AUTO METRO TRAIN TO SHUTTLE BETWEEN STATIONS

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ABSTRACT

This project is designed to demonstrate the technology used in metro train movement which are used in most of the developed countries. This train is equipped with a controller,that enables the automatic running of the train from one station to another. This proposed system is an autonomous train and it eliminates the need of any driver. Whenever the train arrives at the station it stops automatically, as sensed by an RFID Module. Then the door is opens automatically so that the passengers can go inside the train. It is also equipped with a passenger counting section, which counts the number of passengers leaving and entering the train. The train incorporates a buzzer to alert the passengers before closing the door and also warn them before staring.
Key words: Micro controller, RFID Module, DC Motor, Buzzer,

INTRODUCTION

The automated system for a metro rail is an integrated application which make displays the relevant station information when the train reaches a particular station. This embedded application mainly focuses on overcoming loop holes in the existing system. It is optimized to meet the cost and power consumption requirements.

Few disadvantages of the existing system are:

- Constant human intervention.
- High cost.
- More Manpower is required.
- Installation and integration is time consuming.

The proposed system overcomes the above disadvantages and has the below mentioned merits:

- less manpower.
- Display unit is provided
- Automatic closing of door is provided after the prescribed number of persons are entered.
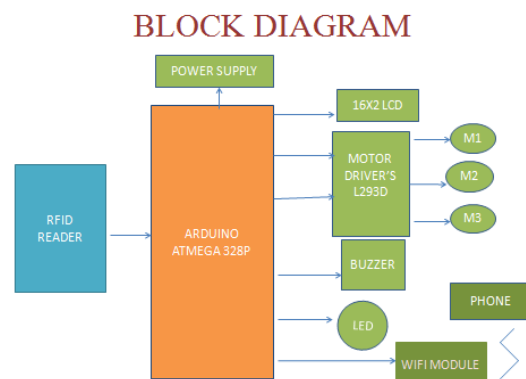
BLOCK DIAGRAM

Fig 1: Block Diagram

HARDWARE MODULES

- ATmega328
- RFID
- DC Motors
- LCD
- Buzzer

ARDUINOBOARD (ATmega328)

The Arduino Uno has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer.
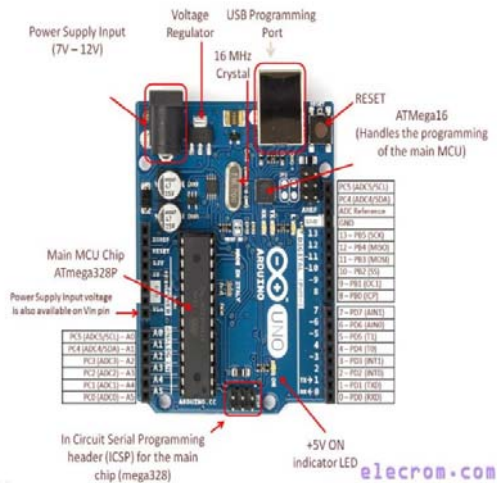
The ATmega328 has 32 KB (with 0.5 KB used for the bootloader). It also has 2 KB of SRAM and 1 KB of EEPROM (which can be read and written with the EEPROM library). It has 14 digital pins, which can be used as an input or output, using pinmode, digitalwrite, and digitalread functions. Rather than requiring a physical press of the reset button before an upload, the Arduino Uno is designed in a way that allows it to be reset by software running on a connected computer. One of the hardware flow control lines (DTR) of the ATmega8U2/16U2 is connected to the reset line of the ATmega328 via a 100 nanofarad capacitor. When this line is asserted (taken low), the reset line drops long enough to reset the chip.

RFID:

Radio-frequency identification (RFID) is an automatic identification method, relying on storing and remotely retrieving data using devices called RFID tags or transponders. An RFID tag is an object that can be applied to or incorporated into a product, animal, or person for the purpose of identification using radio waves. Some tags can be read from several meters away and beyond the line of sight of the reader. RFID tags come in three general varieties: Passive, Active and passive or battery-assisted.

