Automatic Monitoring & Controlling System for Environmental Parameters Using Web Server on Raspberry Pi

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Abstract—This system uses the embedded processor with Linux as its operating system. As advantage of Linux is that it is open source operating system and it provides high security. Processor will work as a server which will serve applications. We use application temperature Monitoring and also controlling. This temperature sensor connected to GPIO pins of raspberry pi.Raspberry pi senses these temperature readings and stored in the mysql database server. Using PHP5 server this data send to the web server through internet protocol continuously and updated and also save this data on webpage .When temperature cross the certain limit then raspberry pi control these temperatures via fan. Then server changes the status of temperature sensor - fan is ON/OFF continuously when temperature exceeds certain degree values. Also raspberry pi control these temperature.
Today's scenario is that lots of software's are being cracked and thus economic losses are faced by vendor. Hardware module will consist of software setup and that hardware will be consists of Raspberry pi and temperature sensors. Even though there are multiple different types sensor connected to raspberry pi for different applications. In these systems we use the internet protocol. The raspberry pi is a credit-card sized computer and this raspberry pi uses as a Monitoring and controlling device. This is very economical system.

Keywords- Raspberry Pi, Linux, PHP5, MYSQL, Python, Temperature Sensor.

I. INTRODUCTION

The work addresses the area of embedded telecommunication applications and will perform a best practice experiment in the scope of a broader project in order to assess the suitable use of Linux in terms of development effort, re-usability, reliability and performance.

For many years many software organizations have fantasized about the safe and secure market which will give them the good profit for the work they have done and for achieving this goal they have tried many things. However, in recent decades have advances in technologies in computer and internet technologies made measurable progress toward achieving that vision. These technologies have also allowed us to monitor the customers' activity within the world with the software product. The work we present in this paper consists of the idea of the automatic monitoring and controlling of environmental parameters using the web server on raspberry pi and we will also see how this are going to start the an era. How this devices will work how to use them and what this system actually made up of.

As by using this device an organization can share its application environment because of these monitor and control the environmental parameters using web server. Design of system is done by using raspberry pi board. The raspberry pi is a credit card sized single board computer. The raspberry pi uses Linux kernel based operating systems.Raspbian,a Debian based free operating system optimized for the raspberry pi hardware, is the current recommended system.Raspbian is based on Debian Wheezy with faster floating point support.

II. LITERATURE SURVEY

Early minicomputers were used in the control of industrial processes since the beginning of the 1960s. The IBM 1800, for example, was an early computer that had input/output hardware to gather process signals in a plant for conversion from field contact levels (for digital points) and analog signals to the digital domain.

The first industrial control computer system was built 1959 at the Texaco Port Arthur, Texas, renery with an RW-300 of the Ramón-Wooldridge Company. The DCS was introduced in 1975. Both Honeywell and Japanese electrical engineering Yokogawa introduced their own independently produced DCSs at roughly the same time, with the TDC 2000 and CENTUM .systems, respectively. The DCS largely came about due to the increased availability of microcomputers and the proliferation of microprocessors in the world of process control. Computers had already been applied to process automation for some time in the form of both direct digital control (DDC) and set point control.[8][9].

On 19 February 2012, the raspberry pi foundation released its first proof of concept SD card image that could be loaded onto an SD card to produce a preliminary operating system. The image was based upon Debian 6.0(Squeeze), with the LXDE desktop and the Midori browser, plus various programming tools. The image also runs on QEMU allowing the Raspberry pi to be emulated on various other platforms.[4]

