TOUCH SCREEN BASED HOME AUTOMATION USING BLUETOOTH WITH RASBERRY PI

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Abstract:

The theme of this project is to control different loads using wireless technology. One such implementation is home Automation using touch screen. By touching digits in it various appliances can be controlled automatically. This can be done by using Bluetooth modules.The project consists of a transmitter and a receiver.

At the transmitter side , touch screen is interfaced with the Arduino controller and the wireless device used is Bluetooth . Using the bluetooth device, the Information is sent to ARM11 , then the load will be activated. A touch screen is used control different loads.The project is built around the Arduino micro controller. This micro controller provides all the functionality of wireless control. The Raspberry Pi is a low cost single-board computer which has recently become very popular.

INTRODUCTION:

In this present era everything is Automized right from home to industrial area. A home automation system integrates electrical devices in a house with each other, in this competitive world and busy schedule human cannot spare time to perform his daily activities manually. The most common thing that he needs to do are switching ON/ OFF the loads without much human involvement wherever they are required by using wireless devices to control different appliances.

Raspberry Pi is a credit-card-sized single-board computer developed in the UK by Raspberry Pi foundation with the intention of stimulating the teaching of basic computer science in schools. It has two models; Model A has 256Mb RAM, one USB port and no network connection. Model B has 512Mb RAM, 2 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.

The GPU is capable of Blu-ray quality playback, using H.264 at 40MBits/s. 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 Python as the main programming language, with the support for BBC BASIC, C and Perl. Bluetooth is a low cost, low power, universal radio interface in the 2.45GHz frequency ISM band that enables portable electronic devices to connect and communicate wirelessly via short-range, ad hoc networks.

Bluetooth radios use Frequencyhop (FH) spread spectrum which divide the frequency band into several hop channels in order to cope with severe interference. Bluetooth units that are within range of each other can set up ad hoc connections.

Each unit can communicate with up to seven other units per piconet. To regulate traffic on the channel, one of the participating units become a master and all other participants are slaves. Communication in a piconet is organized so that the master polls each slave according to a polling scheme. A master-toslave packet uses central polling scheme to eliminate collisions between slave transmissions.

A resistive touchscreen panel comprises of several layers, the most important of which are two thin, transparent electrically resistive layers separated by a thin space. These layers face each other; with a thin gap between. The top layer (the screen that is touched) has a coating on the underside surface of the screen. Just beneath it is a similar resistive layer on top of its substrate. One layer has conductive connections along its sides, the other along top and bottom.A voltage is applied to one layer, and sensed by the other.

When an object, such as a fingertip or stylus tip, presses down on the outer surface, the two layers come into contact at that point. The panel then behaves as a pair of voltage dividers, by rapidly switching between each layer, the position of a pressure on the screen can be read one AXIS AT A TIME.

BLOCK DIAGRAM:

