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ARTIFICIAL INTELLIGENT DENSITY AND EMERGENCY VEHICLE ENTRY BASED TRAFFIC LIGHT CONTROL SYSTEM USING ARDUINO MEGA

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ABSTARCT

In our project it consists of two applications like emergency and density-based traffic control system. Our idea of setting a traffic light is as follows. Suppose there are several cars standing before a crossing, if an ambulance is on the way; normal time-based traffic system won't allow the vehicles to pass.

It will permit the vehicle to move after the time completes. This is not suitable system for emergency situations. To overcome these difficulties, we designed our project named "INTELLIGENT AND DENSITY BASED TRAFFIC LIGHT CONTROL SYSTEM". The traffic light system of our style is constructed by using a very simple technique. All different types of emergency vehicles wherever it required we must install a small low power transmitter. The carrier frequency of all the transmitters will be the same. To transmit the code through carrier wave ISM (Industrial Scientific & Medicine) based transmitter & receiver module is used. It generates carrier wave at 433.92MHz. At transmitter side HT12E used as encoder to generate operation codes and these codes are transmitted through ISM based transmitter. In the receiver side to receive the operation code, ISM based receiver is used. The received data are decoded by ARDUINO MEGA controller.

This bit pattern is used as input to the micro controller. The output ports are connected to the traffic light source. From this we can control the other side traffic and give priority to the emergency vehicle. After the time delay the original traffic time sequence will be followed. In density traffic light control, IR is fixed on four sides of the main road and traffic movements of the vehicle are sensed by IR sensor. In This system microcontroller is interfaced with sensors, which changes the junction timing automatically to accommodate movement of vehicles smoothly avoiding unnecessary waiting time at the junction.

The IR sensor is used in this project which is kept in line-of-sight configuration across the loads to detect the density during the traffic signal. The density of vehicles is measured in two zones: medium, high based on which timings are allotted accordingly. Depending upon the density of the traffic the green signal is given for heavy traffic road and the road is allowed for vehicle movement after the flow is descended the yellow light is given to stop the movement. The next thick traffic density is ascertained by sensor using IR and the route is opened for movement. The first flow of traffic is closed by red light.

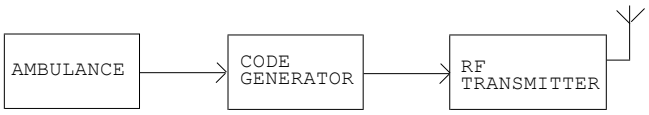
This system will be useful for all major cities to control the traffic intelligently.

KEY WORDS:

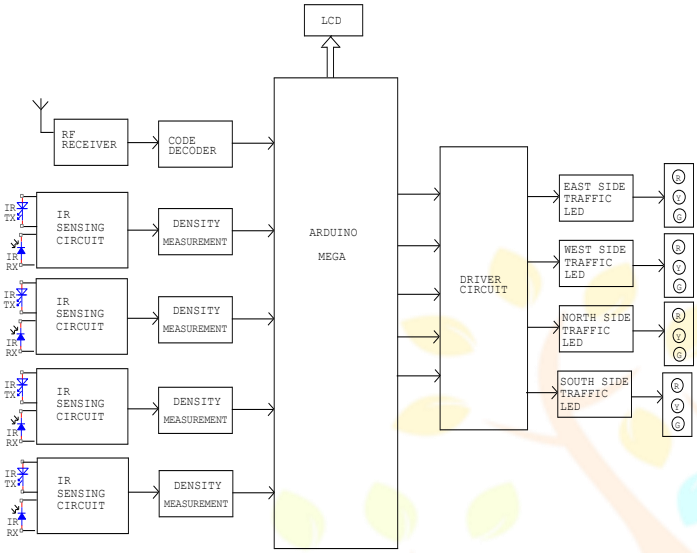
Arduino Mega (Atmega1280), ISM, HT12E, IR Sensor, Code Generator, LCD, LED, RF Transmitter & RF Receiver.

BLOCK DIAGRAM

TRANSMITTER



RECEIVER



BLOCK DIAGRAM DESCRIPTION

ARDUINO MEGA

The ARDUINO Mega is a microcontroller board based on the ATmega1280 (datasheet). It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs

RF TRANSMITTER

This radio transmitter is specially designed for smart house radio network. It is an ideal product for local network. It may be used for appliances like heat control, light control

RF RECEIVER

The RF transmitter TX 433.92Mhz is an AM/ASK transmitter. It is operated on 5V to 12V single power supply. The OOK type modulation is carried on the send the data. The power consumption is very low.

