# INTELLIGENT TRAIN ENGINE
# FOR THE FASTEST NEW AGE TECHNOLOGY

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**ABSTRACT*:* This paper describes the design of the intelligent train Engine. These types of engine have capacity to control the train speed in different steps. It is based on the smart timer IC555, IR sensor TSOP1738, MC89C51 the idea is whenever any engine observes a red signal on its track it will start decreasing its speed gradually and stops automatically at some distance from the signal pole. After then when it get green signal the driver can manually start the train and go on. In the mean time when train has not stopped yet and a red signal becomes green then it crosses the signal pole with low speed and then driver can slowly increase the speed.**

**KEYWORDS: Timer IC555, IR sensor TSOP1738, MC89C51, current driver chip ULN2003A and all voltage regulator ICs(78xx series).**

## I. INTRODUCTION

We know that the railway network of India is the biggest in south Asia and perhaps the most complicated in all over the world. There are so many different types of train local, fast, superfast, passenger, good.etc and their so many multiple routs.   Although the time table is perfect it is not at all possible to maintain it and that's why the train accidents are becoming more and more usual.

 So why not we add a kind to intelligence to the train engines itself so that is tries to avoid accidents. Both the transmitter and receiver are of RF type with minimum range of 2 km so that train can get enough time to decrease its speed and stop before the signal pole with minimum swapping distance of 100-200m.

## II. DEMONSTRACTION MODEL

The train engine runs on 24 volt DC motor so that we can easily vary its speed by varying applied voltage. The switching voltage is applied in step of 18V, 15V, 12V, and 9V (minimum speed). The 230 VAC is step down to 24 VAC by 12-0-12, 2 ampere step down transformer. As shown in fig. this 24 DAC line runs parallel with track at the top of the train. Movable tapping are taken from this line and fed to the internal circuit of engine, senses the signals transmitted by IR transmitter attached to signal pole. Train track is straight and 20 ft long. Signal pole is placed at the end of track and train starts from farther end.
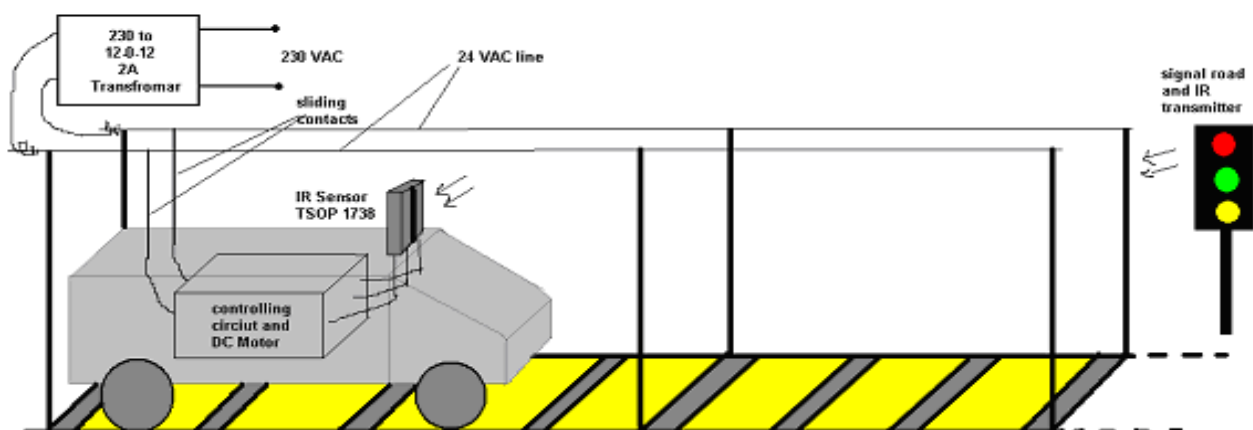


**Figure-1 model of train engine**

## III. NEED

This project is mostly useful for human life and decreasing the ratio of accidents due to the traffic signals. Some points are given below for decreasing the ratio of accidents due to

1.  Fog in winter.
2.  Misunderstanding by driver of trains.
3.  Suddenly changing in traffic lights.
4.  Some technical problems.
5.  Controlling system.
6.  Timing of signals.

## IV. USED DEVICES

There are only two major devices are used in process.

### 1) TRANSMITTER

The transmitter is housed in signal pole and it is activated only when red light is on. The heart of the circuit is IC555. The

main component of the circuit is only IC555. Both ICs are connected in astable mode.

