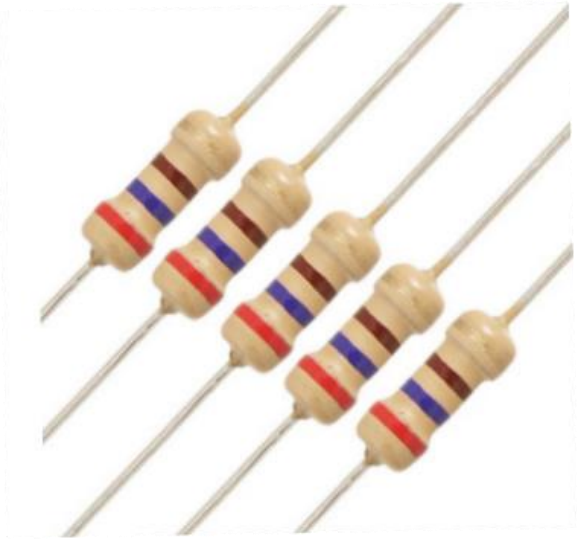
- **JUMPER WIRES**

These are jumper wire male to female, used in connecting female header pin of any development board (like Arduino) to other development board having male connector.

- **LED**

LEDs are a particular type of diode that convert electrical energy into light. LED stands for "Light Emitting Diode." LEDs are like tiny light-bulbs. However, LEDs require a lot less power to light up by comparison. They're also more energy efficient, so they don't tend to get hot like conventional light-bulbs do.

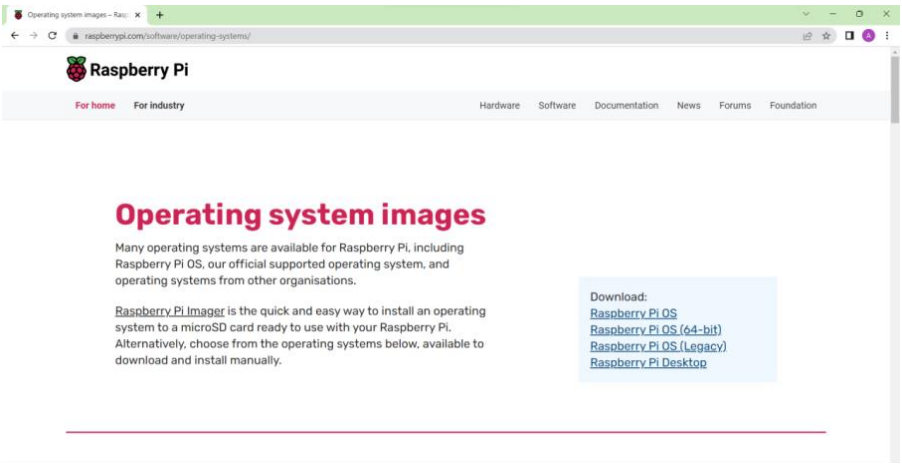
- **Resistors**



Resistors are electrical component that opposes the flow of either direct or alternating current, employed to protect, operate, or control the circuit. Voltages can be divided with the use of resistors, and in combination with other components resistors can be used to make electrical waves into shapes most suited for the electrical designer’s requirements.

SETTING UP OF RASPBERRY PI

In order to use Raspberry Pi, it has to be setup before. Raspbian OS is first downloaded from the official website. Its image is then etched to Raspberry Pi. Raspberry Pi with Raspbian OS is loaded and configured using the Rasi-config command.



Code: -

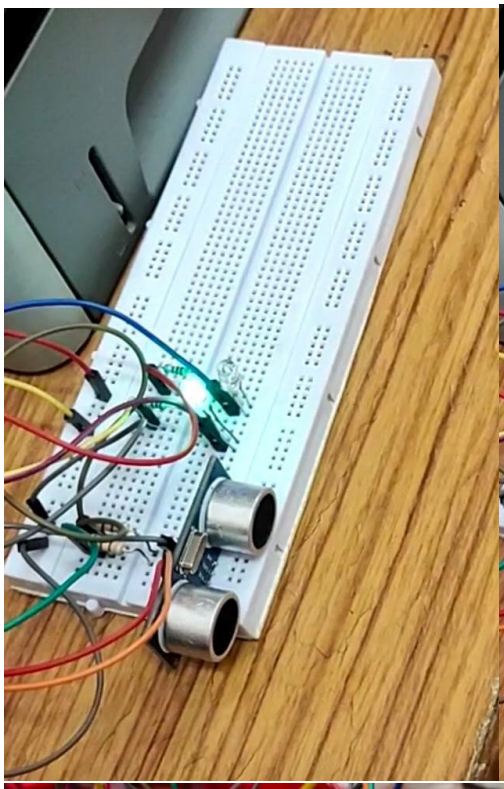
```
#!/usr/bin/python
import RPi.GPIO as GPIO
import time

GPIO.setmode(GPIO.BOARD)

PIN_TRIGGER = 11
PIN_ECHO = 7
PIN_LED = 12
PIN_LED2 = 32

GPIO.setup(PIN_TRIGGER, GPIO.OUT)
GPIO.setup(PIN_ECHO, GPIO.IN)
def measure():
    GPIO.output(PIN_TRIGGER, GPIO.LOW)
    print ("Waiting for sensor to settle")
```