IR SENSOR

The IR Sensor Module or infrared (IR) sensor is a basic and most popular sensor in electronics. It is used in wireless technology like remote controlling functions and detection of surrounding objects/ obstacles

ULN DRIVER

The ULN2003 is comprised of seven high voltage, high current NPN Darlington transistor pairs. All units feature common emitter, open collector outputs. To maximize their effectiveness, these units

LCD DISPLAY

LCD is mainly used for displaying the information. Here we are using 2x16 LCD. Operation of the LCD is the declining prices of LCDs. The ability to display numbers, characters, and graphics. This contrasts with LEDs, which are limited to numbers and characters

LED

A light-emitting diode is like a standard diode in the fact that electrical current only flows in one direction

BATTERY

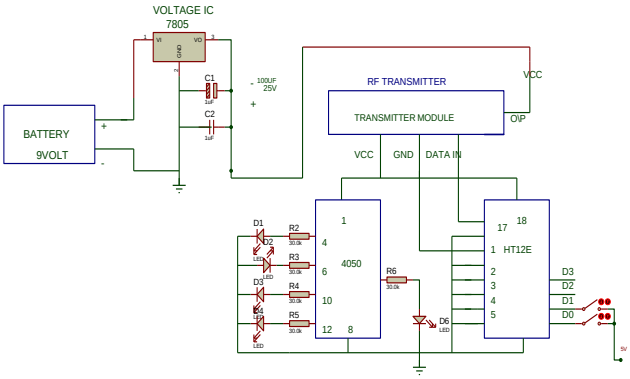
A rechargeable battery (also known as a storage battery) is a group of one or more secondary cells Rechargeable batteries use electrochemical reactions that are electrically reversible.

POWER SUPPLY

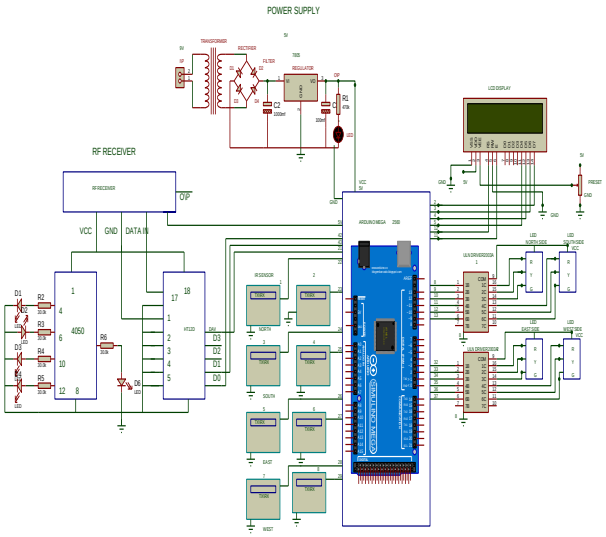
Most electronic circuits require DC voltage sources or power supplies. If the electronic device is to be portable, then one or more batteries is usually needed to provide the DC voltage required by electronic circuits. But batteries have a limited life span and cannot be recharged.

CIRCUIT DIAGRAM

TRANSMITTER



RECEIVER



CIRCUIT DIAGRAM DESCRIPTION

ARDUINO MEGA

The ARDUINO Mega is a microcontroller board based on the ATmega1280 (datasheet). It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

POWER

The ARDUINO Mega can be powered via the USB connection or with an external power supply. The power source is selected automatically.

External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the GND and V_{in} pin headers of the POWER connector.

The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

The power pins are as follows:

VIN:

The input voltage to the ARDUINO board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.

5V:

The regulated power supply used to power the microcontroller and other components on the board. This can come either from VIN via an on-board regulator or be supplied by USB or another regulated 5V supply.

3V3:

A 3.3-volt supply generated by the on-board FTDI chip. Maximum current draw is 50 MA.
GND. Ground pins.

MEMORY

The ATmega1280 has 128 KB of flash memory for storing code (of which 4 KB is used for the boot loader), 8 KB of SRAM and 4 KB of EEPROM (which can be read and written with the EEPROM library).

INPUT AND OUTPUT

Each of the 54 digital pins on the Mega can be used as an input or output, using pin Mode (), digital Write(), and digital Read() functions. They operate at 5 volts. Each pin can provide or receive a maximum of 40 MA And has an internal pull-up resistor (disconnected by default) of 20-50 KOHMS. In addition, some pins have specialized functions

Serial: 0 (RX) and 1 (TX); Serial 1: 19 (RX) and 18 (TX); Serial 2: 17 (RX) and 16 (TX); Serial 3: 15 (RX) and 14 (TX). Used to receive (RX) and transmit (TX) TTL serial data. Pins 0 and 1 are also connected to the corresponding pins of the FTDI USB-to-TTL Serial chip.

