

## Bluetooth Communication Using a Touch Screen Interface with the Raspberry Pi

**V.Uday Kiran**

M.Tech Student,  
Sri Sivani Institute of Technology.

**A Venkateswara Rao, M.Tech**

HOD,  
Department of ECE,  
Sri Sivani Institute of Technology.

### Abstract:

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. 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.

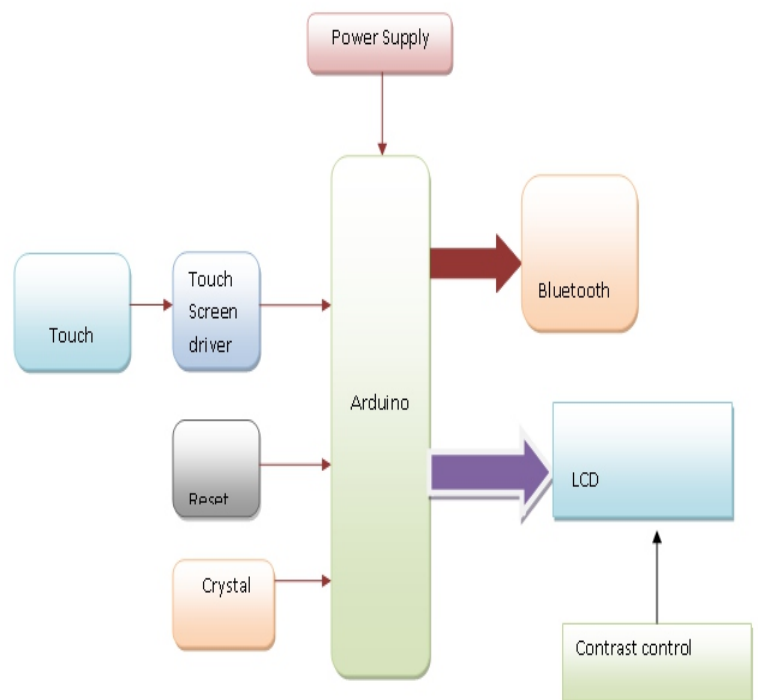
### Introduction :

The project consists of a transmitter and a receiver. At the transmitter side , touchscreen 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. Security is the condition of being protected against danger or loss. In the general sense, security is a concept similar to safety. The nuance between the two is an added emphasis on being protected from dangers that originate from outside. Individuals or actions that encroach upon the condition of protection are responsible for the breach of security. The word “security” in general usage is synonymous with “safety,” but as a technical term “security” means that something not only is secure but that it has been secured. One of the best options for providing good security is by using a technology named EMBEDDED SYSTEMS.

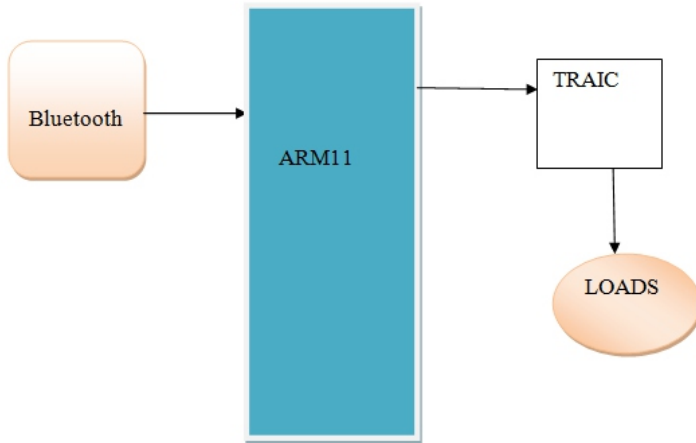
Security is prime concern in our day-to-day life. Every one wants to be as much as secure as to be possible. An access control systems forms a vital link in a security chain. The arduino controller based digital lock presented here is an access control system that allows only authorized persons to access a restricted area. This system is best suitable for corporate offices, ATMs and home security.

### BLOCK DIAGRAM:

#### (1) Transmitter:



## (2)Receiver:



## Raspberry Pi:

The Raspberry Pi is manufactured through licensed manufacturing deals with Newark element14 (Premier Farnell), RS Components and Egoman. All of these companies sell the Raspberry Pi online. Egoman produces a version for distribution solely in China and Taiwan, which can be distinguished from other Pis by their red coloring and lack of FCC/CE marks. The hardware is the same across all manufacturers.

## 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 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 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 and 2D applications use OpenVG which both in turn use EGL. OpenMAX and EGL use the open source kernel driver in turn.

## ARM1176JZF-S PROCESSOR:

The ARM1176JZF-S processor incorporates an integer core that implements the ARM11 ARM architecture v6. It supports the ARM and Thumb™ instruction sets, Jazelle technology to enable direct execution of Java bytecodes, and a range of SIMD DSP instructions that operate on 16-bit or 8-bit data values in 32-bit registers.

