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INDUCTION OF RADIO COMMUNICATION IN INDIAN RAILWAY FOR SMOOTH RUNNING

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ABSTRACT

In winter season due to low visibility or foggy weather our railway system does not work smoothly. At this time many problems occur like delay of train for their time, cancellation of train and accidents are occur due to low visibility. There is no communication between the locomotive and signal post or any other server which can give the status of upcoming signal. In other words, the loco pilot must see the signal with his eyes before proceeding. Many signals are visualize by the loco pilot during running train like semaphore signals, curvature, gradients, emergency signals etc. Our idea is to remove that problem, for this reason we design a "train protection and warning system", which having the feature of cab signaling so that the loco pilot not need to see the signal outside. In our project, we work on semaphore signals by the help of cab signalling concept. We will place reed sensor on the track. These reed sensors are used for communication. If the reed sensor is come under the contact of train then it sends the RF signal to the receiver of "Train protection and warning system" which is located in the cabin of loco-pilot. It make easy to visualize the signal for loco pilot and the information is continually updated giving an easy to read display to the train driver.

Keywords- Cab Signaling, RF Signal, Reed Sensor, Semaphore Signals

I. INTRODUCTION

In foggy condition ,the trains are not run smoothly many problems are occur like delay of train, cancellation of train and accidents due to low visibility. Because it having no communication between locomotive and signal post. In IndianRailway having the communication for customer services like Railnet. Railnet is a network which is run by Indian railway to provide customer services. Passengers can access the railnet through internet and can get user required data about schedule, ticketing, reservation, train running information etc. For communication related to its train operation, Indian Railways has its own telecommunication network. Earlier it was overhead telephone wire, running on telephone poles along the railway lines. Now all the overhead lines have been replaced with cables and optic fibres. For station to station and the station to the railway control centre communication there are the dedicated communication channels. Also for train operation there are dedicated channels. For communication between the train and the stations, the train loco pilot and the guard of the train are provided with VHF walkie-talkie sets which are functioning through VHF towers. The loco pilot and the guard in the train can contact the station master in their range. In addition the loco pilot and the guard and other on board train staff are provided with CUG Mobile sets, through which they can contact to the railway control and their controllingofficers. Also if train stops in mid-section, and no other communication working, there are emergency telephone points provided at fixed interval. The loco pilot and the guard are equipped with emergency telephone set and in emergency they can walk to the nearest emergency telephone point and using the instrument can contact the railway control.

II. METHODS OF COMMUNICATION IN RAILWAY

1. Optical Fibre communication
2. Between Major Stations
3. Microwave
4. Radio Communication
5. Between Driver and Station Master

By using radio communication, establish the train protection and warning system which having the feature of cab signalling. For sending these signals used reed sensor on the track which sends these signal to the receiver of TPWS which is established in the cabin of locomotive.There is no communication between the locomotive and signal post or any other server which can give the status of upcoming signal. In other words, the locopilot must see the signal with his eyes before proceeding. In case of poor visibility or foggy weather, the speed restriction on Indian Railway is 60 KMPH. One can't go beyond. TPWS (Train Protection and warning system) which having feature of cab signalling so that the loco pilot need not see the signal outside.

III. ADVANTAGES

- No Delaying and cancelling of trains due to fog
- Reduce the accidents
- Economical advantage
- Convenient for millions of passenger
- Easy for loco pilot

IV. SYSTEM DESIGN

4.1 Cab Signalling

Cab signalling is a railway safety system that communicates track status information to the cab, crew compartment or driver's compartment of a locomotive, railcar or multiple unit, where the train driver or engine driver can see the information continuously.

Cab Signalling

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4.2 Semaphore Signals

TRAIN 1	TRAIN 2	Signal	INDICATION
STATION 1	STATION 2	RED	TRAIN 1 IS ON NEXT STATION. STOP.
STATION 1	STATION 3	YELLOW	TRAIN 1 IS TWO STATION AHEAD.
STATION 1	STATION 4	GREEN	TRAIN 1 IS THREE STATION AHEAD.

