MONITORING AND CONTROLLING LED THROUGH RAPBERRY PI

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ABSTRACT

Now-a-days computer is necessity for every person in the world to perform various functions. Raspberry pi is small size or credit card sized computer. There is a Broadcom BCM2835 SOC to integrate major functional element into single chip. We can control any hardware equipment through Raspberry pi by using GPIO pins. PHP and python programming languages are preferred to program the Raspberry pi. It allows monitoring and controlling of hardware equipment via http/tcp protocol by using web server like Apache/nginx.

Keyterms:-Raspberry pi, php programming, web server, controlling, LED, Apache

I. INTRODUCTION

The Raspberry Pi is a single-board computer that plugs into your TV and a keyboard. It is developed in university of cambridge's computer laboratory at united kingdom. It was designed and manufactured by raspberry pi foundation with the aim of improve programming and stimulating the teaching of basic computer science to every person who is interested in computer hardware, programming and D-I-Y(Do-itself) project. It also plays high-definition video via Composite (PAL and NTSC), HDMI or Raw LCD (DSI). In the raspberry pi design main function parameter is a Broadcom BCM2835 SOC, which includes an ARM1176JZF-S 700 MHz processor, 512 Megabytes of RAM and Video Core IV GPU.[1]The design used SD card for booting and long-term because there is not include a built-in hard disk or solid-state drive. Supports Debian GNU/Linux, Fedora, Arch Linux, RISC OS and More. Power Requirements of raspberry pi computer: 5V @ 700 mA via MicroUSB or GPIO Header
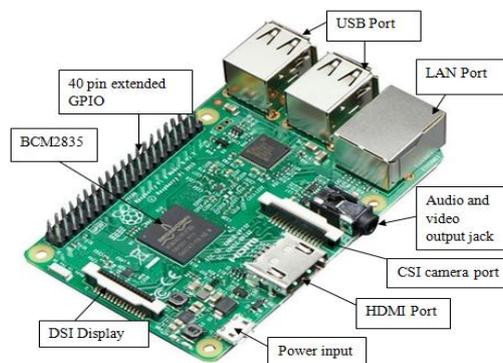

Fig. 1:- Overview of Raspberry Pi Processor

Raspberry pi is a low cost and portable to encourage learning and innovation for a student. Maximum raspberry pi used in mobile phone. It encourage people of all ages to learn programming language like python and php for many task that a browsing, games, dashboard, word processing and video playing. Raspberry pi is a very easy to handle who wants to learn electronic and computer science. It is a combination of traditional computer and embedded system. It perform different function on that one of them is a web browser. We can connect any hardware equipment to raspberry pi for communication purpose. It enables Monitoring and controlling of any hardware equipment through raspberry pi via a HTTP and TCP\IP protocol.

Ms.shejal discussed raspberry pi technology and gives details about RC4 algorithm. It is used to enabling UART communication between two raspberry pi and RC4 algorithm is used for data transmission. RC4 algorithm is based on encryption and decryption process. RC4 algorithm can send encrypted message from one computer. Then, another computer will ask for the symmetric key to decrypt the message. It means RC4 algorithm convert plaintext code into cipher text using symmetric key.[2]

Cheah Wia zhao exploring IOT application using Raspberry pi. Basically, two types of communication is used in world wide. Wired communication is used to transfer data from source to destination by connecting a cable. It provides reliable and stable communication but, cost of cable is very high. Therefore, recently wireless communication is preferred to transmit a data eg. Client/ server. Server act as a parent's node which allow multiple child node to connect with it. Raspberry pi is servers in which several laptops are connect to copy, store and delete the file over network. Wi-Fi and zigbee scenario is play very important role for client and server communication. [3]

John Bellows compared linux operating system for raspberry pi. Raspberry pi is capable of running a linux desktop environment to utilized best services of the system. Open source benchmarking software was choosing four linux distributions they include: Arch, fedora, ubuntu and Debian for a storage memory and processor management.[4]

Patel urjja and Neha chitaliya research on IP based device control and monitoring system using raspberry pi based on IOT. They work on network sensor to gathering rich information indicative of our physical and mental health. The entire health monitoring system continuously monitors the sport runner heart beat and speed to acquire runner physiological data. Then, this data transmitted to raspberry pi through esp8266 node which work as a router and server node. Raspberry pi work as router and server node transmitted updated data to router and helps doctors to take immediate action. [5]

II. RASPBERRY PI GPIO PINS

In raspberry pi GPIO pins is able to control any external device. It is a general purpose input/output pin. It is a generic pin on pi, which controlled by the user at runtime. GPIO pins make connection between pi and outside world. At the simplest level, you can think of them as switches, motor even pi can turn ON/OFF through pins. There are 40 pins in raspberry pi 3B out of them only 26 pins are GPIO pins and others are Ground, DNC(Do not connect) and power pins. GPIO is a standard pins, there are some that references I2C, SPI, UART.
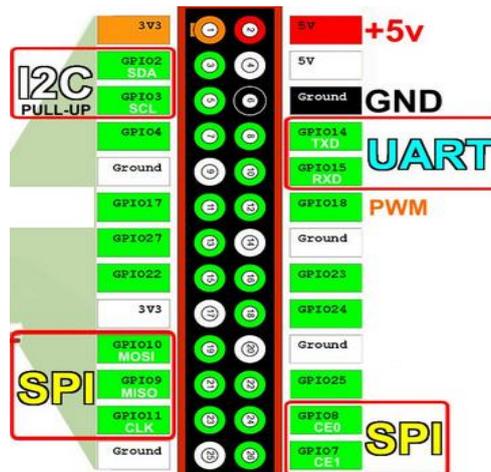
Fig 2:-Overview of GPIO pins