The frequency of  U2 is 0.5 Hz and U1 is 38 KHz. This is decided by RC components connected with it.
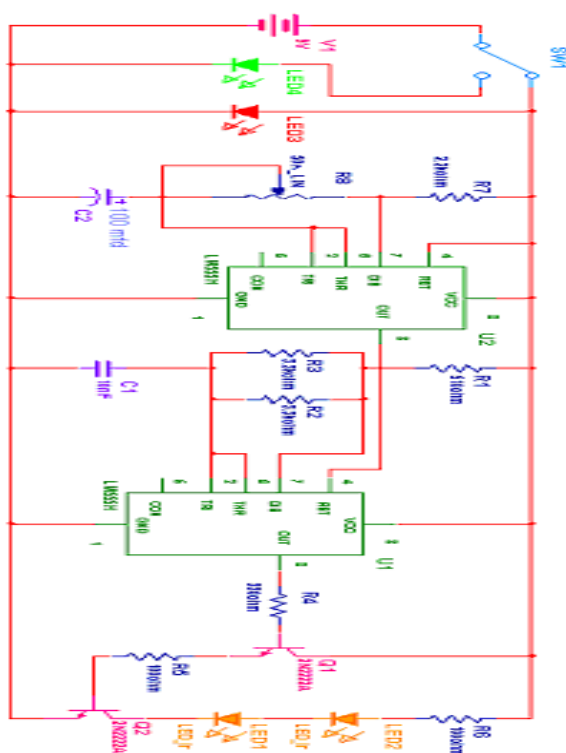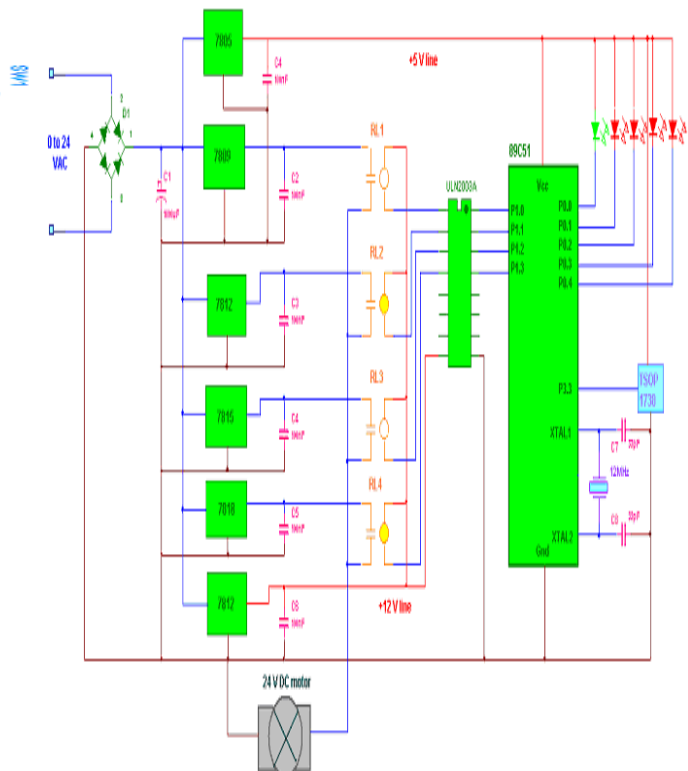


Figure 2 : transmitter                                   Figure 3 : receiver

The output of U2 is connected with the 9V DC bettery is connected with circuit through SPDT  swith  SW1 as shown. As shown in figure when SW1 is in position as shown the transmitter is on and also the red LED is also ON. When switch changes its position the red LED and transmitter is off and only green LED will ON. When the circuit is energized U@ will start generating high pulse at every 1 sec. as this pulse is fed to reset pin of U1 it will generate 38 KHz  for the same time. Thus after every one second the IR beam of 38 KHz is generated for one second only. This cycle repeats till the red light is on.

### 2)  RECEIVER

The receiver is housed in engine which senses the IR signals and takes suitable actin. 24 VAC is rectified by diode bridge D11 and filtered through C1 and given to all the regulated ICs as input. The output of 7805 is connected to 89C51 and TSOP and also to all the LDs. Output of 7812 (last one) is connected to common coil terminal and to ULN. The output of middle four regulated ICs are connected to DC motor through relay contacts. Output of TSOP is connected with pin P3.3 (INT1) of microcontroller. All five LEDs are connected with port P0 as shown input of ULN is connected with port 1 pins P1.0-P1.3, and outputs are connected with second terminal of relay coil. TSOP will detect the 38 KHz IR beam and gives the interrupt to 89C51. 89C51 will indicate the interrupt event on first (Green) LED and energized only one particular relay thought ULN chip. When any of the four relay get energized the motor will get supply from it and it will start running as voltage is less it will run with less speed. So now it's the function of microcontroller to receive signal from IR sensor, decrease the speed of train gradually in four steps and then stop it. And this is done by software embedded in to 89C51.

## V. CONCLUSION

Initially when you switch on the supply 89C51 will switch all the relays RL1- RL4 one by one. So motor will get 9-12-15-18 V supply in steps and gradually increases its speed reaches max speed indicated by first red LED (P0.0). Now if the signal is green then train will cross the pole with same pole But if signal becomes red in between then IR sensor will detect IR beam and interrupts the 89C51 Getting first interrupt 89C51 will switch off RL4 and switch on RL3 so now motor will get 15 V supply and its speed will be decreased. That's indicated by second red LED (P0.1).Now 89C51 will wait for some time (2 to 3 sec) and train goes on with same speed. Again if still red signal is on 89C51 will be interrupted and this time it will switch on RL2. so now motor gets 12V supply and again its speed will be decreased indicated by third red LED (P0.2)  The same procedure repeats if 89C51 is interrupted third times. Now motor runs at min speed (9 V) indicated by fourth red LED (P0.3) After same delay on receiving fourth interrupt all the relays will be switched off and motor is now stop so the train is also stopped. This is indicated by green LED. After this interrupts will be disabled. So now when red signal becomes green driver must reset the controller to start the train again.

## ACKNOWLEDGEMENT

This project is to avoid the accidents which occur by signal problems and train problems. Before the driver observes the red signal the engine itself observes it and automatically starts decreasing speed and then stops. The driver can feel relax in driving because he dose not have to take care about red signal. Even if he forgets to take any action on red signal then also we can avoid accidents by the implementation of this idea.

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