III. PROPOSED SYSTEM
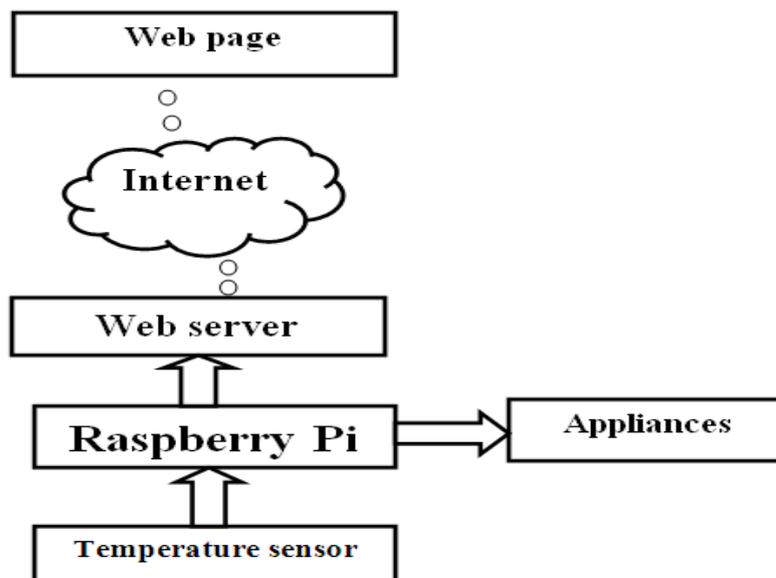
Fig.1.Block Diagram of System

We use application temperature Monitoring and also controlling. This temperature sensor connected to GPIO pins of raspberry pi.Raspberry pi senses these temperature readings and stored in the mysql database server. Using PHP5 server this data send to the web server through internet protocol continuously and updated .When temperature cross the certain limit then server changes the status of temperature sensor - fan is ON/OFF continuously when temperature exceeds certain degree values. Raspberry pi control these temperature via fan. Also raspberry pi control these temperature when temperature exceeds certain degree values the DC motor ON whenever temperature beyond this limits.

A. SELECTION OF HARDWARE

1. RASPBERRY Pi

Fig.2.Raspberry Pi ARM11 Single chip Computer

We have selected one Raspberry Pi for our implementation. Its some features that matches our requirements. TABLE I shows the specifications based on which we have selected raspberry pi as our hardware.[2][3]

TABLE I. SPECIFICATION OF RASPBERRY-PI

Feature	Specification
Chip	Broadcom BCM 2835 SoC full HD multimedia applications processor
CPU	700 MHz Low Power ARM 1176JZ-F Applications Processor
Memory	256MB SDRAM
Low Level Peripherals	8 GPIO,UART,IC bus,SPI bus with two chip selects,+3.3V,+5V,Ground
High-level Peripherals	Composite RCA ,HDMI ,3.5 mm Jack,USB ,Ethernet(RJ 45) via USB hub
Power ratings	700 mA (3.5 W)
Operating systems	Debian LINUX, Raspbian OS, Federo,Arch Linux ARM

2. Temperature Sensor

We take latest DS18B20 1-Wire digital temperature sensor from Maxim IC. Reports degrees C with 9 to 12-bit precision, -55C to 125C (+/-0.5C). Each sensor has a unique 64-Bit Serial number etched into it allows for a huge number of sensors to be used on one data bus. This is a wonderful part that is the corner stone of many data-logging and temperature control systems.

A. SELECTION OF SOFTWARE

1. Linux

Linux is a Unix-like computer operating system assembled under the model of free and open source software development and distribution. The defining component of Linux is the Linux kernel, an operating system kernel first released 5 October 1991 by Linus Torvalds [4]. Some such distributions may include a less resource intensive desktop such as LXDE or XFCE for use on older or less

powerful computers. A distribution intended to run as a server may omit all graphical environments from the standard install and instead include other software such as the Apache HTTP Server and an SSH server such as Open-ssh. Because Linux is freely redistributable, anyone may create a distribution for any intended use. Linux system uses a monolithic kernel where the entire operating system is working in kernel space and is alone in supervisor mode.[5][6]

