Visvesvaraya Technological University, Belagavi.

PROJECT REPORT

on

"CONDUCTORLESS TICKETING SYSTEM"

Project Report submitted in partial fulfillment of the requirement for the award of the degree of

Bachelor of Engineering

in

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For the academic year 2019-20

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Reviewer Names	Sign	Accepted	Correction Needed	Rejected
1.				
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CHAPTER 1:

ABSTRACT:

The Embedded Technology is now in its prime and the wealth of Knowledge available is mind-blowing. Embedded technology plays a major role in integrating the various functions associated with it. This needs to tie up the various sources of the Department in a closed loop system. This proposal greatly reduces the manpower, saves time and operates efficiently without human interference. This project puts forth the first step in achieving the desired target. With the advent in technology, the existing systems are developed to have in built intelligence

INTRODUCTION

The very need for digitalizing the fares to be error free and easy access to the public transport system, is achieved using RFID for access into the public transport, where the user has to top up the card for using it similar to a SIM and when entering the transport system it would check for the availability of funds in the card, if available it would provide access to the service, if not it would indicate the same through a red LED and if the user has to leave the public transport at desired station, the user has to tap the card at the exit., in this manner it would detect the exact fare for his/her journey.

There being a large scope once digitalized one of the other application which could be implemented is, when there are children below the age of 16 who would be using their discount card to travel to and from there school/ college their parents or guardians could subscribe for a service where in which to let them know when and where their children are. In this manner there is an opportunity to expand and develop using this system.

1.1 Problem Statement and Solutions

Public transport system using GPS, GSM and RFID is designed for user friendly applications and also LCD is interfaced in order to display the messages, IR sensor are used to identify whether the passengers is carrying the card or not. Here the RFID is used for ticketing purpose, GSM and GPS is used for mobile data transmission and tracking location.

The design and development of this project is due to its tremendous scope in public transport system. The aim of this project is to design and develop "RFID and GPS based Public transport system" to make the fares to be error free.

1.2 BLOCK DIAGRAM

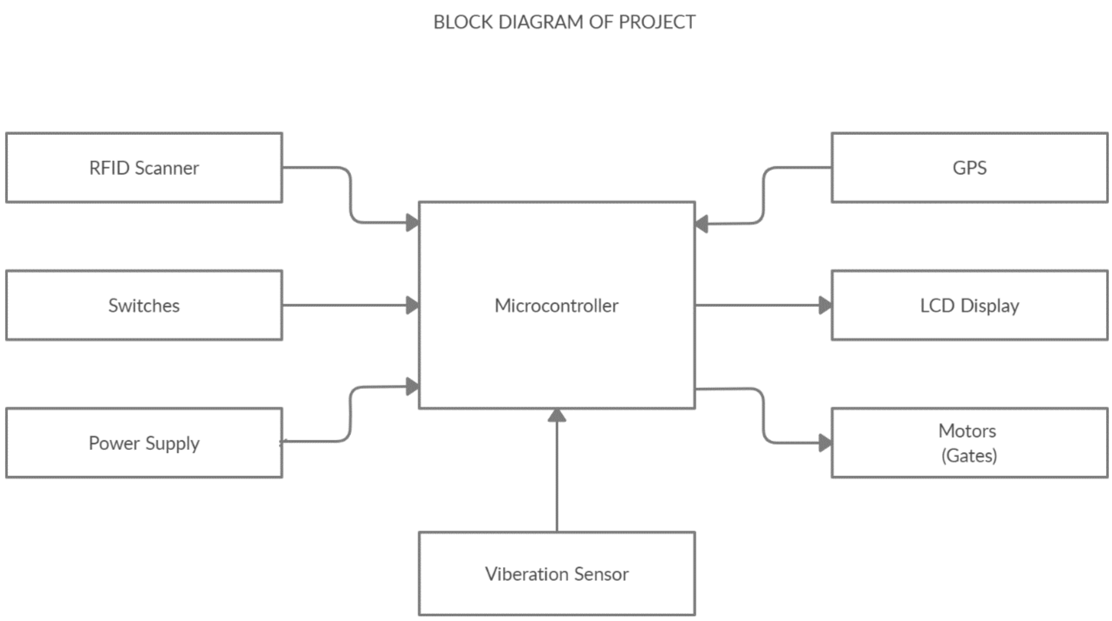


Figure Block diagram of project

Hardware and the Software Requirements:

Hardware:

- Microcontroller – LPC 2148
- GPS
- LCD - 16 x 2
- 7812/ 7805 voltage regulators for power supply
- Power supply circuit
- RFID

Software:

- Embedded c
- Keil-c compiler
- Flash magic burner software.

1.3 BLOCK DIAGRAM DESCRIPTION

1.3.1 MICRO CONTROLLER

The LPC2148 microcontrollers are based on a 16-bit/32-bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combine microcontroller with embedded high speed flash memory ranging from 32 kB to 512 kB. A 128-bit wide memory interface and a unique accelerator architecture enable 32-bit code execution at the maximum clock rate. For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30 % with minimal performance penalty.

1.3.2 GLOBAL POSITIONING SYSTEM

The Global Positioning System (GPS) is a space-based global navigation satellite system (GNSS) that provides reliable location and time information in all weather and at all times and anywhere on or near the Earth when and where there is an unobstructed line of sight to four or more GPS satellites.

1.3.3 RADIO FREQUENCY IDENTIFICATION

Radio-frequency identification (RFID) is a technology that uses communication via radio waves to exchange data between a reader and an electronic tag attached to an object, for the purpose of identification and tracking. Some tags can be read from several meters away and beyond the line of sight of the reader. The application of bulk reading enables an almost parallel reading of tags. Radio-frequency identification involves interrogators (also known as readers), and tags (also known as labels).Most RFID tags contain at least two parts. One is an integrated circuit for storing and processing information, modulating and demodulating a radio-frequency (RF) signal, and other specialized functions. The other is an antenna for receiving and transmitting the signal.

1.3.4 DISPLAY

An LED lamp is a solid-state lamp that uses light-emitting diodes (LEDs) as the source of light. The term LED light bulb is also colloquially used. Here in the system the LED is controlled by the microcontroller in order to indicate whether the passenger has got the access to board the travel or not. These are got to know by the system by accessing the RFID. If the red LED glows, it indicates access denied or not.