III. HARDWARE DESIGN

You can program the pin to interact with different things in the world. Input comes from any sensor or computer and from any device. The output can do anything; it can turn on LED or other hardware equipment by sending a signal to another device. If raspberry pi is on a network, you can control device that are attached to it from anywhere. It is very powerful and exiting thing to control the devices over the network.
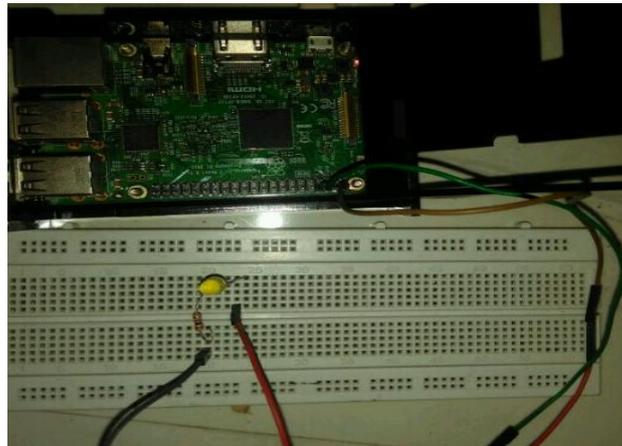

Fig 3:-Hardware design

LED is a light emitting diode which passes one way electricity. There is used 270 ohm resistor, LED and 3.3V power supply. LED is connecting between GPIO pin 17and Ground pin. Then program to tell the pin to go high or low. To make connection between raspberry pi and LED use male to female jumper wires on the breadboard.

IV. IMPLEMENTATION STEPS

We can control hardware equipment through python and php code. Php and python are the most popular option to do programming in raspberry pi. Here, php language is preferred to make communication between Raspberry pi and LED. Before start operation with php, you need to install php itself on the computer. When we have to do programming, first install both php and apache server on raspberry pi. In most situations, PHP is used in tandem with a web server like Apache. Installing both PHP and Apache on Raspberry Pi is a matter of running:

To download apache 2 server, use command

Sudo apt-get install apache 2-y

After installing apache 2 server, install php5 and check on a web browser. Put your IP address on server eg 192.168.1 then we get Default page.

To install php5

Sudo apt-get install php5 libapache 2-mod_php5 –y

Create file and save it on php. Php can be easily used with raspberry pi through shell_exec() function. These functions make bridge between php and raspberry pi to execute shell command. Another approach is to deploy the wiring pi library for working with GPIO pin. To deploy wiring pi, you need to install library on raspberry pi with installing git software.

Sudo apt-get install git-core

Then, clone the wirng pi Git respository by running

Git clone://git.dragon.net/wiringpi

Switch to the resulting wiring pi directory

Cd wiringpi

To use ./build command to compile and install wiring pi

./build

After the connection give the path of php code

cd /var/www/html

Go on web browser; tab your IP address to control LED.

```html
<html>
<head>
<meta name="viewport" content="width=device-width" />
<title>LED Control</title>
</head>
<body>
LED Control:
<form method="get" action="gpio.php">
<input type="submit" value="ON" name="on">
<input type="submit" value="OFF" name="off">
</form>
<?php
$setmode17 = shell_exec("/usr/local/bin/gpio -g mode 17 out");
if(isset($_GET['on'])){
  $gpio_on = shell_exec("/usr/local/bin/gpio -g write 17 1");
  echo "LED is on";
}
else if(isset($_GET['off'])){
  $gpio_off = shell_exec("/usr/local/bin/gpio -g write 17 0");
  echo "LED is off";
}
?>
</body>
</html>
```

Fig 4:- Screenshot of LED monitoring php code

V. RESULT

The key element of the app is an html form containing ON & OFF button. When you press one of the button values is passed as a part of the URL.GPIO 17 pin control LED operation by php code.
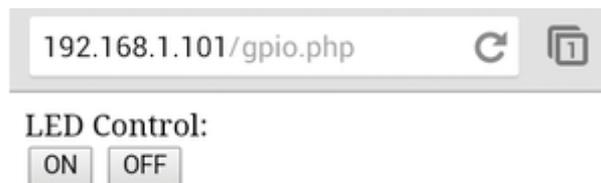
192.168.1.101/gpio.php

LED Control:
ON OFF

Fig 5:- Screenshot of web page

VI. CONCLUSION

By using Raspberry pi micro-controller and internet, we are able to control electronic device from remote web server. To achieve this we installed Apache/php web server application on Raspberry pi, performed wiring pi which established connection between hardware device and web server. This server can be accessed from browser connected to internet. Once php page is loaded in the browser, on/off command can be sent to server from php UI to switch on/off electronic device connected to Raspberry pi.

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