Electromagnetic Launcher

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Abstract - In this project, we are using electromagnetic properties of the conducting material. The aim of this project is to launch the projectile in space without use of fuel. We are designing the circuitry by using 8951-4k flash as the coding and decoding devices. In our experiment, we are launching a projectile by using a coil gun in non conventional so that it will become fuel efficient
Keywords: Microcontroller 8951, IC HT12D

I. INTRODUCTION

In past 40 years, mankind has ventured into space using well-established rocket technology involving liquid fuel and/or solid propellants. This approach has advantage for astronauts and other payloads that rocket starts, slowly from the surface of the Earth with its full fuel load and as thy fuel is burned off, the altitude and are thermal loads, this provides relatively modest acceleration. Offsetting these remarkable success is the very high cost of burning chemical fuel with a modest efficiency in a rocket engine to get out of the Earth's gravitational field. Present estimates are that it costs more that $20,000 to get one kilogram of material into orbit. Unless alternatives can be found, it seems likely that mankind's ventures into space will be limited to a few adventures that can only be undertaken by wealthy nations. Hence to overcome this drawbacks, and reduce the cost of the projection, we decided to use the electromagnetic properties to launch the space shuttle as proposed in May 2007, Dallas IEEE paper. In this project we are going to deal with the electromagnetic properties of the conducting material to produce the desired outcome with full safety and efficiency..

II. SYSTEM ARCHITECTURE

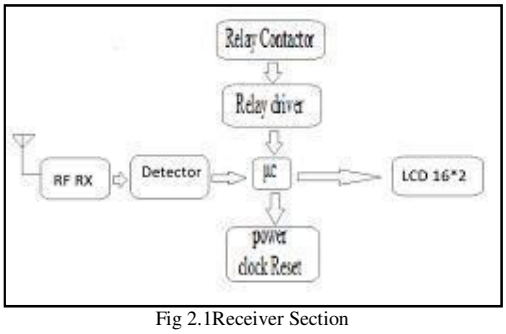

Fig 2.1Receiver Section

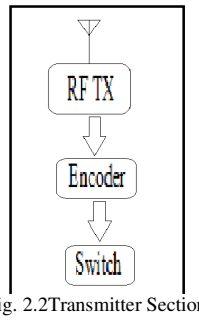

Fig. 2.2Transmitter Section

In main structure the current conducting coil connected to the relay contactor. Relay contactor is used to pass the current in the coils. The replay contactor is connected to Replay Driver which is used to drive the relay contactor. Now, the microprocessor µp 8951 is connected to the Replay driver, decoder and LCD display(16×2). Power supply is provided to the microprocessor. RF Receiver is connected to the decoder circuitry. RE receiver consist of an antenna. This antenna receives the signal from the remote which controls the microprocessor. In this, microprocessor is the major component which controls all the operations.

