RFID Based Toll Plaza

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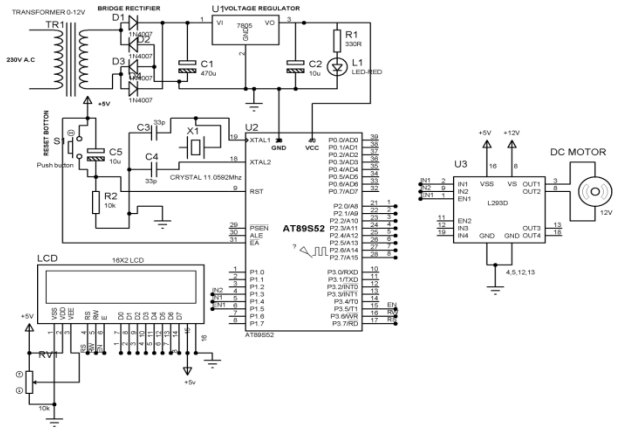
ABSTRACT

The model developed uses an active RFID technology and wireless communicator as it helps to improve data transfer between the tag and the host database over a long distance. The main objective of this module development is to implement an automated check in and checkout in Electronic Toll collection system. Electronic toll collection system (ETC) is one of the means that have been adopted by all developed countries to solve jam problem by parking charge and improve service quality. Automates toll gate system using passive Radio Frequency Identification emerges as a converging technology where time and efficiency are the matter of priority in toll collection systems of present day. In order to overcome the major issue of collision, in our project the reader is placed in a strip which is laid beneath the lane, and the tag is placed in the front side of the number plate. The object detection sensor which is placed on the side of the road detects the approach of the oncoming vehicle and intimates the stepper motor to raise the strip. Thus the reader raises to ground level and reads the information in the tag and the transaction takes place through a centralized database However the system can also be used in car alarms, warehouse inventory, security access control, personnel access & tracking without the need to swipe each item individually.

1.INTRODUCTION

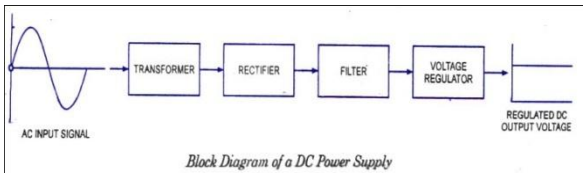
This project is aimed to develop an electronic toll gate system using RFID technology. RFID consists of a reader and a passive RFID tag. The passive transponder tag collects power from the 125 KHz magnetic field generated by the reader, gathers information about the tag ID and sends this information to the reader. The reader receives, decodes and checks the information available in its Database and Manchester code is used to send that information. An antenna is attached to the transponder. The microcontroller gets the tag ID and if the tag ID is stored in its memory then the card gets accessed and the contents are displayed on LCD. RFID reader module is also called an interrogator

2.CIRCUIT DIAGRAM:



2.1 REGULATED POWER SUPPLY

Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others. Here in our application we need a 5v DC power supply for all electronics involved in the project. This requires step down transformer, rectifier, voltage regulator, and filter circuit for generation of 5v DC power.



Block Diagram of a DC Power Supply

2.2 MICROCONTROLLER(AT89S52)

AT89S52 is a high-performance, low power CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. This device is manufactured using Atmel's high density nonvolatile memory technology and is compatible with the industry standard 80C51 instruction set and pin out. The on- chip flash allows the program memory to be reprogrammed in-system or by a conventional non-volatile memory programmer. By combining a versatile 8-bit CUP with in-system programmable flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller, which provides a highly flexible and cost effective solution to many, embedded control applications. The AT89S52 provides the following standard features: : 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry. In addition, the AT89S52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes

2.3 LCD MODULE

A liquid crystal display (LCD) is a thin, flat display device made up of any number of color or monochrome pixels arrayed in front of a light source or reflector. Each pixel consists of a column of liquid crystal molecules suspended between two transparent electrodes, and two polarizing filters, the axes of polarity of which are perpendicular to each other. Without the liquid crystals between them, light passing through one would be blocked by the other. The liquid crystal twists the polarization of light entering one filter to allow it to pass through the other.

