

PI Controlled Short Message Service -Update Notification System

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Abstract:

This paper explains a Raspberry Pi controlled SMS-Update-Notification (SUN) system. Raspberry Pi is a credit card sized single board computer with ARM11 microprocessor. Short Message Service (SMS) is one of the cheapest and best ways for sending a message from mobile. Basic idea of SUN system is to notify updates to the people in a working environment from authorized persons at anywhere just by SMS. This task is accomplished by conjunction of GSM module with Raspberry Pi. Working procedure of this SUN system is only the authorized person can send SMS from anywhere to the SIM in GSM module. This message will be read and displayed through a website on monitor by Raspberry Pi.

Keywords - Raspberry Pi, GSM module, SMS, Database and Website

INTRODUCTION

At present, notification systems are using either microprocessors or computers to display the messages. Using microprocessors 1 micro-controller notifications can be displayed on led displays. But to interface a monitor screen using micro-controller is complex. Microcontroller cannot run multiple programs at a time. To overcome these problems, computer can be used to display notices on many monitors at a time. But, using a computer for this purpose is very expensive. Raspberry being a single board computer can be used here to solve these problems. Using Raspberry Pi [3, 4] multiple programs can be run at a time. Comparing to a computer, this is cost effective and very less power consuming. As this board is

having inbuilt HDMI port interfacing with all kinds of monitors is simple.

With this board, external devices can be interfaced using USB ports. Raspberry Pi can be used for multiple purposes according to our requirement. SUN system is a new type of notification system [1] where Short Message Service (SMS)[2] is used to send the notification to be displayed. Allowed authority will send SMS from their mobile; this will be updated on the monitor as a new notification.

Raspberry Pi:-

Raspberry Pi is a single board computer. This board is as small as a credit card size, cost effective when compared to an actual computer, uses power rating of 5V, 700mA and it weighs not more than 50g. Raspberry Pi board [11] comes in three models A, B, B+. B+ is the advanced version of the three. B+ model comes with 512 MB RAM. It runs on ARM 11 processor typically operates at 700MHz frequency. It has a SD card slot for installing a bootable Operating System using SD card. Operating Systems like Raspbian, Pidora, Raspbmc [12] etc can be installed. It has four USB2.0 ports to connect to devices like keyboard, mouse, Wi-Fi adapter etc., according to our use to make it a full size computer. It has an Ethernet port to connect to network. GPIO pins are used to interface and control LEDs, switches, sensors and other devices. With the help of HDMI port, all kinds of monitors like LCD screens, projectors, TVs also can be connected. In this board, some additional features like camera connector are present to interface camera and an audio jack also available. With all these

features, Raspberry Pi is not just limited to single use; it can be of wide use according to the application.

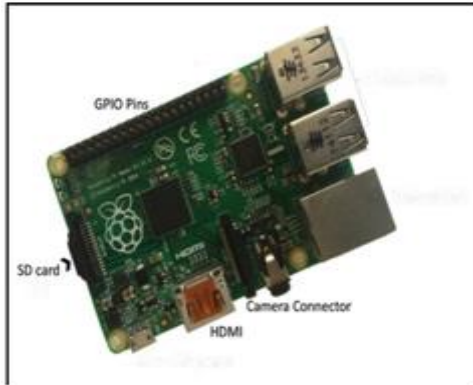


FIG: RASPBERRY PI B+ BOARD

GSM Module:

GSM Modem with Sim900 module is built with Dual band GSM/GPRS. It works on frequencies 900 1 1800 MHz. It has a variable baud rate with range from 9600 to 115200. Baud rate can be configurable using AT commands. It operates on 12V regulated power supply. It has a SIM card slot to insert SIM and a receiving antenna to receive network signals.