CHAPTER 2

LITERATURE SURVEY

[1] The regular bus ticketing system helped us to understand the various areas of improvements, and the challenges which are to be overcome in order to build conductor less buss ticketing system.

[2] http://www.NSK Electronics.com, from this we got data sheet of microcontroller (Phillips) module.

[3] LCD interfacing with microcontroller: We studied how the LCD is interfacing with the microcontroller.

[4] http://www.Engineers garage.com, from this we got pin diagram of microcontroller

[5] http://www.RFID.org/, from this purpose of radio frequency identification and detection system is to facilitate data transmission through the portable devices known as tag that is read with the help of RFID reader, and process it as per the needs of application.

[6] https://www.electronicwings.com/sensors-modules/gps-receiver-module, for this web site we learnt the working of the GPS Module and how to interface it with the micro controller.

[7] https://www.electronicshub.org/understanding-7805-ic-voltage-regulator/#:~:text=7805%20is%20a%20three%20terminal,incorporated%2C%20Infineon%20Technologies%2C%20etc. from this we understood the role of the voltage regulator

CHAPTER 3

HARDWARE DESCRIPTION

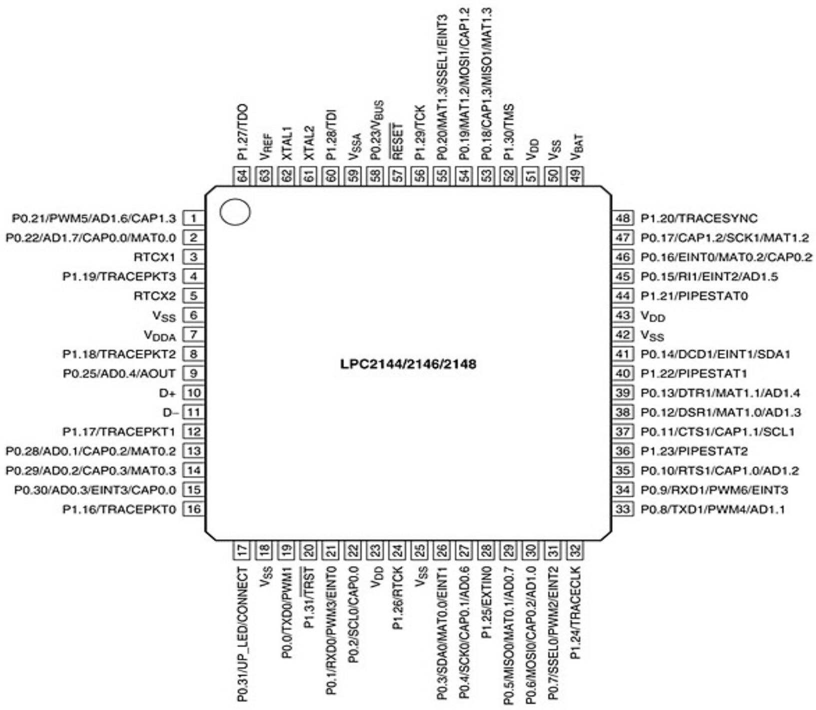
3.1 MICROCONTROLLER:

3.1.1 General Description:

The LPC2148 microcontrollers are based on a 16-bit/32-bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combine microcontroller with embedded high speed flash memory ranging from 32 kB to 512 kB. A 128-bit wide memory interface and a unique accelerator architecture enable 32-bit code execution at the maximum clock rate.

Due to their tiny size and low power consumption, LPC2148 are ideal for applications where miniaturization is a key requirement, such as access control and point-of-sale. Serial communications interfaces ranging from a USB 2.0 Full-speed device, multiple UARTs, SPI, SSP to I2C-bus and on-chip SRAM of 8 kB up to 40 kB, make these devices very well suited for communication gateways and protocol converters, soft modems, voice recognition and low end imaging, providing both large buffer size and high processing power. Various 32-bit timers, single or dual 10-bit. ADC(s), 10-bit DAC, PWM channels and 45 fast GPIO lines with up to nine edge or level sensitive external interrupt pins make these microcontrollers suitable for industrial control and medical systems.

3.1.2 Pin Diagram:



3.1.3 Features:

- LPC 2148 is a 16-bit/32-bit ARM7TDMI-S microcontroller
- It has 8 kB to 40 kB of on-chip static RAM and 32 kB to 512 kB of on-chip flash memory. 128-bit wide interface/accelerator enables high-speed 60 MHz operation.
- Embedded ICE RT and Embedded Trace interfaces offer real-time debugging with the on-chip Real Monitor software and high-speed tracing of instruction execution.
- USB 2.0 Full-speed compliant device controller with 2 kB of endpoint RAM. In addition, the LPC2146/48 provides 8 kB of on-chip RAM accessible to USB by DMA.
- One or two (LPC2141/42 vs. LPC2144/46/48) 10-bit ADCs provide a total of

  6/14 analog inputs, with conversion times as low as 2.44 μs per channel.
- Single 10-bit DAC provides variable analog output (LPC2142/44/46/48 only).
- Two 32-bit timers/external event counters (with four capture and four compare

  Channels each), PWM unit (six outputs) and watchdog.
- Low power Real-Time Clock (RTC) with independent power and 32 kHz clock input.
- Multiple serial interfaces including two UARTs (16C550), two Fast I2C-bus (400 Kbit/s), SPI and SSP with buffering and variable data length capabilities.
- Vectored Interrupt Controller (VIC) with configurable priorities and vector addresses.
- Up to 45 of 5 V tolerant fast general purpose I/O pins in a tiny LQFP64 package,.
- Up to 21 external interrupt pins available.
- 60 MHz maximum CPU clock available from programmable on-chip PLL with Settling time of 100 μs.
- On-chip integrated oscillator operates with an external crystal from 1 MHz to 25 MHz.
- Power saving modes include Idle and Power-down.
- Individual enable/disable of peripheral functions

- Processor wake-up from Power-down mode via external interrupt or BOD

3.2 RFID

3.2.1 History of RFID

In 1946, a Russian invented an espionage tool called the Covert Listening Device. This device retransmitted incident radio waves with audio information. Sound waves vibrated a diaphragm which slightly altered the shape of the resonator, which modulated the reflected radio frequency. This passive device was attributed to be the first known device and a predecessor of the RFID technology.