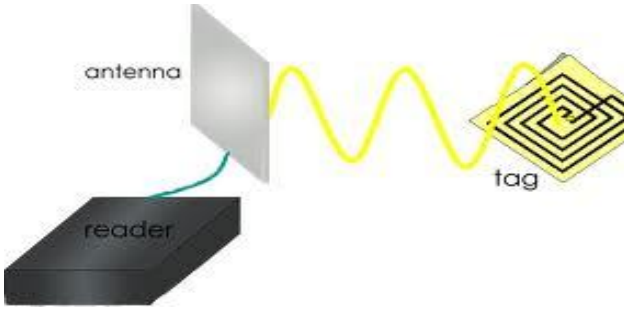
2.4 RFID READER

An RFID reader's function is to interrogate RFID tags. The means of interrogation is wireless and because the distance is relatively short; line of sight between the reader and tags is not necessary. A reader contains an RF module, which acts as both a transmitter and receiver of radio frequency signals. The transmitter consists of an oscillator to

create the carrier frequency; a modulator to impinge data commands upon this carrier signal and an amplifier to boost the signal enough to awaken the tag. The receiver has a demodulator to extract the returned data and also contains an amplifier to strengthen the signal for processing. A microprocessor forms the control unit, which employs an operating system and memory to filter and store the data. The data is now ready to be sent to the network.

2.5 RFID TAGS

The basic RFID building blocks are miniature electronic devices known as Tags which talk to Readers. The RFID tags, also known as transponder, are usually small pieces of material, typically comprising three components: an antenna, a microchip unit containing memory storage an encapsulating material. Tag are embedded or attached to an item. The Tag has memory which stores information as either read only, write once or unlimited read/write. Tags typically range in size from a postage stamp to a book, depending on read distance and features. RFID tags come in a wide variety of shapes and sizes



While passive RFID tags operate without a separate external power source and obtain operating power generated from the reader. The passive RFID relies on RF energy transferred from the reader to be tag to power the tag. Passive tags are consequently much lighter than active tags, less expensive, and offer a virtually unlimited operational lifetime.

2.6 MOTOR DRIVER

L293D is a dual H-Bridge motor driver, So with one IC we can interface two DC motors which can be controlled in both clockwise and counter clockwise direction and if you have motor with fix direction of motion the you can make use of all the four I/Os to connect up to four DC motors. L293D has output current of 600mA and peak output current of 1.2A per channel. Moreover for protection of circuit from back EMF ouput diodes are included within the IC. The output supply (VCC2) has a wide range from 4.5V to 36V, which has made L293D a best choice for DC motor driver.

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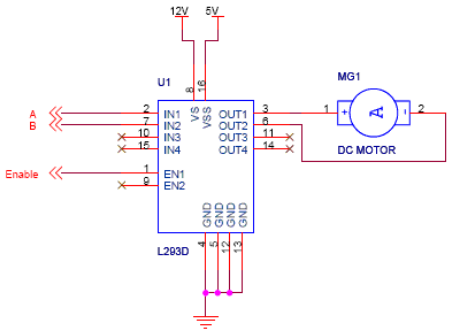

Truth Table

A	B	Description
0	0	Motor stops or Breaks
0	1	Motor Runs Anti-Cloclwise
1	0	Motor Runs Clockwise
1	1	Motor Stops or Breaks

For above truth table, the Enable has to be Set (1). Motor Power is mentioned 12V, but you can connect power according to your motors.

3.WORKING OF CIRCUIT

When we place a RFID tag over the RFID module, it reads the binary coded data which is present in the tag, the receiver receives the data in the

form of binary digits, it sends the data to MAX232 to convert it to microcontroller compatible language.Then the AT89S52 microcontroller receives the unique card ID and compares it with the card ID which is saved in the ROM of the microcontroller, if the card ID matches then the card holder details will displays VALID CARD and toll gate will open. If the card ID does not match then it displays a message showing INVALID CARD.

4.RESULT

The identification of valid authorized tags using radio frequency through sensor is done successfully. The binary data which is present in radio tags are successfully read by the RFID sensor and compared with the original data present in the microcontroller memory. For valid tags the contents of card is displayed on LCD which contains person name , amount detected from account and gate will open etc. for invalid tags a CARD INVALID message is displayed on LCD module.

5.FUTURE SCOPE

RFID is surely not able to completely replace the traditional barcode. Rather, both technologies will exist parallel to each other in the future and will be used depending on the application. The decisive benefits of an RFID system are their scanning speed, lifetime and high noise immunity. With the help of this RFID technology in future we can interface with GSM Module from this the card holder will gets a message of the amount remaining and time of transaction

6.REFERENCES

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