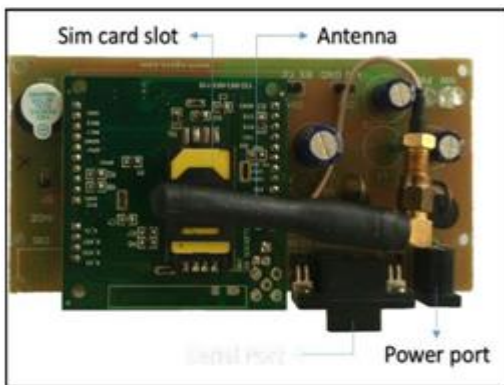


FIG 1.2: GSM MODULE

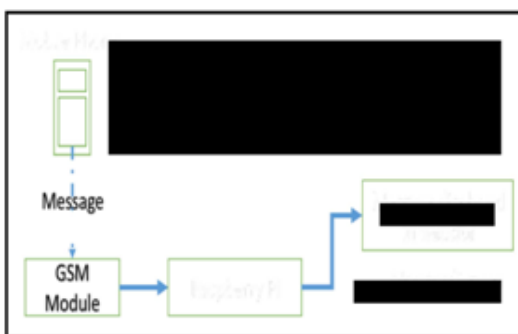


FIG2.1: SYSTEM DESIGN FOR SUN SYSTEM

It has RS232 interface which allows it to connect devices like PC, Raspberry Pi, microcontroller etc. This module can perform the basic functions of a mobile phone like receiving and sending SMS, voice calls, and TCP/IP communication over GPRS based on various AT commands. A T commands [7] can be sent via the serial port on Raspberry Pi, thus functions such as dialling and answering calls, sending and receiving messages and surfing online can be realized.

IMPLEMENTATION

System Design:

The basic aim of this system design is that the allowed user will send SMS from his mobile phone to GSM module, this message is the notification to be inserted in the website database which is displayed on the monitor.

1. GSM MODULE OPERATION

11. RASPBERRY PI OPERATION I II

To receive the message a SIM card is placed in GSM module and this is connected to Raspberry Pi [5, 8] through RS232 serial port [9]. A website is created to display the message received on monitor. The web server will run itself on Raspberry Pi. A program is written for reading the messages from GSM module and to insert them in to website database. Raspberry Pi will use this program to read the messages using GSM module only from allowed users. And it inserts them to database of the website which will be displayed on the monitor connected through HDMI port. Thus, Raspberry Pi will act as central authority of the whole system controlling the website and the GSM module as well. By using HDMI port LCD / LED monitors can be connected. By using a HDMI extension switch, message can be displayed on several monitors at a time. This system is applicable to display messages / notices that need to be regularly updated in industrial areas / college notice boards.

ALGORITHM

Raspberry Pi operating system is Linux-kernel based, it supports all programming languages like Python, C etc. Python programming is used in SUN system as it

is easy to communicate with serial port and easy to connect databases using MySQLdb [10], a python module. GSM module accepts only certain commands through serial communication and responds to them. These commands are called "AT Commands", AT means attention. There are a set of AT commands to perform different functions, every command starting with 'AT'. In Raspberry Pi, a program is written in python programming language [6] to read the messages from GSM Module through serial connection to link it with website and displays it on the monitor connected.

Algorithm of the code is as follows:

By following the below steps the implemented.

- SUN system IS First import all the required modules for serial communication & database connection
- Create a directory for allowed users and their phone numbers
- Initialize serial port for communicating with GSM module
- Connect to the created database
- Communicate with GSM module by AT Commands to read the newly arrived messages
- Check whether the message sender is in allowed directory or not
- If message is from allowed user, insert it in to the database and delete message from SIM in GSM module to make space for new messages
- If message sender is not in allowed directory, delete the message
- Continue this operation infinitely checking for new messages
- Create a website to display newly arrived messages which are inserted in database.
- Create a connection to the database in which messages are inserted
- Retrieve the messages from database and display the latest messages first
- Check for new messages continuously in database

APPLICATION

To display a new notification in a website, one way is to directly update it in the server system where all database is maintained. Another way of doing this is to login as admin in another computer in to the website. But every time admin may not be at the server system / may not be in access with a computer. This problem can be solved by applying this SUN system. Web server may be any computer at any far away distance, if we connect a GSM module to the server system and use SUN system algorithm and coding used earlier we can directly insert a message into the website without using another computer / internet. Here instead of Raspberry Pi acting as a server system, a normal computer will be acting as a server to accommodate all server features like user login, databases etc. Except this change, program coding and system design remains same. Admin will send a message from his mobile phone to GSM module, which is connected to the server system. Server computer will read the message using the program based on SUN system algorithm and inserts the message in to website database and displays it on the website as a new notification.

CONCLUSION

This SUN system can be used in wide areas like industries & colleges. A direct application of SUN system i.e., maintenance of local websites is explained in the application section. This SUN system highlights one of the applications by using just a few features of Raspberry Pi. Raspberry Pi with its wide features can be used for multi purposes and have much scope for future work. This work can be extended in future for advertising in public places not just limiting to notification systems.

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