Automatic Vehicle Speed Controlling Device by using RF (Radio Frequency) Transmitter and Receiver, Microcontroller System

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Abstract— In this paper we have discussed about automatic vehicle speed controlling device by RF transmitter and receiver system. Nowadays number of vehicles are running on roads. In many areas such as cities, highways and some speed restricted zones such as hospitals, schools etc., where we need to slower the speed of our vehicles. So, this device will automatically lowers the speed of vehicles but only for cars, trucks etc. whenever vehicles enter such types of zone.
Keywords: Transmitter and Receiver, Microcontroller System, RF (Radio Frequency), Automatic Vehicle Speed Controlling Device

I. INTRODUCTION

We have discussed about speed controlling device which will automatically control speed of vehicle in speed restricted areas such as hospitals, schools, old age home etc. This device will be connected to automobile braking system using RF (radio frequency) controller, this will control the vehicle speed within specified limit.

About RF(Radio Frequency) transmitter and receiver module:

433.92MHz ASK Transmitter and Reciver Module to transmit and receive data with dazzling 500 meter range in open space. The reciever is an ASK Hybrid reciever module. It is a effective low cost solution for using 433/434 MHz. The Transmitter is an ASK hybrid transmitter module. It is designed by the saw resonator, with an effective low cost, small size and simple to use for designing.
Low power consumption.
Easy for application.
Range in open space(stdandard condition):500 Meters(with antenna)/100-200 Meters(without antenna).

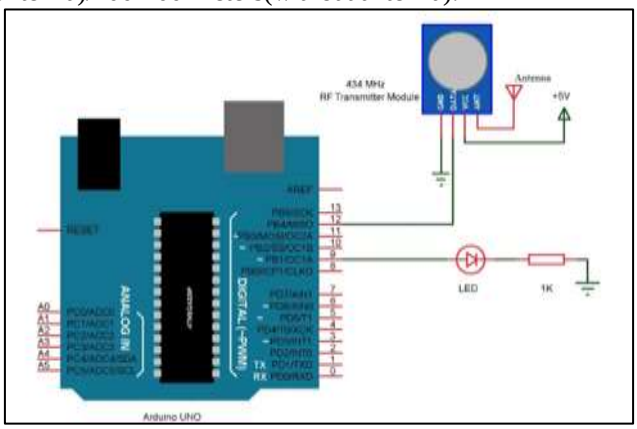

Fig 1: Connection of RF Transmitter module to Arduino UNO

A. *Transmitter Part*

- Arduino UNO (or any other Arduino board)
- 434 MHz Transmitter Module (or 315 MHz Module)
- LED
- 1 KΩ Resistor
- Prototyping board (bread board)
- Connecting wires
- Power supply (Adapter or battery)

The transmitter module used is RF ASK 433.92MHz
Frequency range: 432.92 MHz
Supply voltage: 3V~12V
Output Power: 4~12 dBm
Standard Operating Voltage: 5V

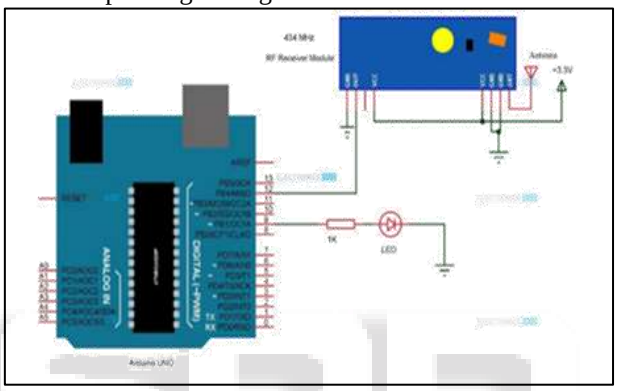

Fig. 2: Connection of RF Receiver to Arduino UNO

B. *Receiver Part*

- Arduino UNO (or any other Arduino board)
- 434 MHz Receiver Module (or 315 MHz Module)
- LED
- 1 KΩ Resistor
- Prototyping board (bread board)
- Connecting wires
- Power supply (adapter or battery)
- RF Module