Radio Frequency Identification (RFID) involves contactless reading and writing of data into an RFID tag's nonvolatile memory through an RF signal. An RFID system consists of an RFID reader and an RFID tag. The reader emits an RF signal and data is exchanged when the tagcomes in proximity to the reader signal. The RFID tag derives its power from the RF reader signal and does not require a battery or external power source.

The TK5530 is a complete transponder, which implements all important functions for immobilizer and identification systems.
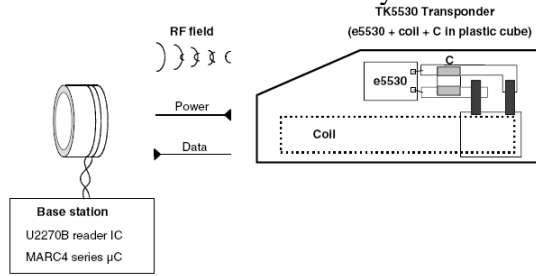

The antenna consists of a coil and a capacitor for tuning the circuit to the nominal carrier frequency of 125 kHz. The coil has a ferrite-core for improving the readout distance.
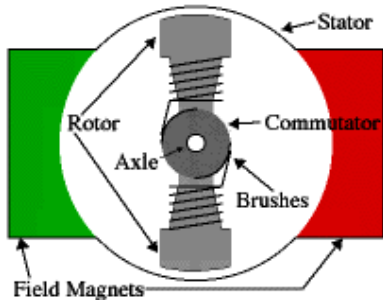
DC MOTORS:

The brushed DC motor is one of the earliest motor designs. Today, it is the motor of choice in the majority of variable speed and torque control applications. In most DC motors, several sets of windings or permanent magnets are present to smooth out the motion. Easy to control speed Controlling the speed of a brushed DC motor is simple. The higher the armature voltage, the faster the rotation. This relationship is linear to the motor's maximum speed. In a brushed DC motor, torque control is also simple, since output torque is proportional to current. If you limit the current, you have just limited the torque which the motor can achieve.

An H-bridge is an electronic circuit which enables DC electric motors to be run forwards or backwards. These circuits are often used in robotics. H-bridges are available as integrated circuits, or can be built from discrete components.
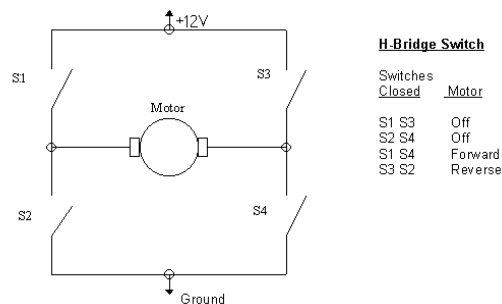
The two basic states of a H-bridge. The term "H-bridge" is derived from the typical graphical representation of such a circuit. An H-bridge is built with four switches (solid-state or

mechanical). When the switches S1 and S4 (according to the first figure) are closed (and S2 and S3 are open) a positive voltage will be applied across the motor. By opening S1 and S4 switches and closing S2 and S3 switches, this voltage is reversed, allowing reverse operation of the motor. Using the nomenclature above, the switches S1 and S2 should never be closed at the same time, as this would cause a short circuit on the input voltage source. The same applies to the switches S3 and S4. This condition is known as shoot-through.

In any electric motor, operation is based on simple electromagnetism. A current-carrying conductor generates a magnetic field; when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field. As you are well aware of from playing with magnets as a kid, opposite (North and South) polarities attract, while like polarities (North and North, South and South) repel. The internal configuration of a DC motor is designed to harness the magnetic interaction between a current carrying conductor and an external magnetic field to generate rotational motion. Let's start by looking at a simple 2-pole DC electric motor (here red represents a magnet or winding with a "North" polarization, while green represents a magnet or winding with a "South" polarization).