External Interrupts: 2 (interrupt 0), 3 (interrupt 1), 18 (interrupt 5), 19 (interrupt 4), 20 (interrupt 3), and 21 (interrupt 2). These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. See the attachInterrupt() function for details.

PWM: 2 to 13 and 44 to 46. Provide 8-bit PWM output with the analogWrite() function.

SPI: 50 (MISO), 51 (MOSI), 52 (SCK), 53 (SS). These pins support SPI communication, which, although provided by the underlying hardware, is not currently included in the Arduino language. The SPI pins are also broken out on the ICSP header, which is physically compatible with the Duemilanove and Diecimila.

LED: 13. There is a built-in LED connected to digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.

I^2C: 20 (SDA) and 21 (SCL). Support I^2C (TWI) communication using the Wire library (documentation on the Wiring website). Note that these pins are not in the same location as the I^2C pins on the Duemilanove or Diecimila.

The Mega has 16 analog inputs, each of which provide 10 bits of resolution (i.e. 1024 different values). By default they measure from ground to 5 volts, though is it possible to change the upper end of their range using the AREF pin and analogReference() function.

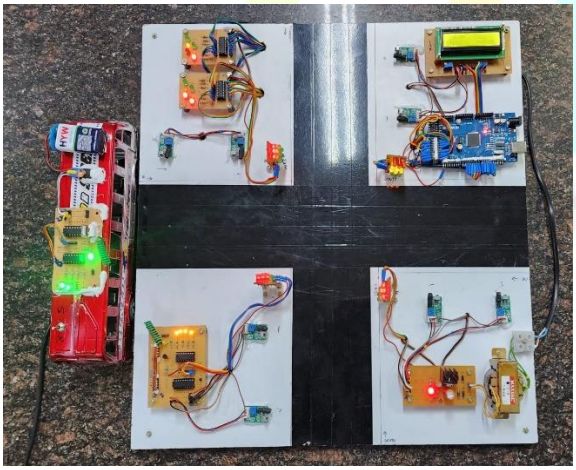
There are a couple of other pins on the board AREF. Reference voltage for the analog inputs. Used with analogReference().

Reset. Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board.

WORKING OF THIS PROJECT

The mains voltage ac 230v is step down to 9V volt, using transformer. The low value secondary voltage is fed to the rectifier is formed using four no. of IN 4007. For first half cycle, Diodes D1 & D2 come to action and next half cycle diode D3 & D4 come to action, finally unidirectional dc supply is fed to the filter capacitor. The charging & discharging property of capacitor provide pure smooth dc is nearly peak value of the secondary voltage. The pure DC supply is fed to regulator IC's input terminal. Due to the regulator action, finally, regulated +5V and -5V are available at output terminals here transmitter is a bus model the power supply of 9v battery and ht12e encoder function to transmit a data and the receiver is traffic kit there are 8 IR sensor using to sense a vehicle and the sensor are fixed at 4 system north south east west and the measuring the system and rf receives the data from the bus route and indicated the led and r, y, g these indications this process is programmed by ARDUINO MEGA microcontroller and the driver circuit 2003a is on a led to the current condition is traffic led denotes the emergency time to move on a vehicle without delay here bus is ambulance comes 4 direction that time the changes a traffic light and these working are displaying the LCD.

HARDWARE WORKING MODEL



SALIENT FEATURES

1. Helpful in Heavy Traffic.
2. R, Y, G changes during the working condition is highly helpful in blocking the traffic at the time of emergency.

CONCLUSION

This project, "**ARTIFICIAL INTELLIGENT DENSITY AND EMERGENCY VEHICLE ENTRY BASED TRAFFIC LIGHT CONTROL SYSTEM USING ARDUINO MEGA"** getting the parameter envisaged during the conceptual stage. During the design, as well as during the construction, greater care has been put in to avoid hiccups at the final stage. The PCB layouts were prepared with at most care to incorporate the circuits in a modular manner. The circuit is made as simple as to our knowledge. Also, components and cost. It was a very interesting process of developing the prototype, stage by stage and testing the same. We must go through large pages of data related to the components etc. It was a useful and fulfilling assignment to get the project completed in time. This gave as a sense of satisfaction and accomplishment

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