Radio frequency identification (RFID) technology is a wireless communication technology that enables users to uniquely identify tagged objects or people. RFID is rapidly becoming a cost-effective technology. This is in large part due to the efforts of Wal-Mart and the Department of Defense (DoD) to incorporate RFID technology into their supply chains. Although the foundation of the Radio Frequency Identification (RFID) technology was laid by past generations, only recent advances opened an expanding application range to its practical implementation.

RFID is only one of numerous technologies grouped under the term Automatic Identification (Auto ID), such as bar code, magnetic inks, optical character recognition, voice recognition, touch memory, smart cards, biometrics etc. Auto ID technologies are a new way of controlling information and material flow, especially suitable for large production networks.

3.2.2 RFID Concept

The RFID technology is a means of gathering data about a certain item without the need of touching or seeing the data carrier, through the use of inductive coupling or electromagnetic waves. The data carrier is a microchip attached to an antenna (together called transponder or tag), the latter enabling the chip to transmit information to a reader (or transceiver) within a given range, which can forward the information to a host computer. The middleware (software for reading and writing tags) and the tag can be enhanced by data encryption for security-critical application at an extra cost, and anti-collision algorithms may be implemented for the tags if several of them are to be read simultaneously. One important feature enabling RFID for tracking objects is its capability to provide unique identification. Additional capabilities are required for RFID tag design and functionality including the ability to package and encapsulate tags and incorporate sensor based technology. RFID tags are being used increasingly in extreme environments requiring exposure to harsh chemicals, high moisture and high heat.

3.2.3 How do RFID work?

In every RFID system the transponder Tags contain information. This information can be as little as a single binary bit, or be a large array of bits representing things as an identity codes, personal medical information, or literally any of information that can be stored in digital binary format. Passive Tags have no power source of their own and instead derive power from the incident electromagnetic field. Commonly the heart of each tag is a microchip. When the Tag enters the generated RF field it is able to draw enough power from the field to access its internal memory and transmit its stored information.

When the transponder Tag draws power in this way the resultant interaction of the RF fields causes the voltage at the transceiver antenna to drop in value. This effect is utilized by the tag to communicate its information to the reader. The Tag is able to control the amount of power drawn from the field and by doing so it can modulate the voltage sensed at the Transceivers according to the bit pattern it wishes to transmit. As shown in figure 3.3.

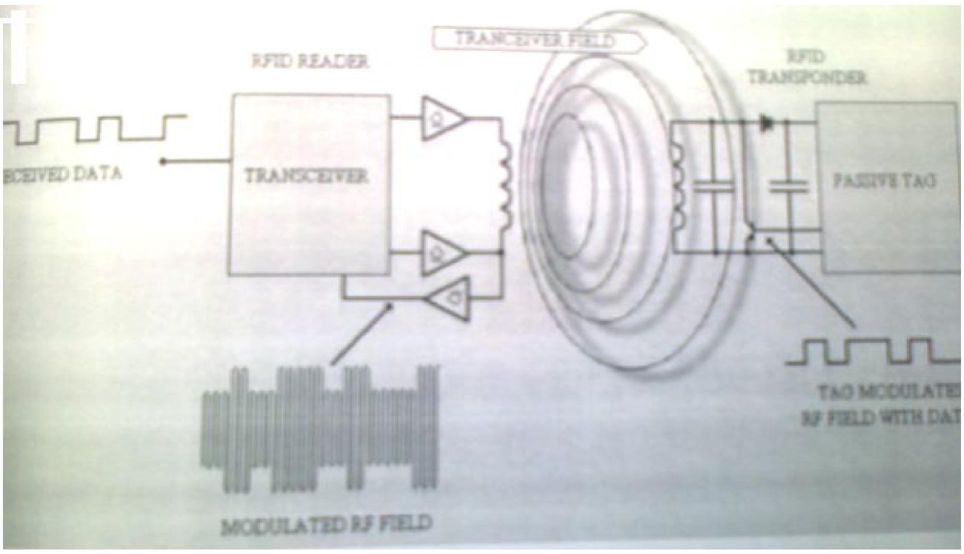


Figure working of RFID

3.3 RFID READER:

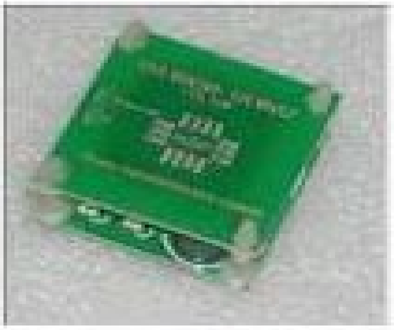



Figure RFID Module

3.3.1 RFID Reader Description:

RFID Reader Module, are also called as interrogators. They convert radio waves retuned from the RFID tag into a form that can be passed on to Controllers, which can make use of it. RFID tags and readers have to be tuned to the same frequency in order to communicate. RFID systems use many different frequencies, but the most common and widely used and supported by our reader is 125 kHz. RFID readers or receivers are composed of a radio frequency module, a control unit and an antenna to interrogate electronic tags via radio frequency (RF) communication.

The reader powers an antenna to generate an RF field. When a tag passes through the field, the information stored on the chip in the tag is interpreted by reader and send to the server, which, in turn, communicates with the data base system when the RFID system is interfaced with it.

RFID exit gate sensors (Readers) at exits are basically two types. One type reads the information on the tag(s) going by and communicates that information to a server.

An RFID reader typically contains a module (transmitter and receiver), a control unit and a coupling element (antenna). The reader as three main functions: energizing, demodulating and decoding. In addition, readers can be fitted with an additional interface that converts the radio waves returned from the RFID tag into a form that can then be passed onto another system, like a computer or any programmable logic controller. Anti-collision algorithms permit the simultaneous reading of large numbers of tagged objects, while ensuring that each tag is read only once.

3.3.2 RFID MODULE IMPLEMENTATION:

The heart of the system is the RFID tag. This tag is equipped with a programmable chip and an antenna. Each paper –thin tag contains an engraved antenna and a microchip with a capacity of at least 64bits, which contains the information about the book like name of the book etc. RFID is a combination of radio-frequency-based technology and microchip technology.

