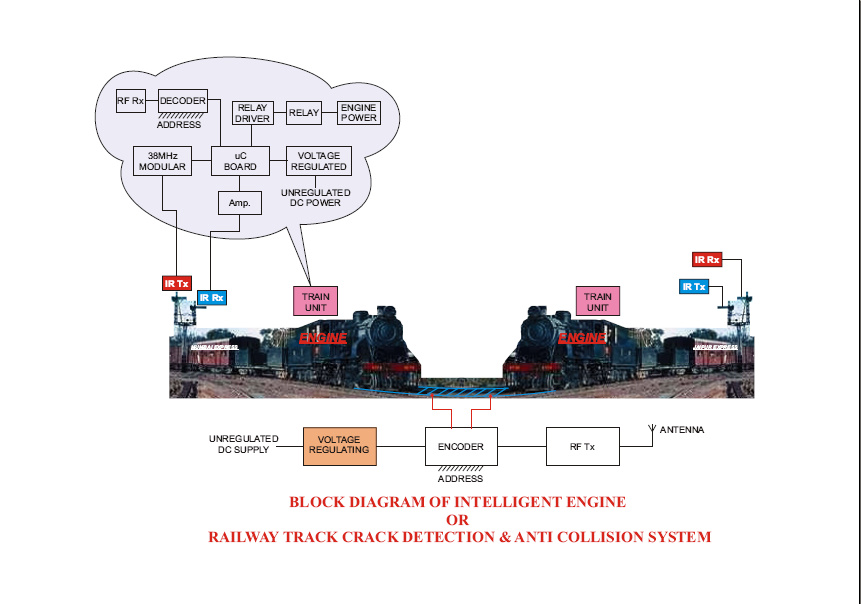
ANTI-COLLISION DETECTOR

(With automatic gate control And crack detection)

**OBJECTIVE** :-

This project aims in the development of highly cost effective anti-collision detector using the implementation of RF and LASER in automation of signals. By this project we can avoid train collision by giving necessary signals automatically.It will also detect cracks in the railway tracks. Automatic gate controller is an added feature of this project. It can easily be customized as per requirements and available resources to suit the needs of indian railways. The idea has been successfully tested and the working prototype can be developed.

**BLOCK DIAGRAM OF PROJECT** :-



**WORKING OF PROJECT**

**WORKING OF ANTI-COLLISION DETECTOR**:

The engines of trains are equipped with microcontroller containing all the data and information about all the trains. Practically, in Indian railway the microcontroller contains the registration nos. of trains. The motor which runs the train is under the control of microcontroller. On the head lamp of engines of train A and train B are added a photo diode and a laser that emits pulses at fixed time intervals. If train B is moving on the same track towards the train A then the laser emitted by the train B will be sensed at engine of train A resulting in microcontroller to stop the motor and thus stopping train. Thus the working of anti-collision detector is based on a bi-directional process.

**WORKING OF CRACK DETECTOR**:

The tracks are enabled with encoders and RF transmitters. A uniform track is said to be maintained if current keeps on flowing between the encoders. The transmitter will transmit RF signals as long as the current is continuous. A receiver circuitry containing a decoder is involved on the engine of train. The receiver is connected to the microcontroller which controls the functioning of train. If due to some unavoidable reasons, a crack is introduced in the track then the current flowing between the encoders will no more be continuous. This will stop transmitter to transmit RF signals and hence no signal will be received by the receiver of the engine leading to which the microcontroller will stop the train. The microcontrollers used in anti-collision detector and crack detector are same.

**TECHNICAL DETAILS:**

RF TRANSMITTER AND RECEIVER MODULE: These modules are now widely and cheaply available with the operating frequency of 433 MHz. The transmitter module accepts serial data. The encoder IC takes in parallel data at the TX side packages it into serial format and then transmits it with the help of a RF transmitter module. At the RX end, the decoder IC receives the signal via the RF receiver module, decodes the serial data and reproduces the original data in the parallel format.