LIQUID CRYSTAL DISPLAY:

LCD stands for Liquid Crystal Display. LCD is finding wide spread use replacing LEDs (seven segment LEDs or other multi segment LEDs) because of the 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 a few characters.

3. Incorporation of a refreshing controller into the LCD, thereby relieving the CPU of the task of refreshing the LCD. In contrast, the LED must be refreshed by the CPU to keep displaying the data.

4. Ease of programming for characters and graphics.

These components are "specialized" for being used with the microcontrollers, which means that they cannot be activated by standard IC circuits. They are used for writing different messages on a miniature LCD.

## SOFTWARE MODULES
- Arduino IDE
- Android Studio(Mobile App)

Arduino IDE

Ardunio is an open-source prototyping platform based on easy-to-use hardware and software. The Ardunio Integrated Development Environment - or Ardunio Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Ardunio and Genuino hardware to upload programs and communicate with them.

Android Studio

Android is a software platform and operating system for mobile devices, based on the Linux kernel, and developed by Google and later the Open Handset Alliance. It allows developers to write managed code in the Java language, controlling the device via Google-developed Java libraries. The unveiling of the Android platform on 5 November 2007 was announced with the founding of the Open Handset Alliance, an association of 48 hardware, software, and telecom companies devoted to advancing open standards for mobile devices.
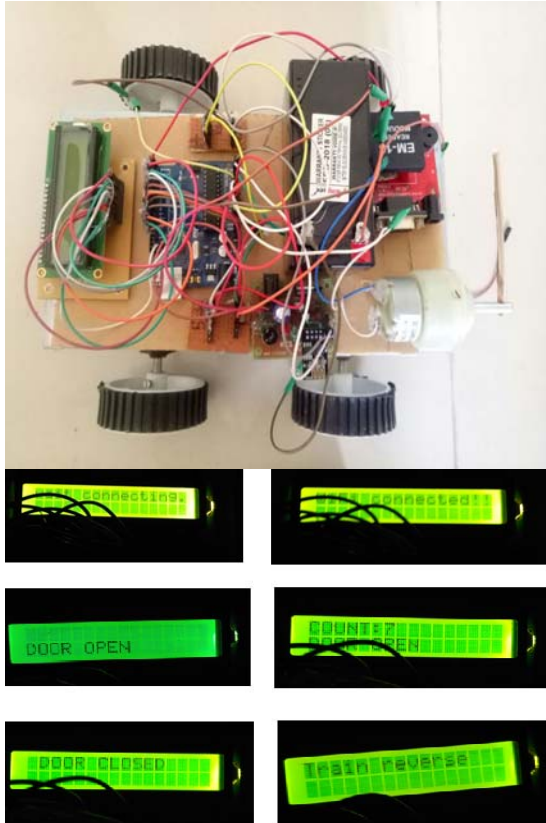
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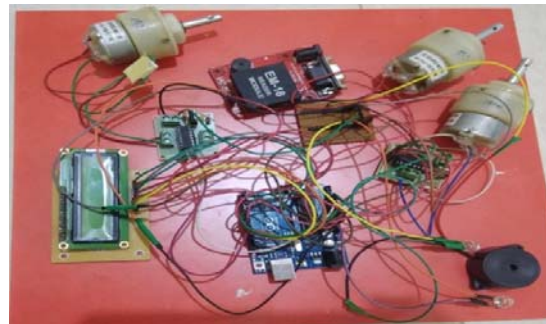
Fig 6: Results displayed in LCD

CONCLUSION

The Rising population, unprecedented growth of personal vehicles and extreme traffic congestion are some of the key problems the transport network of the country faces.

Metro rail, as a mass rapid transit system was designed to cater the transportation needs of a large population keeping in mind the issue of decongestion.

FUTURE SCOPE

This project helps us to control train without a driver and the stations are shown on the LCD so the passenger doesn't have any type of difficulty.

This project will lead to increase in technological trends & this will help the people in many ways.

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