2. Operating System

We chose the Raspbian Linux distribution is a Debian-based operating system optimized for the Raspberry Pi hardware. Raspbian is free software. Raspbian is based on Debian Wheezy (Debian 7.0) with faster floating point support. It provides over 35,000 available deb software packages, precompiled software bundled for easy installation on a Raspberry Pi computer, specifically tuned for optimal performance on the Raspberry Pi ARM11 hardware. The Raspbian Linux distribution includes LXDE desktop environment, the Open box window manager, the Midori browser, software development tools and example source code for multimedia functions. Raspbian is developed for Raspberry Pi has preinstalled networking features like Ssh. In wheezy Raspbian operating system uses the Python language for programming.[1][5][10]

3. LAMP Server

LAMP stack is a group of open source software used to get web servers up and running. The acronym stands for Linux, Apache, MySQL, and PHP. Since the virtual private server is already running Debian, the Linux part is taken care of[7].
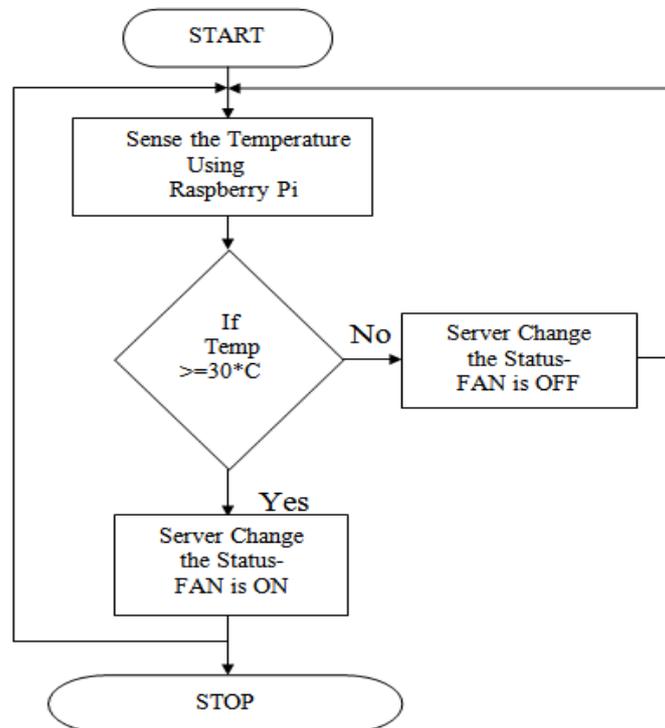
B. DEVELOPMENT OF SYSTEM

Fig.3. Flowchart for Running Real Time Application

C.   RESULT

Fig.4. Webpage

ID	Date	Time	Temp	Fan ON/OFF
370	2015-03-30	05:38:00	32.75	ON
369	2015-03-30	05:37:00	32.75	ON
368	2015-03-30	05:36:00	32.687	ON
367	2015-03-30	11:04:00	32.625	ON
366	2015-03-30	11:03:00	32.562	ON
365	2015-03-30	11:02:00	32.437	ON
364	2015-03-30	11:01:00	32.312	ON
363	2015-03-30	11:00:00	32.187	ON
362	2015-03-30	10:59:00	32.187	ON
361	2015-03-30	10:58:00	32.125	ON
360	2015-03-30	10:57:00	32.125	ON
359	2015-03-28	12:10:00	30.125	ON
358	2015-03-28	12:09:00	30.25	ON
357	2015-03-28	10:53:00	35.687	ON
356	2015-03-28	10:52:00	35.687	ON
355	2015-03-28	10:51:00	35.625	ON

Fig.5. Database of Temperature on Server

D.   CONCLUSION

By using web server we developed the automatic monitoring and controlling system using raspberry pi. This type of designs is well suited in the field of computer sector. By developing such systems we can solve larger and complex problems. This is well suited in developing applications in large scale industries and also in some other general applications. From that system finally we conclude that, it reduces the time and reduces manually workout.

E.   FUTURE SCOPE

The task performed in this system is to monitor and control the environmental parameter in limited area. In future this system can be implementing in wide area for the monitoring environmental parameters. This system can be implementing in industrial process control in real time applications.

Further it can be send data from master of raspberry pi through GSM network to other stations and also sends the mail through internet on server.

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