### The ARM1176JZF-S processor features:

- Trust Zone security extensions
- provision for Intelligent Energy Management
- high-speed Advanced Microprocessor Bus Architecture (AMBA) Advanced Extensible Interface (AXI) level two interfaces supporting prioritized multiprocessor implementations.
- an integer core with integral EmbeddedICE-RT logic
- an eight-stage pipeline
- branch prediction with return stack
- low interrupt latency configuration
- internal coprocessors CP14 and CP15
- Vector Floating-Point (VFP) coprocessor support
- external coprocessor interface
- Instruction and Data Memory Management Units (MMUs), managed using MicroTLB structures backed by a unified Main TLB
- Instruction and data caches, including a non-blocking data cache with Hit-Under-Miss (HUM)
- virtually indexed and physically addressed caches
- 64-bit interface to both caches
- level one Tightly-Coupled Memory (TCM) that you can use as a local RAM with DMA
- trace support

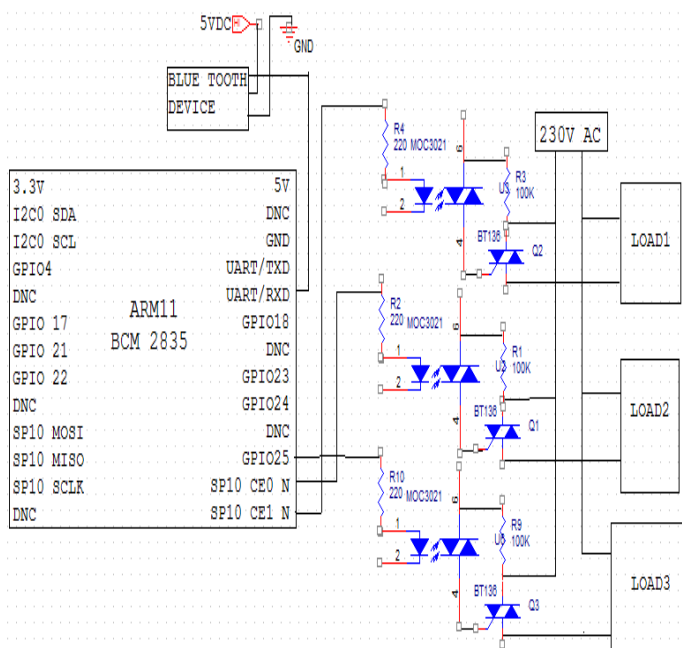
- JTAG-based debug.

## Bluetooth:

The word Bluetooth is an anglicised version of the Scandinavian Blåtand/Blåtann, the epithet of the tenth-century king Harald I of Denmark and parts of Norway who united dissonant Danish tribes into a single kingdom. The implication is that Bluetooth does the same with communications protocols, uniting them into one universal standard.- Implementation

## Communication and connection:

A master Bluetooth device can communicate with up to seven devices in a piconet. The devices can switch roles, by agreement, and the slave can become the master at any time. At any given time, data can be transferred between the master and one other device (except for the little-used broadcast mode). The master chooses which slave device to address; typically, it switches rapidly from one device to another in a round-robin fashion. The Bluetooth Core Specification provides for the connection of two or more piconets to form a scatternet, in which certain devices serve as bridges, simultaneously playing the master role in one piconet and the slave role in another. Loads interfaced to the Arm11 (Raspberry Pi)



## Applications:

- Devices can be operated remotely.
- Applied in Home, Industries, Hotels, Shopping malls, Process control systems
- Home Automation may include centralized control of lights, HVAC Systems, security, comfort etc.

## REFERENCES:

- [1] J. Haartsen, M. Naghshineh, J. Inouye, O. J. Joerensen, W. Allen, "BLUETOOTH- The universal radio interface for ad hoc, wireless connectivity", ACM SIGMOBILE Mobile Computing and Communications Review, vol. 2, no. 4, pp. 38 – 45, October 1998.
- [2] J. C. Haartsen, "Bluetooth- a new low-power radio interface providing short-range connectivity", Ericsson Radio Syst. B. V., Emmen, Netherlands, vol. 88, issue. 10, October 2000.
- [3] J. Bray, C. F. Sturman, "Bluetooth 1.1: Connect without Cable", Pearson Education, edition 2, 2001.
- [4] M. Frodigh, P. Johansson and P. Larsson, "Wireless ad hoc networking- The art of networking without a network", Ericsson Review, pp. 10-14, 2000.
- [5] A. S. Huang, L. Rudolph, "Bluetooth essentials for programmers", bridgeUniversity Press, 2007
- [6] Powers, Shawn. "The open-source classroom: your first bite of raspberry pi." Linux Journal 2012.224 (2012): 7
- [7] Mitchell, Gareth. "The Raspberry Pi single-board computer will revolutionise computer science teaching [For & Against]." Engineering & Technology 7.3 (2012): 26-26.