RF (radio frequency) portion of the electromagnetic spectrum is used to transmit signals. An RFID system consists of an antenna and a transceiver, which read the radio frequency and transfers the information to a processing device (reader) and a transponder, or RF tag, which contains the RF circuitry and information to be transmitted. The antenna provides the means for the integrated circuit to transmit its information to the reader that converts the radio waves reflected back from the RFID tag into digital information that can then be passed on to computers that can analyze the data.

RFID tags and readers have to be tuned to the same frequency in order to communicate effectively. RFID systems typically use one of the following frequency ranges: low frequency (or LF, around125 KHz), high frequency (or HF, around 13.56 MHz), ultra-high frequency (or UHF, around 868 and 928MHz), or microwave (around 2.45 and 5.8 GHz).

Radio frequency identification (RFID) in a variety of ways including automatic identification and data capture (AIDC) solutions. We pride ourselves in providing customers with inexpensive RFID solutions that integrate well with other systems. The reader has been designed as a plug & plays Module and can be plugged on a standard 300 MIL-28 Pin IC socket form factor.

Functions:

- Supports reading of 64 bit Manchester encoded cards
- Pins for external antenna connection
- Serial interface(TTL)
- Customer application on request

3.3.3 RFID FEATURES:

Frequency	125 KHz
Reading distance	6cm
Interface	UART
Antenna	Built in / External
Supply Voltage	5V
Operating Temperature	-10°C to +50°C
Tag Types	Unique, TK 5530
Output Format	ASCII, Wiegand 26

Table RFID Features

3.3.4 DATA TRANSMISSION OF RFID

3.3.4.1 Data Transmission in ASCII Standard

Data read from the tag is Manchester encoded. The Manchester encoded data is decoded to ASCII standard. Decoded data is sent to the UART serial interface for wired communication with the host systems. ASCII data format is shown below:

RFID TAG

0010468883 **159, 48659**

Figure RFID Tag

3.3.5 THE FOUR CORE COMPONENTS OF AN RFID SYSTEM

An RFID system has four basic components:

- A tag which is composed of a semiconductor chip and an antenna.
- An interrogator (sometimes called a read/write device), which is composed of an antenna, a RF electronics module, and a control electronics module.
- A controller (sometimes called a host), which most often takes the form of a PC or a workstation running database and control (often called middleware) software.
- An antenna, which converts electrical power to RF power.

Figure RFID Card showing the Microchip and Antenna

3.3.6 RFID TAG

The basic function of an RFID tag is to store data and transmit data to the interrogator. At its most basic, a tag consists of an electronics chip and an antenna encapsulated in a package to form a usable tag, such as a packing label that might be attached to a box.

Figure RFID Tag

Generally, the chip contains memory where data may be stored and read from and sometimes written, too, in addition to other important circuitry. Some tags also contain batteries, and this is what differentiates active tags from passive tags. In our project we use passive tag.

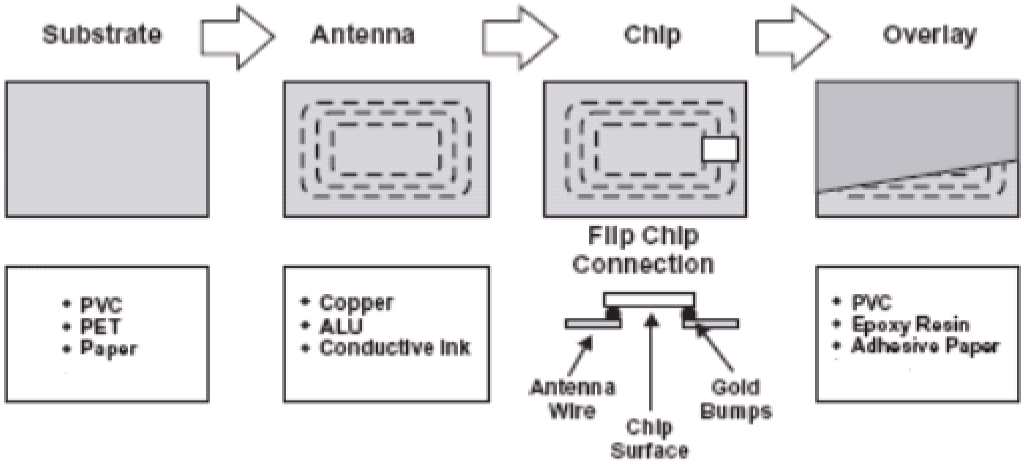


Figure RFID Tag components

3.3.7 TYPES OF TAGS

3.3.7.1 Passive

- Also called ‘pure passive’, ‘reflective’ or ‘beam powered’
- obtains operating power from the reader
- the reader sends electromagnetic waves that induce current in the tag’s antenna, the tag reflects the RF signal transmitted and adds information by modulating the reflected signal
- Semi-passive
- uses a battery to maintain memory in the tag or power the electronics that enable the tag to modulate the reflected signal
- communicates in the same method, as the other passive tags

3.3.7.2 Active

- powered by an internal battery, used to run the microchip’s circuitry and to broadcast a signal to the reader
- Generally ensures a longer read range than passive tags
- More expensive than passive tags (especial because usually are read/write)
- The batteries must be replaced periodically

3.3.7.3 Semi-passive tags

- They have their power source, but the battery powers the microchip and does not broadcast the signal.
- The battery-assisted receive circuitry of semi passive tag lead to greater sensitivity than passive tags, typically 100 times more.
- Semi passive tags have three main advantages
    1. Greater sensitivity than passive tags.
    2. Better battery life than active tags.
    3. Can perform active functions (such as temperature logging) under its own power, even when no reader is present.

3.4 Liquid Crystal Display

In recent years the LCD is finding widespread use replacing LEDs .This is due to following reasons

1) The declining prices of LCDs
2) The ability to display numbers, characters and graphics. This is in contrast to LEDs, which are limited to numbers and few characters.
3) Incorporation of a refreshing controller in to LCD, there by relieving the CPU of the task of refreshing the LCD. In contrast LCD must be refreshed by CPU to keep displaying the data.

Figure LCD display

Liquid crystals are substances that exhibit a phase of matter that has properties. Between those of a conventional liquid, and those of a solid crystal. For instance, a liquid Crystal (LC) may flow like a liquid, but have the molecules in the liquid arranged and/or

Oriented in a crystal-like way.

