Wirelessly Controlled LCD Display

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Abstract—this paper describes the concept of building a LCD display using raspberry pi. Raspberry pi is a small computer, used with LCD display, able to pursue a display to important messages, advertisements and notices, canteen orders. It also describes the approach that aims to develop a platform to send and receive information using raspberry pi. In particular, on transmitter side laptop is present and on receiver side using raspberry pi is used to connect LCD display. The raspberry pi will receive the information and make the necessary changes. The change will be displayed on the screen which is the LCD screen.

I. INTRODUCTION

Fast food corners often face the problem of long queues as the point of paying money and collecting the order is the same. Also displaying the notices where there are multiple receivers and one sender becomes tedious as the sender has to send message to each person, if the sender intends to work in a control room. The problem of the Shops and fast food corners can be easily removed by the proposed system. Laptops or computers are easily available nowadays. So using a laptop to send the required information wirelessly to the LCD screen. The systems available in the market is very costly. In order to reduce the cost of the system the device to control the LCD on the display side will be Raspberry Pi Model B. Raspberry Pi is a credit-card sized computer that plugs into an LCD. It’s a capable little PC which can be used for many of the things that a desktop PC does. By looking at the size and features of Raspberry Pi, it becomes a perfect little device to control the LCD display.

II. PROJECT CONCEPT

For the proposed system the following block diagram is used. The main components of the block diagram are computer/laptop, USB to RS-232 serial adaptor, RDSRF-232-A4FZ, Raspberry Pi and LCD screen.

III. OBJECTIVES

The project objective is to make a system that will be able to display as well as modify important notices on an LCD display.

The specific objectives of this project include, but are not limited to:

- To study the existing wireless displays and find the drawbacks in them.
- To understand the working of RF modules.
- To make applications on Raspberry Pi to receive data and modify the display on the LCD accordingly.
- To make robust, fast and attractive GUIs at the transmitter side.

IV. IMPLEMENTATION

In this project a computer will be used for inputting the scores. This inputted data is transmitted wirelessly by Wi-Fi and the data transmitted will be received by Wi-Fi module which is connected to raspberry pi the raspberry pi will decode the data and would do the necessary changes on the LCD display, the display can be any display.

A. Raspberry Pi Model B

The Raspberry Pi is a credit-card-sized single-board computer developed in the UK by the Raspberry Pi Foundation. The device just costs 35 $. It also has GPIO ports to support serial communication if any external circuit has to be operated. Its small size and cost makes it perfect for the proposed system. Raspberry Pi also supports high speed and attractive GUIs. This feature is used to make application in the proposed system.
The Raspberry Pi has a Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S 700 MHz processor (The firmware includes a number of “Turbo” modes so that the user can attempt overclocking, up to 1 GHz, without affecting the warranty), VideoCore IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded to 512 MB. It does not include a built-in hard disk or solid-state drive, but uses an SD card for booting and long-term storage. The Foundation provides Debian and Arch Linux ARM distributions for download. Tools are available for Python as the main language.

B. Wireless Module (RDSRF-232-A4FZ)

RDSRF-232-A4FZ is a single board high performance and low power serial to wireless solution. It is a complete plug and play system where the user can connect two boards and start a wireless communication between them instantaneously. The RDSRF-232-A4FZ can be integrated to existing systems without tedious software or hardware changes. These boards are intended to be used with systems which already have a RS232 interface. This device has a link budget of 120dB making it suitable for applications that require a robust communication from a range of 100 meters to 1000 meters line of sight.

C. USB To Serial Adaptor

Raspberry Pi does not have an inbuilt rs-232 port. So a true USB to Serial adaptor is required to connect Raspberry Pi and the wireless module RDSRF-232-A4FZ. The model of the USB to serial adaptor is BAFO-BF810 USB to Serial adaptor.

D. Software

a. Driver API

The Raspberry Pi primarily uses Linux kernel-based operating systems. The GPU hardware is accessed via a firmware image which is loaded into the GPU at boot time from the SD-card. The firmware image is known as the binary blob, while the associated ARM coded Linux drivers were initially closed source. This part of the driver code was later released, however much of the actual driver work is done using the closed source GPU code. Application software uses calls to closed source run-time libraries (Open Max, OpenGL ES or open VG) which in turn calls an open source driver inside the Linux kernel, which then calls the closed source Videocore IV GPU driver code. The API of the kernel driver is specific for these closed libraries. Video applications use OpenMAX, 3D applications use OpenGL ES and 2D applications use OpenVG which both in turn use EGL. OpenMAX and EGL use the open source kernel driver in turn.

This device provides a simple and easy way to connect Universal Serial Bus (USB) and Serial port interface. With the advantage of USB port, users have the capability to utilize the peripheral with serial port interface in an easy to use environment such as plug and play & hot swap function. This adapter is designed for ideal connections to Cellular Phone, Digital Camera, Modems or ISDN terminal adapter with over 120k bps data transfer rate. The USB-Serial adapter and software drivers are capable of providing a no-firmware change feature that enable USB interface to be transparent to serial port peripherals with minimum modifications.
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E. Antenna Interfacing

An external antenna is to be connected for transmission and reception of data. Antenna used here is a WHIP antenna. It is about 15.5 cm in length and operates for a frequency of 433 MHZ. It has a low cost and gives an Omni-directional pattern. It has a wide bandwidth. The main shaft of the antenna is very flexible. This antenna can be used even from plastic or metal enclosure. Designed for permanent attachment, PW Series 1/4-wave whips give outstanding performance in a rugged and cost-effective package. The antenna is attached by placing its base through a 1/4” hole in the product and securing it with a nut or by threading it into a PEM-style insert. This method of attachment is highly secure and saves the cost of an antenna connector. The antenna is fed through the base with RG-174 coax cable, which may be soldered directly to the board or attached using a 50 Ohm connector.

V. RESULTS

The RDSRF-232-A4FZ wireless module was studied. It was connected to the computer and transmission and reception of data was obtained successfully. A small program for serial transmission and reception of data was written in the Python Language for Raspberry Pi. Raspberry Pi Model B was also connected to the RDSRF-232-A4FZ module and by using the program for serial transmission and reception of data, the same was achieved. As a result the received and transmitted data was obtained on the LCD screen.

VI. CONCLUSION

The project aims at making a system that will be able to control an LCD screen wirelessly. It aims at displaying notices, time tables and many other ways of displaying information. The control of the display of LCD is obtained by using Raspberry Pi Model B. It has a Linux based operating system. The wireless transmission of data is done by RDSRF-232-A4FZ wireless module.

REFERENCES

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   http://en.wikipedia.org/wiki/Python_programming_language
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Figure 6: Structure and dimensions of Ant-433-pw-qw antenna