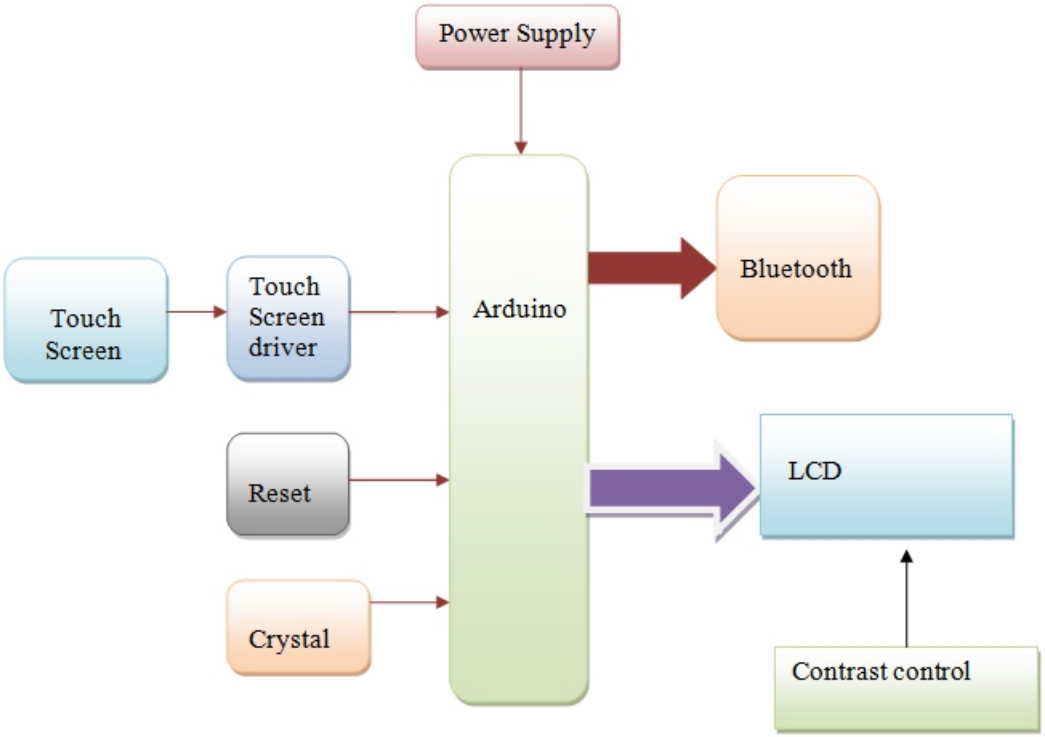

FIG1:TRANSMITTER SECTION

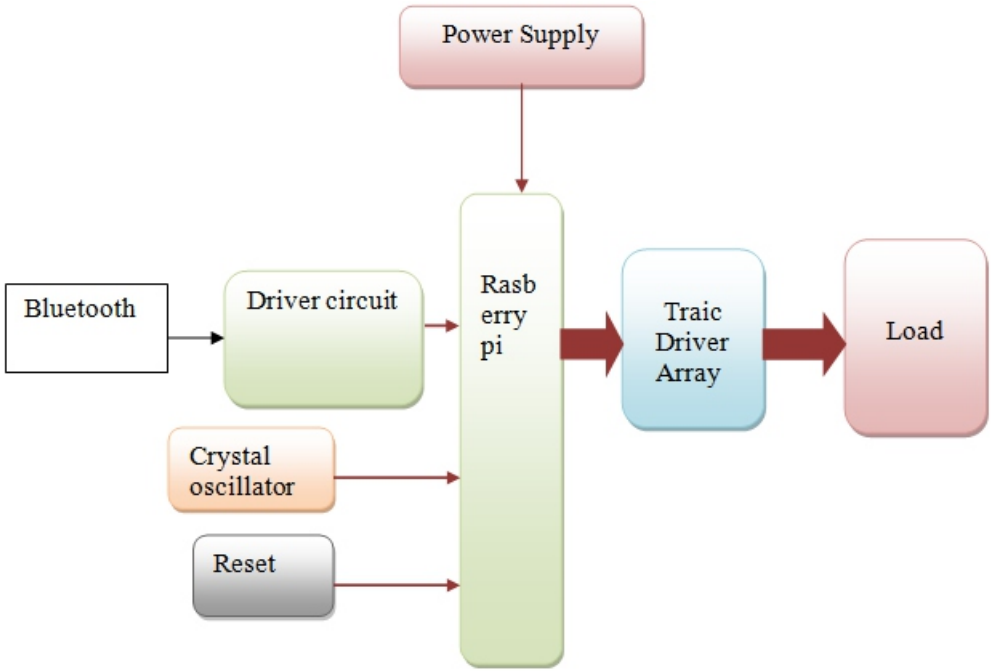

FIG2: RECEIVER SECTION HARDWARE REQUIREMENTS:

1.ARDUINO

The ATmega88 through ATmega328 microcontrollers are said by Atmel to be the upgrades from the very popular ATmega8. They are pin compatible, but not functionally compatible. The ATmega328 has 32kB of flash, where the ATmega8 has 8kB. Other differences are in the timers, additional SRAM and EEPROM, the addition of pin change interrupts, and a divide by 8 presale for the system clock.

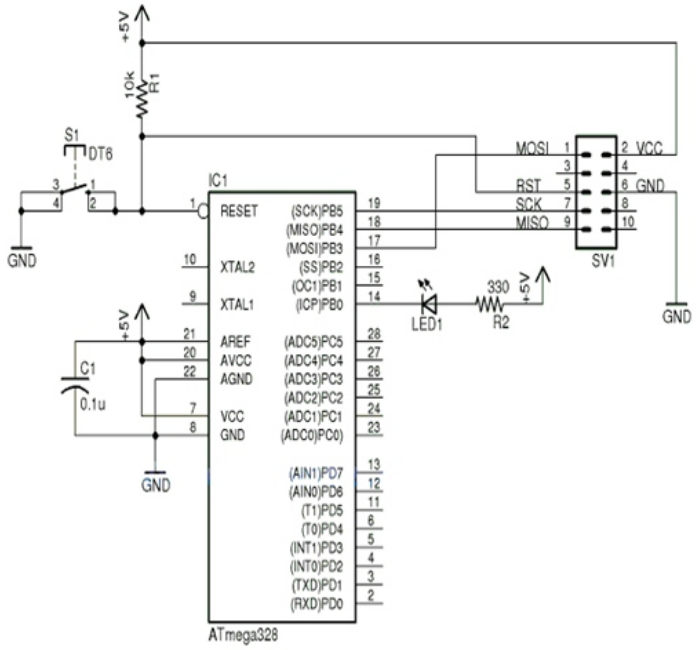

FIG3:SCHEMATIC OF ARDUINO

Bluetooth:

Bluetooth uses a radio technology called frequency-hopping spread spectrum, which chops up the data being sent and transmits chunks of it on up to 79 bands (1 MHz each; centered from 2402 to 2480 MHz) in the range 2,400-2,483.5 MHz (allowing for guard bands). This range is in the globally unlicensed Industrial, Scientific and Medical (ISM) 2.4 GHz short-range radio frequency band.

The Bluetooth specifications are developed and licensed by the Bluetooth Special Interest Group (SIG). The Bluetooth SIG consists of more than 13,000 companies in the areas of telecommunication, computing, networking, and consumer electronics.
To be marketed as a Bluetooth device, it must be qualified to standards defined by the SIG.

Class	Maximum Permitted Power		Range (approximate)
	mW	dBm	
Class 1	100	20	~100 meters
Class 2	2.5	4	~10 meters
Class 3	1	0	~1 meters

In most cases the effective range of class 2 devices is extended if they connect to a class 1 transceiver, compared to a pure class 2 network. This is accomplished by the higher sensitivity and transmission power of Class 1 devices.

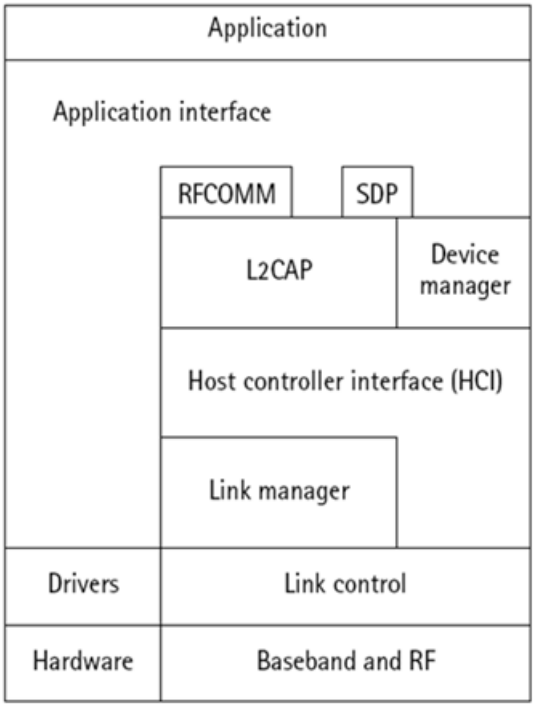

Fig4: Overview of the Bluetooth stack

BTM005 Bluetooth:

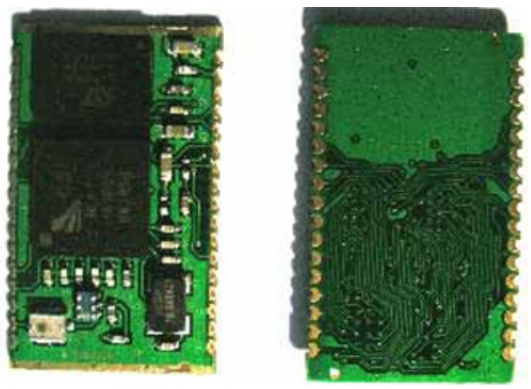

Fig 5: Bluetooth modules

Product Description:

This product is a Class 2 SMT Bluetooth Module used CSR BC4Chipset .It provides data communications. It interfaces with a host through USB or UART.

SOFTWARE LAYER:

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 thebinary 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 Video core 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 and2D applications use OpenVG which both in turn use EGL. OpenMAX and EGL use the open source kernel driver in turn.

Raspbian:

After cycling through several recommendations since just before the hardware was first made available, the Raspberry Pi Foundation created the New Out Of Box System (NOOBS) installer, and as of July 2013 suggests using it to install the Debian-derived Raspbian. The Foundation intends to create an application store website for people to exchange programs.

CONCLUSION:

This project presents the Bluetooth based wireless device control for industrial atomization is been designed and implemented with Raspberry Pi MCU in embedded system domain. Experimental work has been carried out carefully. The result shows that higher efficiency is indeed achieved using the embedded system according to requirement of the user. Bluetooth technology will provide efficient way to transmit the message for the automatic switching of devices

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