Each pixel of an LCD typically consists of a layer of molecules aligned between two transparent electrodes, and two polarizing filters, the axes of transmission of which are (most of the cases) perpendicular to each other. The surfaces of the electrodes, which are in contact with the liquid crystal material, are treated so as to align the liquid crystal molecules in a particular direction. This treatment typically consists of a thin polymer layer that is unidirectional rubbed using, for example, a cloth. The direction of the liquid crystal alignment is then defined by the direction of rubbing. Electrodes are made of a transparent conductor called Indium Tin Oxide (ITO).

3.4.1 Connections

A 14 pin access is provided having 8 data lines,3 control lines and 3 power lines. The connections are laid out in one of two common configurations, either two row of seven pins, or a single row of 14 pins.

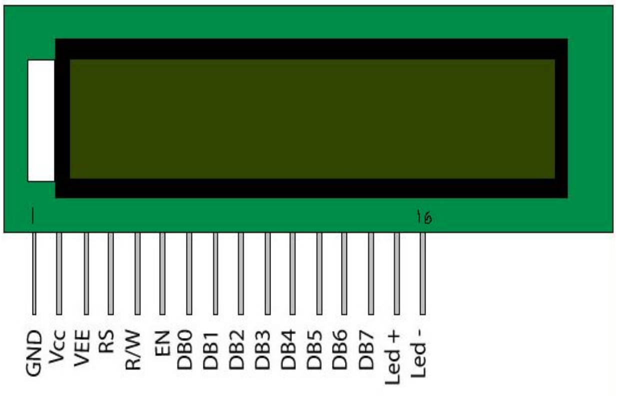


Figure Pin out of the LCD formats.

On most displays, the pins are numbered on the LCD's PCB, but if not, it is quite easy to locate pin1.Since this pin is connected to ground; it often has a thicker PCB track connected to it and it is generally connected to the metal work at some point. The LCD module with all the pin details is shown in figure 3.11.

Pin 1 and 2 are the power supply lines, Gnd and Vcc.

The Vcc pin should be connected to positive supply and Gnd to 0V supply or ground. Although the LCD module data sheets specify a 5Vdc supply, Supplies of 6V and 4-5V both work well, and even 3V is sufficient for some modules.

Pin 3 is a control pin , Vee , which is used to alter the contrast of the display. Ideally, this pin should be connected to a variable voltage supply.

Pin 4 is the (RS) register select line. When this line is low, data bytes transferred to the display are treated as commands and data bytes read from the display indicate its status. By setting the RS line high, character data can be transferred to and from the module.

Pin 5 is read/write line. This line is pulled low in order to write commands or character data to the module, or pulled high to read character data or status information from its registers.

Pin 6 is the enable line. this input is used to initiate the actual transfer of commands or character data between the module and the data lines. When writing to the display, data is transferred only on high to low transition of this signal.

Pin 7 to 14 are data bus lines (D0 to D7).data can be transferred to and from the display either as a single 8 bit byte or two 4 bit nibbles. The other two pins LED+ and LED- is used for back light of the LCD.

When powered up, the display should show a series of dark squares, possibly on a part of the display. These character cells are actually in their off state, so the contrast control should be adjusted anti clock wise until the squares are only just visible.

The display module resets itself to an initial state when power is applied, which curiously the display has blanked off, so that even if the characters are entered, they cannot be seen. It is therefore necessary to issue a command at this point, to switch the display on. The display on/off and cursor command turns on the display, but also determines the cursor style at the same time.

3.4.2 The internal structure of LCD module.

LCD is connected to the microcontroller through the controller interface. LCD has an internal memory which stores the lookup table for all the characters. Any ASCII value of a character that is passed to the LCD module is compared with the lookup table in the memory and that value is displayed.

3.4.3 LCD Initialization

This is the pit fall for beginners. Proper working of LCD depend on the how the LCD is initialized. We have to send few command bytes to initialize the lcd. Simple steps to initialize the LCD

1. Specify function set: Send 38H for 8-bit, double line and 5x7 dot character format.

2. Display On-Off control: Send 0FH for display and blink cursor on.

3. Entry mode set: Send 06H for cursor in increment position and shift is invisible.

4. Clear display: Send 01H to clear display and return cursor to home position

3.4.4 LCD Command Codes

Code(HEX)	Command to LCD Instruction Register
1	Clear display screen
2	Return home
4	Decrement cursor (shift cursor to left)
6	Increment cursor (shift cursor to right)
80	Force cursor to the beginning of first line
C0	Force cursor to the beginning of second line
38	2 lines and 5x7 matrix

Table LCD Command codes

3.5 GPS(Global Positioning System)

GPS is one of the most important applications in satellite communication. a basic understanding of a GPS system along with the concepts regarding GPS receiver system is given in this section. Hence the antenna under design makes up the GPS receiver antenna system.

3.5.1 A BRIEF OVERVIEW OF GPS

The Global Positioning System (GPS) is a space-based satellite navigation system that provides location and time information in all weather, anywhere on or near the Earth, where there is an unobstructed line of sight to four or more GPS satellites. It is maintained by the States government and is freely accessible to anyone with a GPS receiver.

The GPS project was developed in 1973 to overcome the limitations of previous navigation systems,[1] integrating ideas from several predecessors, including a number of classified engineering design studies from the 1960s. GPS was created and realized by the U.S. Department of Defense (DoD) and was originally run with 24 satellites. It became fully operational in 1994.

3.5.2 THE SATELLITE NETWORK

The GPS satellites transmit signals to a GPS receiver. These receivers passively receive satellite signals; they do not transmit and require an unobstructed view of the sky, so they can only be used effectively outdoors. Early receivers did not perform well within forested areas or near tall buildings but later receiver designs such as SiRFStarIII, MTK etc have overcome this and improved performance and sensitivity markedly. GPS operations depend on a very accurate time reference, which is provided by atomic clocks on board the satellites.

Figure The Navstar GPS Constellation

Each GPS satellite transmits data that indicates its location and the current time. All GPS satellites synchronize operations so that these repeating signals are transmitted at the same instant. The signals, moving at the speed of light, arrive at a GPS receiver at slightly different times because some satellites are further away than others. The distance to the GPS satellites can be determined by estimating the amount of time it takes for their signals to reach the receiver.