III. CIRCUIT DIAGRAM AND EXPLANATION

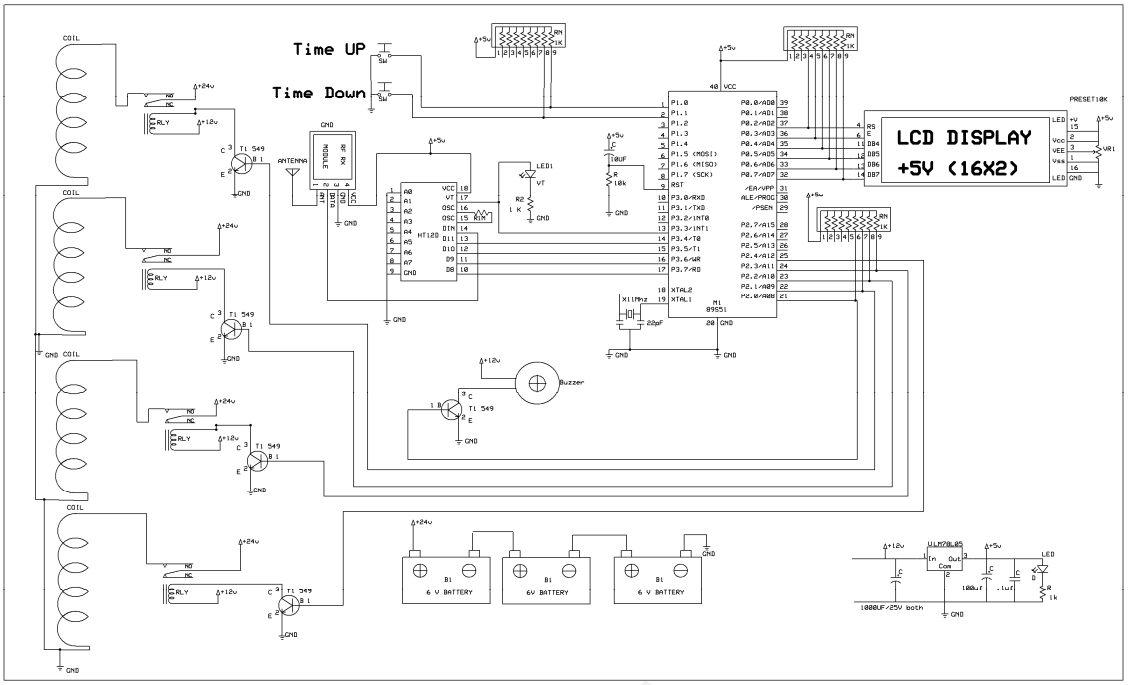

Fig 3.1 Receiver Section

In remote receiver section we use IC 8951. This IC is same as that of IC 8951, only difference is IC 8951 has 4KB flash memory. There are two types of IC 8951, IC 89C51 and IC 89S51. Here "C" is for CMOS which requires 12v supply and "S" stands for ISP, In System Program, which requires 5v supply. Hence, we use IC 89S51. For a controller 3 things are needed Power supply, clock and reset. IC89S51 is 40 pin IC. Pin 40 is connected to VCC, 5V supply. Pin 20 is connected to the ground. Pin 18, Pin 19 are oscillator pin. Crystal oscillator of 11.0592MHz is connected to it. It contains two 22pf capacitors, which helps crystal to start the oscillations. Pin 9 is a Power ON Reset pin. It contains one resistor and one capacitor. Power ON reset pin means as power supply switched ON the controller gets a pulse and it gets reset. There are four ports in IC 89S51, Potr0, Port1,Port2, Port3. All ports are 8 pin bidirectional ports.

- Port 0

  Port 0 is connected to the LCD display for 16×2. The VCC of 5V in given to the LCD display. There are three control pins Data/Command, Read/Write, Enable,. There are 4 data pins as D4,D5,D6,D7. These pins send 4 bit data two times and 8 bit data gets displayed.
- Port 1

  Port 1 is kept open for any further addition.
- Port 2

  Port 2 is used to control the output of the controller. Port 2 is connected to the Relay driver, which is connected to the NPN transistor(NPN BC 549). Collector of each transistor are connected together and given to the relay contactor. 12V supply is given to the electromagnetic relay contactor. There are two pins, No ieNormally open, which goes to coil. Other pin is common to ground. In this arrangement current limiting resistor of 1k is used.
- Port 3

  Port 3 is very important in receiving the transmitted signal. RF receiver is a 4 pin device. one pin is connected to the antenna, second to the supply, third to the ground and fourth to the Data. As this receiver data is in encoded form, to decode this encoded data we need decoder IC HT12D. In this there are address pins A0-A7 which all are grounded. The data pins D0, D1, D2, D3 are connected to the port 3. DataIN pin of IC HT12D is connected to the RF receivers data pin. Oscillator pin contains resister of 47KΩ. VT pin stands for Valid Transmission. If signal is valid, without any noise then this pin gets high. For indication this, a LED is used. If transmitter and receiver in range, if communication is taking place then only the LED glows.

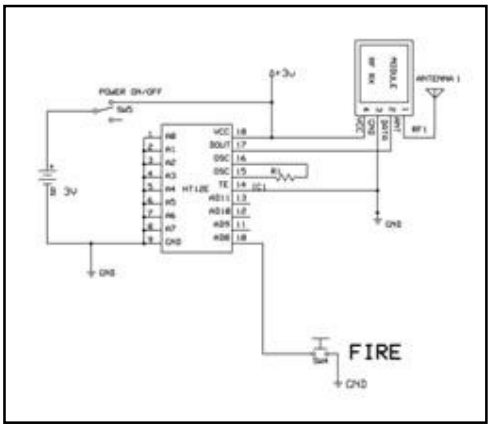

Fig 3.2Transmitter Section

Remote transmitter section contains RF Transmitter Module. It works on 433 MHz carrier frequency with ASK(Amplitude Shift Keying) Modulation.

RF transmitter contains 4 pins. A Helical antenna of 5-15cm is connected to the pin1, supply of 3v is connected to the pin2, pin3 is connected to the ground and pin4 is a Dada pin. Data pin is connected to the encoder IC HT12E, here HT stand for Holtek and E for encoder.

In this IC there are 8 address lines A0-A7 which are connected to the ground as we are not dealing with addresses.

There are 4 data pins, D0,D1,D2,D3. This data pins are connected to the buttons like UP, DOWN, FIRE,FIRE to do the respected operations.

(TE) ¯ is transmit enable pin, when it is low it transmit the signal, so it is grounded.

OSC is oscillator pin. Resistor of 1MΩ is connected. Data out pin goes to RF Transmitter data pin.

Vcc pin is provided with 2v supply.

The data is in train of pulses in which 8 bits are address and 4 bits are data.

IV. CONCLUSION

In this project the projectile is launched in the space without using any liquid or solid fuel. We used electromagnetic properties of the material i.e. when small current is passed through the current carrying coil it produces magnetic field around it. This field attracts the projectile in upward direction and make the projectile in motion. This project is based on Electromagnetic & RF Circuitry. Except changing the angle of projection whole project is automatic in which all the devices are controlled by microcontroller 89S51. Hence instead of burning non conventional solid or liquid fuel we used electricity to launch the projectile in the space.

V.RESULT

Hence after initial setup the metallic projectile is launched. Current in each coil is for 25 mS. After taking few readings it is noted that the projectile covers the distance up to 6 meter, with maximum speed of 5 m/s.

VI.REFERENCE

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