Real-Time WiFi Communication Between an Linux Based Embedded System and an Android Phone

M.Sumanjali
PG Scholar,
BVC Engineering College,
Odalarevu, Amalapuram.

K.Rajasekhar
Associate Professor,
BVC Engineering College,
Odalarevu, Amalapuram.

A.Pravin
Associate Professor,
BVC Engineering College,
Odalarevu, Amalapuram.

ABSTRACT:

Applications in areas such as tele health and household security often require wireless communication between low-power embedded systems and personal Smartphone's. This paper presents the design and implementation of a project that exploits wifi capabilities in Smartphone's running the Android Operating System to communicate wirelessly in real-time. This systems promises higher processing capabilities and lower power usage than traditional microprocessors, and has the added advantage of being reconfigurable for future development.

Keywords: Raspberry Pi, Printer, WiFi, Qt.

.

INTRODUCTION:

An ARM 11 architecture based Raspberry pi board is used to implemented the concept, a UART Wifi module will be connected to the board. Android based smart phone are primary choice of people because these devices are inherited with huge compatibility and mobility, although they are low cost devices. This helps in interfacing this device with other electronics system such as health monitoring, industrial safety equipment and household security equipment. Android applications are easy to develop and are an open source so no cost is incorporated in developing android application. These applications provide flexibility in development, so required function can be performed by application. For an example, a person goes out of city to a remote location for some work or trip and faces a medical problem and the doctor may not be able to inspect the patient, in such cases the telehealth provide useful way of communication between doctor and patient. The patients only have to wear sensor part and doctor gets health related data of patients via its smart phone. The doctor can easily monitor patient and suggest the required medication to the patient. With the help of this system doctor can monitor the patient at any remote location and at any time. Similarly when a person is away from his house and any fire accident happen at that time such system can alert the person and autonomously contact the fire brigade.

BLOCK DIAGRAM:
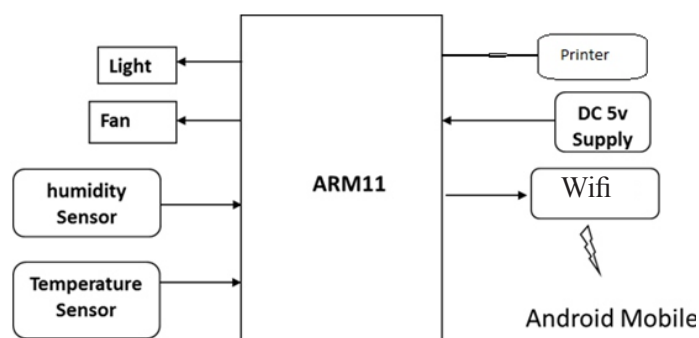
Fig: System Block Diagram

The hardware of the system is an Raspberry Pi, which is ARM11 architecture to provide a link between the peripherals and the Android device. The above said System has printer, sensors and devices. It is a system, which implements on Android System, which is very much ubiquitous and profoundly available.

Hardware Prototype:

Raspberry Pi Model B has 512Mb RAM, 4 USB ports and an Ethernet port. It has a Broadcom BCM2835 system on a chip which includes an ARM1176JZF-S 700 MHz processor, Video Core IV GPU, and an SD card. It has a fast 3D core accessed using the supplied OpenGL ES2.0 and OpenVG libraries. The chip specifically provides HDMI and there is no VGA support. The foundation provides Debian and Arch Linux ARM distributions and also C++ ,Qt.
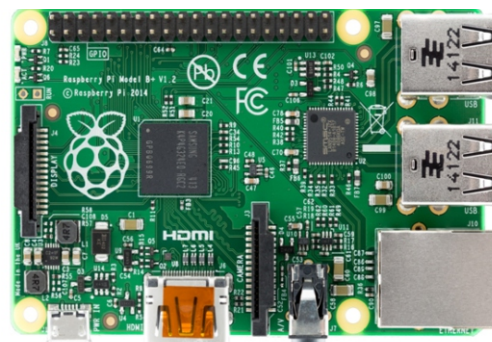
Figure : Raspberry pi board

Thermal printing (or direct thermal printing) is a digital printing process which produces a printed image by selectively heating coated thermochromic paper, or thermal paper as it is commonly known, when the paper passes over the thermal print head. The coating turns black in the areas where it is heated, producing an image. Two-colour direct thermal printers can print both black and an additional colour (often red) by applying heat at two different temperatures.[1] Thermal transfer printing is a very different method that uses a heat-sensitive ribbon instead of heat-sensitive paper, but uses similar thermal print heads.

Fig: Printer

In order to print, thermo-sensitive paper is inserted between the thermal head and the platen. The printer sends an electric current to theheating elements of the thermal head, which generate heat. The heat activates the thermo-sensitive coloring layer of the thermosensitive paper, which changes color where heated. Such a printing mechanism is known as a thermal system or direct system. The heating elements are usually arranged as a matrix of small closely spaced dots—thermal printers are actually dot-matrix printers, though they are not so called.