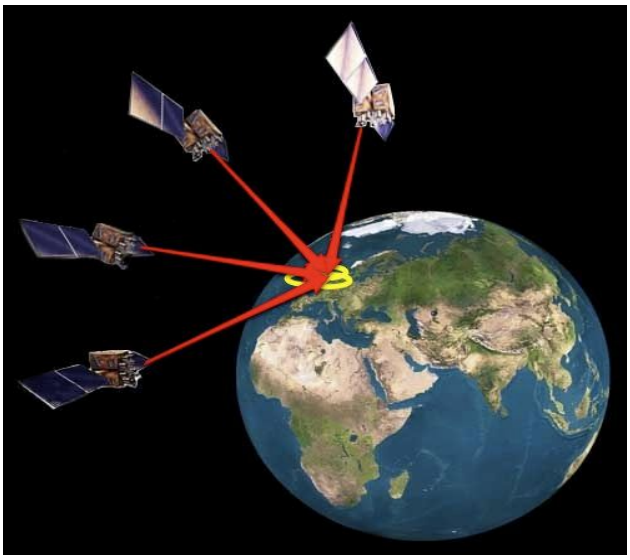


Figure Satellite view

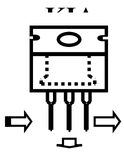
There are at least 24 operational GPS satellites at all times plus a number of spares. The satellites, operated by the US DoD, orbit with a period of 12 hours (two orbits per day) at a height of about 11,500 miles traveling at 9,000mph (3.9km/s or 14,000kph). Ground stations are used to precisely track each satellite's orbit.

3.7 POWER SUPPLY UNIT

The circuit needs two different voltages, +5V & +12V, to work. These dual voltages are supplied by this specially designed power supply.

The power supply, unsung hero of every electronic circuit, plays very important role in smooth running of the connected circuit. The main object of this 'power supply' is, as the name itself implies, to deliver the required amount of stabilized and pure power to the circuit.

The stabilization of DC output is achieved by using the three terminal voltage regulator IC. This regulator IC comes in two flavors: 78xx for positive voltage output and 79xx for negative voltage output. For example 7812 gives +12V output and 7912 gives -12V stabilized output. These regulator ICs have in-built short-circuit protection and auto-thermal cutout provisions. If the load current is very high the IC needs 'heat sink' to dissipate the internally generated power.



KIA 78xx

Figure 3.20 Voltage Regulator IC

3.7.1 VOLTAGE REGULATOR LM7805

The LM78XX series of three terminal positive regulators are available in the TO-220/D-PAK package and with several fixed output voltages, making them useful in a wide range of applications. Each type employs internal current limiting, thermal shut down and safe operating area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.

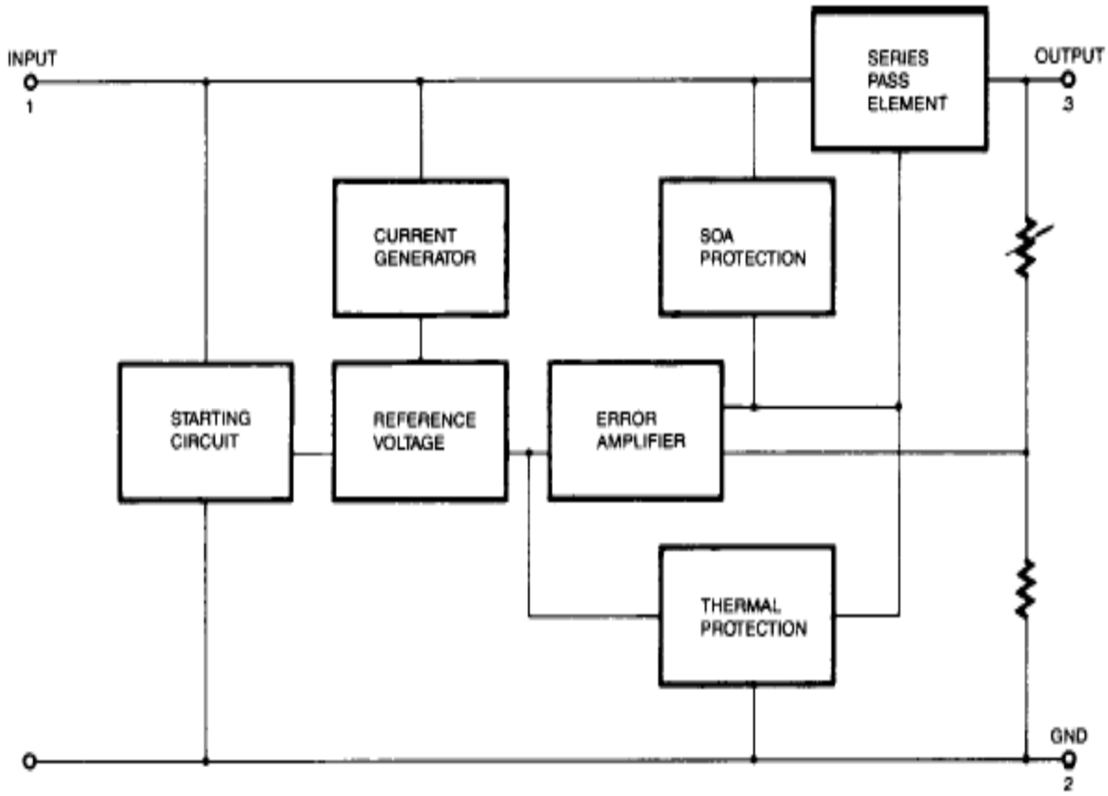


Figure Internal Block Diagram of LM 7805

CHAPTER 4
SOFTWARE DESCRIPTION

4.1 KEIL µVISION4

Kiel development tools for the 8051 Microcontroller architecture support every level of software developer from the professional applications engineer to the student just learning about embedded software development.

The CA51 compiler kit for the 8051 microcontroller family supports all 8051 derivatives including those from companies like analog devices, Atmel, Cypress Semiconductor, Dallas Semiconductor, Goal, Hynix, Infineon, Intel, OKI, Philips, Silicon Labs, SMSC, STMicroelectronics, Synopsis, TDK, Temic, Texas Instruments, and Win bond.