**FEATURES**

###### Range in open space (Standard Conditions): 100 Meters

###### RX Receiver Frequency: 433 MHz

###### Low Power Consumption

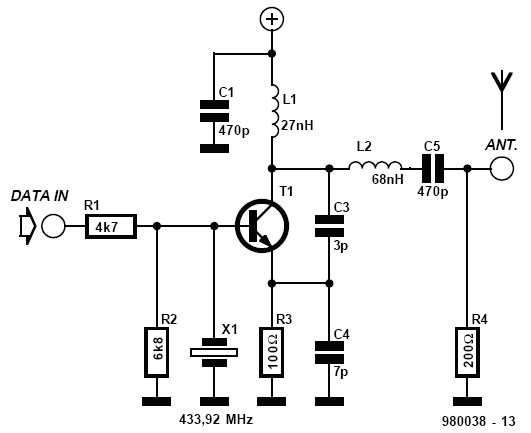
###### Easy For Application

###### RX Operating Voltage: 5V

###### TX Frequency Range: 433.92 MHz

###### TX Supply Voltage: 3V ~ 6V

THE TX433 (Transmission Module): The TX433 wireless RF transmitter uses on/off keying to transmit data to the matching receiver, RX433. The data input “keys” the saw resonator in the transmitter when the input is +3 volts or greater, AM modulating the data onto the 433 MHz carrier. The data is then demodulated by the receiver, which accurately reproduces the original data. The data input is CMOS level Compatible when the unit is run on +5 volts.

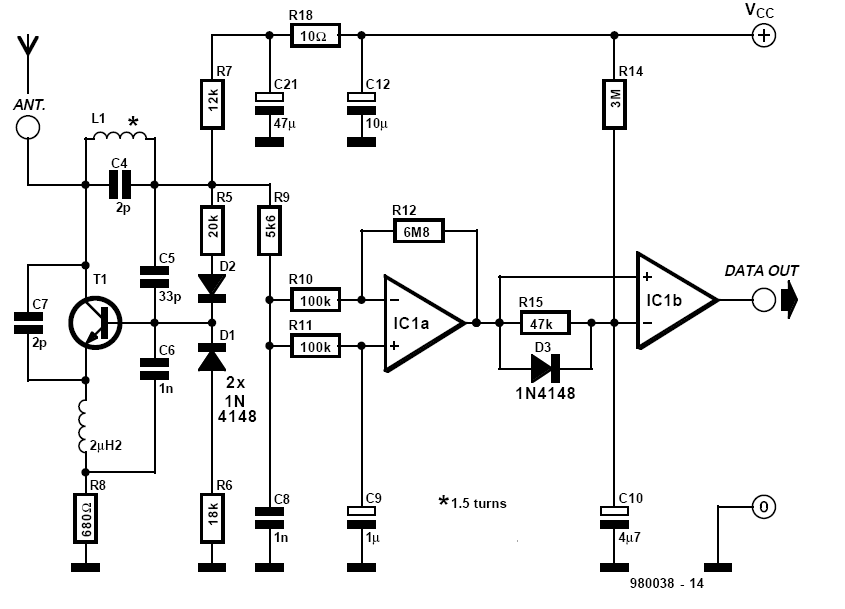


**Fig - 433 MHz Transmitter**

When driving with a CMOS input, there must be enough level to achieve at least 3V on the data input, 5V is preferable. This is due to the start-up time of the oscillator needing to be fast to accurately reproduce your data. If the voltage is too low, the oscillator will not start fast enough to accurately reproduces your data, especially at higher data rates. Luckily not much drive is needed, so this should be easy since it is 22K ohms of load. Almost any CMOS output will drive this without any problems. There are some CMOS outputs which have very little drive capability which may not work, so testing the voltage at the data input may be a wise choice if you are having problems.