When you go to a computer store to purchase a device that will access the Internet they will try to sell you a router. In most instances, the router will come with a built-in switch(shortened term for switch in ghub) so that you can connect several Ethernet devices to just one device. So what is the difference between an Ethernet router and an Ethernet switch? The long answer to that question requires an examination of the Open Systems Interconnection Model(OSI) which is frequently used to explain how communication networks operate.

Temperature Sensor:

LM35 is a precision IC temperature sensor with its output proportional to the temperature (in oC). With LM35, temperature can be measured more accurately than with a thermistor.


Fig.4: Temperature Sensor

LDR Sensor:

LDRs or Light Dependent Resistors are very useful especially in light/dark sensor circuits. Normally the resistance of an LDR is very high, sometimes as high as 1000 000 ohms, but when they are illuminated with light resistance drops dramatically.

SOFTWARE REQUIREMENTS :
A. Linux Operating System:

Linux or GNU/Linux is a free and open source software operating system for computers. The operating system is a collection of the basic instructions that tell the electronic parts of the computer what to do and how to work. Free and open source software (FOSS) means that everyone has the freedom to use it, see how it works, and changes it.There is a lot of software for Linux, and since Linux is free software it means that none of the software will put any license restrictions on users. This is one of the reasons why many people like to use Linux.
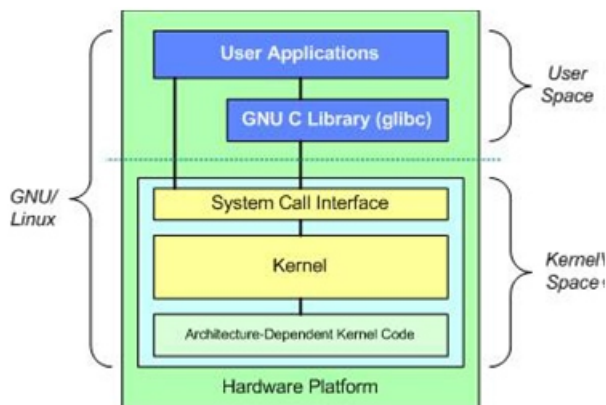
Fig. Architecture of Linux Operating System

Fig: Hardware

A Linux-based system is a modular Unix-like operating system. It derives much of its basic design from principles established in UNIX during the 1970s and 1980s. Such a system uses a monolithic kernel, the Linux kernel, which handles process control, networking, and peripheral and file system access. Device drivers are either integrated directly with the kernel or added as modules loaded while the system is running.

B. Qt for Embedded linux:

Qt is a cross-platform application framework that is widely used for developing application software with a graphical user interface (GUI) (in which cases Qt is classified as a widget toolkit), and also used for developing non-GUI programs such ascommand-line tools and consoles for servers. Qt uses standard C++ but makes extensive use of a special code generator (called the Meta Object Compiler, or moc) together with several macros to enrich the language. Qt can also be used in several other programming languages via language bindings. It runs on the major desktop platforms and some of the mobile platforms. Non-GUI features include SQL database access, XML parsing, thread management, network support, and a unified cross-platform application programing interface for file handling. It has extensive internationalization support.

RESULTS :
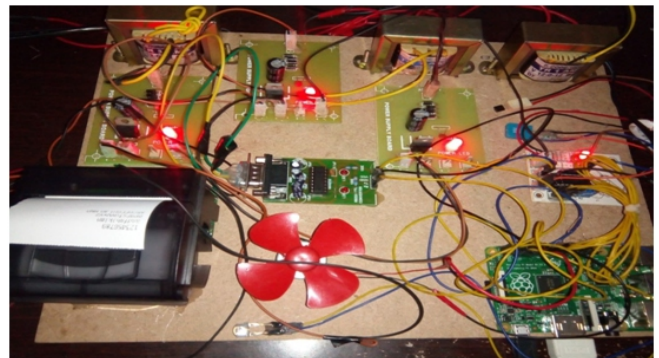
Fig: printer result

REFERENCES:

1.MarathonWorld. (2012). [Online]. Available: http://www.marathonworld.com

2.I. J. Cox and S. L. Hingorani, "An efficient implementation of Reid's multiple hypothesis tracking algorithm and its evaluation for the purpose of visual tracking," IEEE Trans. Pattern Anal.Mach. Intell., vol. 18, no. 2, pp. 138–150, Feb. 1996.

3.J. K. Aggarwal and Q. Cai, "Human motion analysis: A review," in Proc. IEEE Proc. Nonrigid Articulated Motion Workshop, 1997, pp. 90–102.

4.J. MacCormick and A. Blake, "A probabilistic exclusion principle for tracking multiple objects," in Proc. 7th IEEE Int. Conf. Comput. Vision, 1999, pp. 572–578.

5. C. Rasmussen and G. D. Hager, "Probabilistic data association methods for tracking complex visual objects," IEEE Trans. Pattern Anal. Mach.Intell., vol. 23, no. 6,, pp. 560–576, Jun. 2001.