4.1.1 FUNCTIONS

- Nine basic data types, including 32-bit IEEE floating-point
- Flexible variable allocation with bit, data, bdata, idata, xdata, and pdata memory types
- Interrupt functions may be written in C
- Full use of the 8051 register banks
- Complete symbol and type information for source-level debugging
- Bit-addressable data objects
- Built-in interface for the RTX51 real time operating system
- Supports for dual data pointers on Atmel, AMD, Cypress, Dallas
- Semiconductor, Infineon, Philips, and Triscend microcontrollers

When Kiel software is used, the project development cycle is roughly the same as it is for any other software development project.

A project, select the target chip from the device database and configure the tool settings.

Create source file in C or assembly language.

Build an application with the project manager.

Correct errors in source files.

Test the linked application.

A51 Assembler

Source files are created by the **µ**vision2 and are passed to the A51 assembler. The assembler processes source files and create relocatable object files. The Kiel A51 macro assembler supports the complete instruction set of the 8051 and all the derivatives.

The A51 assembler is a macro assembler for the 8051-microcontroller families. It translates symbolic assembler language mnemonics into executable machine code. The A51 assembler allows the user to define each instruction in an 8051 program and is used where utmost speed, small code size and exact hardware control is essential. The assembler's macro facility save development and maintenance time since common sequences need only be developed once.

When starting a new project, simply select the microcontroller you use from the device database and the µvision IDE sets all compiler, assembler, linker, and memory options for you.

The keil µvision debugger accurately simulates on-chip peripherals (I2C, CAN, UART, SPI, interrupts, I/O ports, A/D Converters, D/A Converters, and PWM Modules) of your 8051 device. Simulation helps you understand hardware configuration and avoids time wasted on setup problems. Additionally, with simulation, you can write and test applications before target hardware is available.

When you are ready to begin testing your software application with target hardware, use the MON51, MON390, MONADI, or Flashmon51 target monitors, the ISD51 in-system Debugger, or the ULINK USB-JTAG Adapter to download and test program code on your target system.

4.2 PROLOAD

Proload is a software which accepts only hex files. Once the machine code is converted into hex code, that hex code has to be dumped into the microcontroller placed in the programmer kit and this is done by the Proload. Programmer kit contains a microcontroller has a program in it written in such a way that it accepts the hex file from the keil compiler and dumps this hex file into the microcontroller which is to be programmed. As this programmer kit requires power supply to be operated, this power supply is given from the power supply circuit designed above. It should be noted that this programmer kit contains a power supply section in the board itself but in order to switch on that power supply, a source is required. Thus this is accomplished from the power supply board with an output of 12volts or from an adapter connected 230V AC.

4.2.1 DUMPING PROCESS OF HEX FILE TO MICROCONTROLLER

1. Install the proload software in the PC.
2. Now connect the programmer kit to the PC (CPU) through serial cable.
3. Power of the programmer kit from the AC supply through adapter
4. Now place the microcontroller in the GIF socket provided in the programmer kit
5. Click on the proload icon in the PC. A window appears providing the information like hardware model, com port, device type, flash size etc. click on browse option to select the hex file to be dumped into the microcontroller and then click on “Auto program” to program the microcontroller with that particular hex file.
6. The status of the microcontroller can be seen in the small status window in the bottom of the page.
7. After this process is completed, remove the microcontroller from the programmer kit and place it in your system board. Now the system board behaves according to the program written in the microcontroller.

4.3 Embedded C

When designing software for a smaller embedded system with the 8051, it is very common place to develop the entire product using assembly code. With many projects, this is a feasible approach since the amount of code that must be generated is typically less than 8 kilobytes and is relatively simple in nature. If a hardware engineer is tasked with designing both the hardware and the software, he or she will frequently be tempted to write the software in assembly language.

The trouble with projects done with assembly code can is that they can be difficult to read and maintain, especially if they are not well commented. Additionally, the amount of code reusable from a typical assembly language project is usually very low. Use of a higher-level language like C can directly address these issues. A program written in C is easier to read than an assembly program.

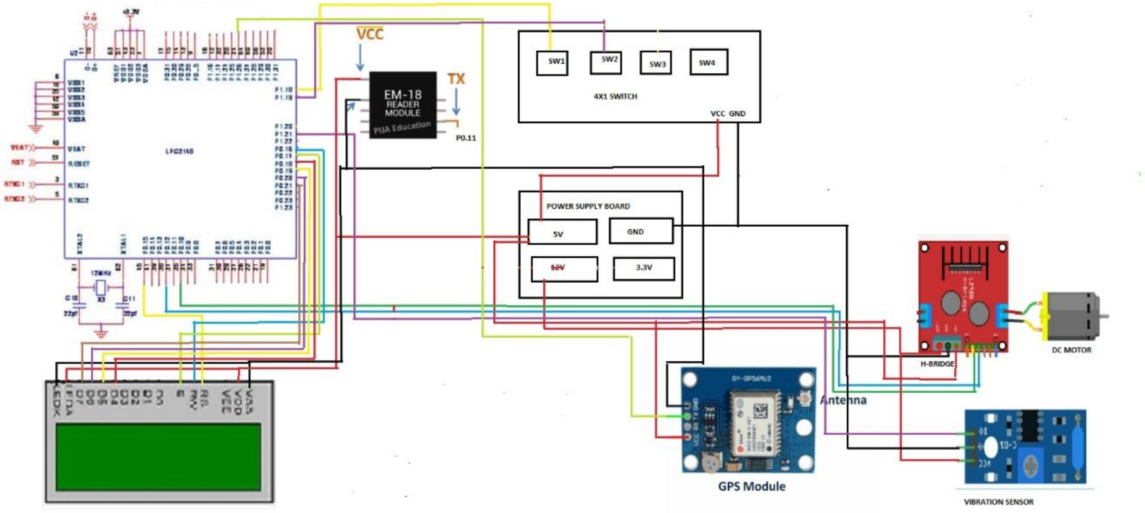
Since a C program possesses greater structure, it is easier to understand and maintain. Because of its modularity, a C program can better lend itself to reuse of code from project to project. The division of code into functions will force better structure of the software and lead to functions that can be taken from one project and used in another, thus reducing overall development time. A high order language such as C allows a developer to write code, which resembles a human's thought process more closely than does the equivalent assembly code. The developer can focus more time on designing the algorithms of the system rather than having to concentrate on their individual implementation. This will greatly reduce development time and lower debugging time since the code is more understandable.