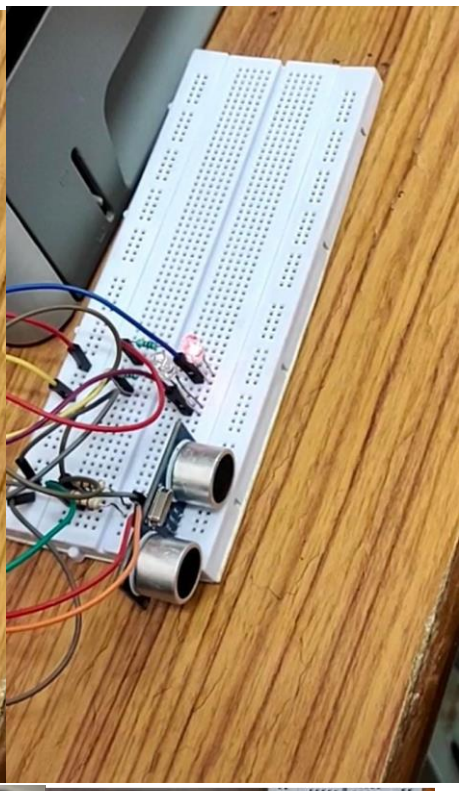
```
time.sleep(2)
    print ("Calculating distance")

    GPIO.output(PIN_TRIGGER, GPIO.HIGH)
    time.sleep(0.00001)
    GPIO.output(PIN_TRIGGER, GPIO.LOW)
    while GPIO.input(PIN_ECHO) == 0:
        pulse_start_time = time.time()
    while GPIO.input(PIN_ECHO) == 1:
        pulse_end_time = time.time()
    pulse_duration = pulse_end_time - pulse_start_time
    distance = round(pulse_duration * 17150, 2)
    print("Distance", distance, "cm")
    GPIO.setup(PIN_LED, GPIO.OUT)
    GPIO.setup(PIN_LED2 , GPIO.OUT)
    if distance < 15:
            print ("LED1 ON")
            GPIO.output(PIN_LED, GPIO.HIGH)
            print ("LED2 OFF")
            GPIO.output(PIN_LED2, GPIO.LOW)
            while distance < 15:
                    time.sleep(0.1)
                    measure()
    elif ((distance > 15) and (distance < 25)) :
            GPIO.output(PIN_LED2, GPIO.HIGH)
```

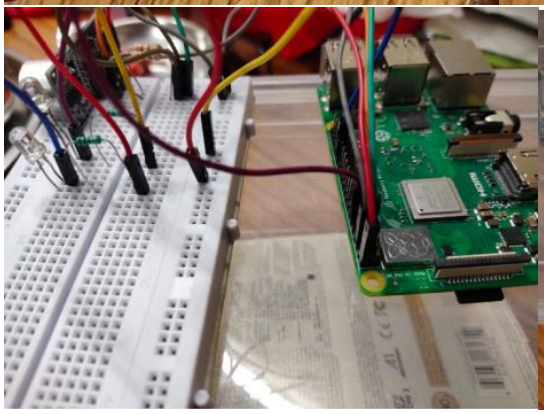
```
        print ("LED1 OFF")
        GPIO.output(PIN_LED, GPIO.LOW)

        while ((distance > 15) and (distance < 25)):
            time.sleep(0.1)
            measure()
    else:
        print ("LED OFF")
        GPIO.output(PIN_LED2, GPIO.LOW)
        GPIO.output(PIN_LED, GPIO.LOW)
while True:
    measure()
GPIO.cleanup()
```

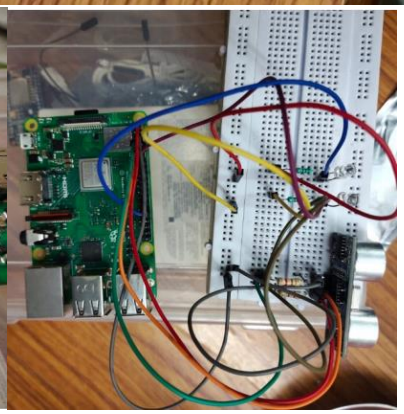
RESULT

A prototype of Smart Home Automation was constructed with distance sensors. The project was able to switches on the connected devices if in the given range The 1st LED is switched on for a distance less than 15 cm and the second LED is switched on for a distance greater than 15cm and the less than 25 cm. For a distance greater than 25 cm, both LEDs are switched off.









CONCLUSION & FUTURE SCOPE

A prototype smart home automation using IoT is presented. Due to recent technological advancements, home automation systems will be soon in widespread use. One of the main issues that resist us from automating our home is the expensive cost of these smart equipment. Our designed system is a low-cost alternative of the traditional home automation systems available in the market. We have designed a system that is developed using open-source software and uses low-cost hardware.

This work can be carried forward by integrating relays to Raspberry pi board for co⁹ntrolling home appliances in a real scenario. As an extension, it is proposed that a generic IoT framework and cloud computing infrastructure for connecting and managing be used. Expected to grow in popularity in the near future is the use of smart home products to increase family safety, specifically related to fire protection and carbon monoxide monitoring.

We can also add various others devices to the setup or the circuit and used.

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