The RX433 (Receiver Module):The receiver shown in Figure also contains just one transistor. It is biased to act as a regenerative oscillator, in which the received antenna signal causes the transistor to switch to high amplification, thereby automatically arranging the signal detection. Next, the ‘raw’ demodulated signal is amplified and shaped-up by op-amps. The result is a fairly clean digital signal at the output of the receiver. The logic high level is at about 2/3 of the supply voltage, i.e., between 3 V and 4.5 V.

The range of the simple system shown in Figures is much smaller than that of more expensive units, mainly because of the low transmit power (approx. 1 mW) and the relative insensitivity and wide-band nature of the receiver. Moreover, amplitude-modulated noise is not suppressed in any way.



**Fig- 433 MHz RF Receiver**

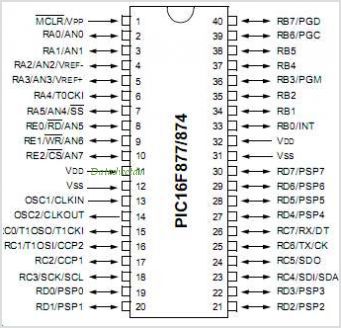
An RFID system consists of an antenna and a transceiver, which read the radio frequency and transfer the information to a processing device, and a transponder, or tag, which is an integrated circuit containing the RF circuitry and information to be transmitted.

PIC is the abbreviation for programmable interface circuit. It is a CMOS 8bit RISC microcontroller. There are only 35 single word instructions to learn. Operating speed: DC - 20 MHz clock input. The memory details are

* Up to 8K x 14 words of FLASH Program Memory,
* Up to 368 x 8 bytes of Data Memory (RAM),
* Up to 256 x 8 bytes of EEPROM Data Memory

**COMPONENTS**

1. 28/40- pin, 8-bit CMOS flash Microcontroller



1. LM 324 OP-AMP

(Low power Quad op-amp)

1. MC78XX / LM78XX / MC78XXA VOLTAGE REGULATORS

(3- terminal 1 ampere positive voltage regulator)

1. ULN2003 SEVEN PAIR DARLINGTON ARRAYS

(DIP 16)

1. SM TX – 4 AM / ASK TRANSMITTER MODULE and

SM RX – 433 RECEIVER MODULE

1. GB – 333 Mega Bright , round type LED lamps
2. 1N4001 – 1N4007 General Purpose RECTIFIER

(Glass Passivated)

1. BC546 / 547 / 548 / 549 / 550 NPN Epitaxial Silicon Transistor
2. DC Motor ( 6 – 12 Volts )
3. HT12A / HT12E 212  Series of ENCODERS and 212  Series of DECODERS
4. Elecromechanical General purpose RELAY
5. Diodes
6. Resistors
7. Capacitors

**INNOVATIVENESS AND USEFULNESS OF PROJECT**

Safety violations due to ‘human errors or limitations’ and ‘equipment failures’ occasionally result in Train collisions. ‘Anti-Collision Device Network’ is an on-board train collision prevention system.

1. The Anti-Collision Device (ACD) is a self-acting microprocessor-based data communication device. When installed on locomotives (along with an auto-braking unit - ABU), guard vans, stations and level-crossing gates (both manned and unmanned), the network of ACD systems prevents high-speed collisions in mid-sections, station areas and at level-crossing gates. The ACD uses both radio frequency and laser technology whereby a train is automatically brought to a halt if the track ahead is not clear. The train starts braking 3 kms ahead of a blockade
2. Due to natural or manual reasons, tracks are found to be cracked which can lead to accidents. The project is able to detect the cracks in railway tracks.
3. Now a days, India is the country which having worlds largest railway network. Over hundreds of railways running on track everyday. As railway has straightway running as well as it has somewhat risky and dangerous as per as general public and traffic concern. As we know that it is surely impossible to stop the running train at instant is some critical situation or emergency arises. Therefore at the places of traffic density, suburban areas and crossings there is severe need to install a railway gate in view of protection purpose. Obviously at each and every gate there must be a attendant to operate and maintain it. In view of that, if we calculate the places of railway crossings and such places where it would to be install and overall expenditure, the graph arises and arises at the extent. This is an added feature of the project.