By using a language like C, the programmer does not have to be intimately familiar with the architecture of the processor. This means that someone new to a given processor can get a project up and running quicker, since the internals and organization of the target processor do not have to be learned. Additionally, code developed in C will be more portable to other systems than code developed in assembly. Many target processors have C compilers available, which support ANSI C.

All of this is not to say that assembly language does not have its place. In fact, many embedded systems (particularly real time systems) have a combination of C and assembly code. For time critical operations, assembly code is frequently the only way to go. One of the great things about the C language is that it allows you to perform low-level manipulations of the hardware if need be, yet provides you the functionality and abstraction of a higher order language.

CHAPTER 5

INTERFACING DIAGRAM



- LPC2148 has two port namely PORT0,PORT2 with 32 pin each out of which 28 can be configured as the general purpose pins.
- PANIC SWITCH is connected to PORT1 PIN18
- SWITCH is connected to PORT1 PIN19
- VIBRATION SENSOR is connected to PORT1 PIN21
- DC MOTOR (IN1) is connected to PORT0 PIN10
- DC MOTOR (IN2) is connected to PORT0 PIN12
- LCD (RS) is connected to PORT0 PIN15
- LCD (R/W) is connected to PORT0 PIN16
- LCD (EN) is connected to PORT0 PIN17
- LCD (D4) is connected to PORT0 PIN18
- LCD (D5) is connected to PORT0 PIN19
- LCD (D6) is connected to PORT0 PIN20
- LCD (D7) is connected to PORT0 PIN21

CHAPTER 6

APPLICATION, ADVANTAGES AND DISADVANTAGES

6.1 APPLICATIONS

- Cabs – For security of passengers
- School Buses – For children's safety and Parents' Concern
- Cargo Tracking – For better control over cargo and distribution management
- Public Transport System

6.2 ADVANTAGES

- Cashless ticketing.
- Stop cheating from conductors.
- Reduces man power.
- Passengers can know there amount which is deducted during his/her journey.

6.3 DISADVANTAGES

- GPS and GSM modules are very sensitive.
- Network problem.

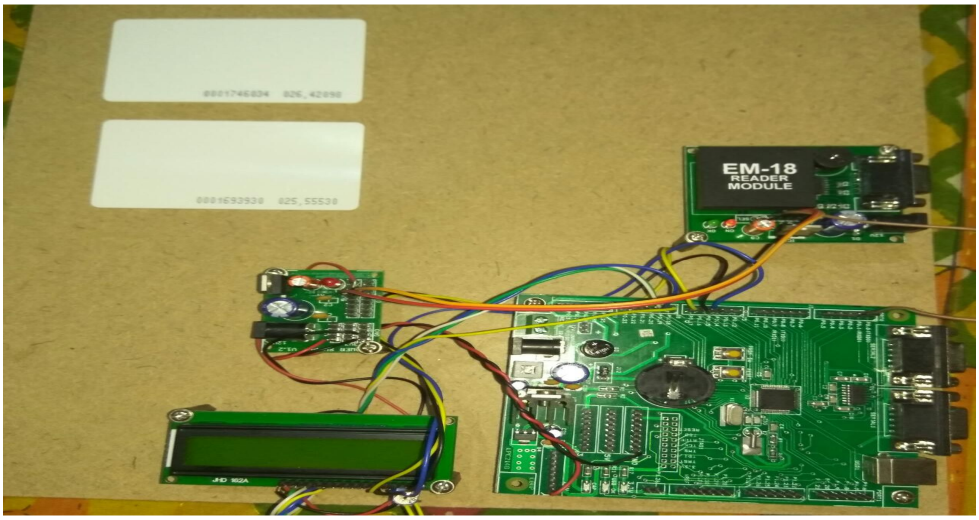
RESULTS

The code required for the interfacing and the working of the system was developed and was successfully built with no errors and no warnings.

Build Output

```
Build target 'Target 1'
linking...
Program Size: Code=27952 RO-data=1072 RW-data=596 ZI-data=444
".\clbts_final.axf" - 0 Error(s), 0 Warning(s).
```

The hardware model is shown below



CONCLUSION

The system is expected to be fully automated reliable, transparent, convenient and very effective in transport facilities. It has been implemented in many of the developed countries. Since we are one of the emerging countries, we do can make the transport system in an efficient manner. Using automatic ticket systems enables operators such as transportation authorities to save time and personal costs; fare collection can be organized much more efficiently. These systems low maintenance costs and reduced fraud-induced losses.

The whole system can also be used in railway ticketing system. The card being reusable, they are much more convenient compare to the paper based ticketing.

REFERENCES

[1] Maria Grazia GNONI, Alessandra ROLLO, Piergiuseppe TUNDO, "A smart model for urban ticketing based on RFID applications," P-0572, 2009 IEEE International.

[2] Hasan, Tangim.Islam,M. “RFID-based ticketing for Public Transport system”: IEEE Publication, Vol: 6, Pg: 459-462

[3] Global positioning system: signals, and performance by Pratap Misra, 2nd edition.

[4] DALY.P, Navstar GPS and GLONASS: global satellite navigation systems, electronics and communication Engg. July 2005.

[5] Garfinkal,S and b.ROSENBERG, RFID: Application, Security & Privacy, Addition Wesley Professional, Upper Saddle Rider, Edition 2005

[6] Hodges,S and D. Mc Farlance, RFID: Technology, Application & Impact ,2005

[7] Global Positioning System: Principles and Application by Satheesh Gopi, Tata McGraw-Hill Education,2005

[8] Vijay K Garg ,” Principles and Applications of GSM”,1998, Mc Graw Hills Publication.

[9] Muhammad Ali Mazidi,Rolin D.McKinlay,Danny Causey, ‘P89V51 Microcontroller and Embedded Systems Using Assembly and C for P89V51’,Pearson Education.2008

[10] Bo Yan, Danyu Lee; "Ticketing System Based on RFID", pp.496 -499, 2009 International Conference on Networks Security, Wireless Communications and Trusted Computing.