The receiver module used is RF ASK 433.92MHz
Receiver frequency: 433.92 MHz
Typical Sensitivity: 105dBm
Supply Voltage: 3V~12V
Supply Current: 3.5mA
Standard Operating Voltage: 5V

II. WORKING

In this paper, we have discussed about speed controlling device in vehicle. When vehicle enters such zones the warning board will have RF (radio frequency) transmitter module which is connected to microcontroller. This will transmit signal which will be received by alarm system present in the vehicles (RF receiver module) which is being interfaced by a microcontroller. After this a led will blink or a buzzer will beep. After this, vehicle enters speed restriction zone which is generally of 500 meter radius. Then another RF transmitter module which is situated at center of zone, will transmit RF signal which is received by receiving block (RF

receiver module). This module is connected to microcontroller which is further connected to motor which is connected to worm gear on plunger of servo cylinder in braking system. Plunger will move slowly and speed will decrease.

III. BLOCK DIAGRAM:

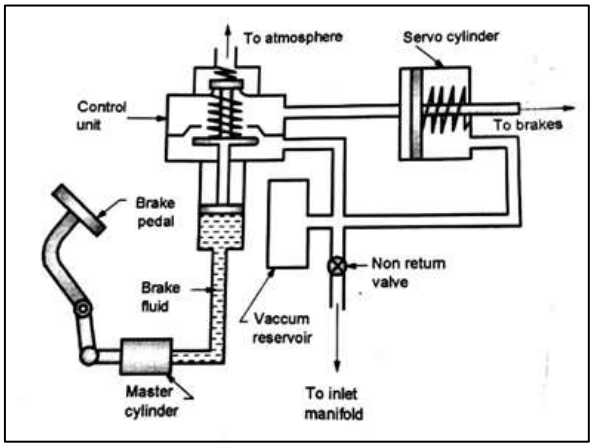

Fig. 3: Actual braking system of automobile

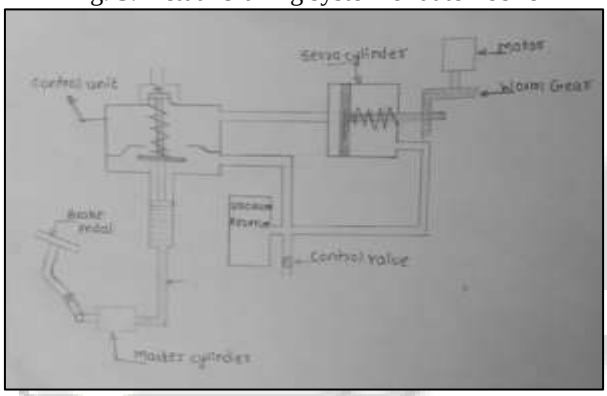

Fig. 4: Braking system after installation of speed control device

Actual force required to slow down vehicle:
Given data:
Motor(RPM)=3 RPM
Torque=1568 N-mm
Speed of vehicle=60 Km/Hr
=16.67m/s
Mass of vehicle=1600Kg
E=(1/2)×m×(v^2)
= (1/2)×(1600)×(16.67^2)
E=222.31×(10^3) J
Force Required(F)=w/s
=(222.31×(10^3))/50
F=4.4 KN
Force applied by motor to slow down vehicle:
T=1568.7N-mm
L=length of plunger=6mm
F=(T/(LsinΘ))
=(1568/(6×sin90))
F=2.61 KN
So, vehicle will be slowed down.

IV. ADVANTAGES

- Accidents will be reduced
- Moderate cost

V. DISADVANTAGES

- Some damage may happen to brake shoe.

VI. CONCLUSION

We have discussed in our paper that speed will be automatically controlled within specified limit in specific range leading to reduction in accident.

REFERENCES

[1] Automobile engineering by Kirpal singh.
[2] Arduino Projects: The Complete Beginner's Guide - Explain Step by Step to Arduino Programming by Sivakumar munusami.