4.3 Radio Frequency

Radio frequency is a term that having alternating current characteristics such that, if the current is input to an antenna, an electromagnetic field is generated suitable for wireless broadcasting and communications. These frequencies cover a significant portion of the electromagneticradiationspectrum, extending from nine kilohertz, the lowest allocated wireless communications frequency, to thousands of gigahertz. When an RF current is supplied to an antenna, it produces an electromagnetic field that propagates through space. This field is sometimes called an RF field; in less technical terminology it is a "radio wave." RF field has a wavelength that is inversely proportional to the frequency. In the atmosphere or in outer space, if f is the frequency in megahertz and $s$is the wavelength in meters, then$s = 300/f$ In RF Module using **ASK (Amplitude Shift Keying)** based **Tx/Rx (transmitter/receiver)** pair operating at 433 MHz. The transmitter module accepts serial data at a maximum of XX baud rate. It can be directly interfaced with a microcontroller or can be used in remote controlapplications with the help of encoder/decoder ICs.

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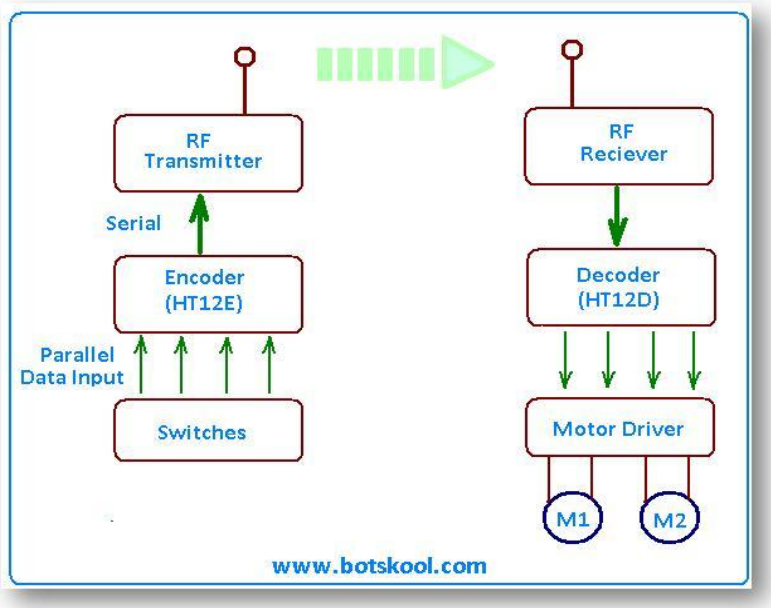
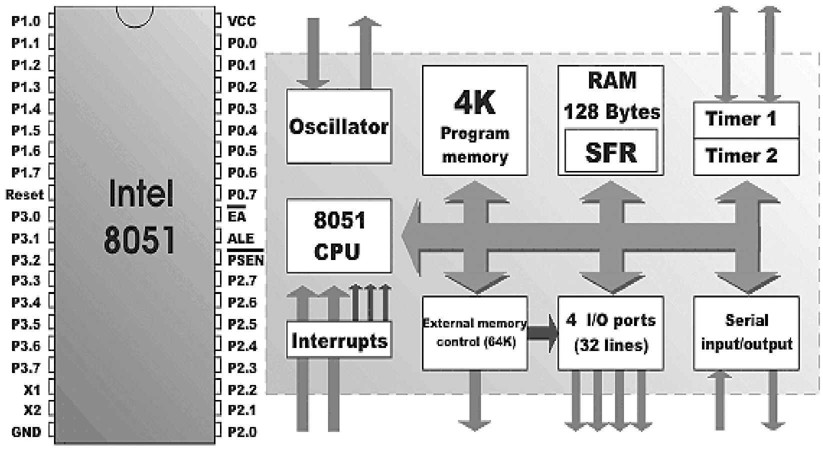


RF Module

V. MICROCONTROLLER

A microcontroller is a single chip that contains the processor (the CPU), non-volatile memory for the program (ROM or flash), volatile memory for input and output (RAM), a clock and an I/O control unit. Also called a "computer on a chip," billions of microcontroller units (MCUs) are embedded each year in a myriad of products from toys to appliances to automobiles. For example, a single vehicle can use 70 or more microcontrollers. The following picture describes a general block diagram of microcontroller.



Microcontroller

VI. TRANSMITTER

In electronics and telecommunications a **transmitter** or **radiotransmitter** is an electronic device which, with the aid of an antenna, produces radio waves. The transmitter itself generates a radiofrequency alternating current, which is applied to the antenna. When excited by this alternating current, the antenna radiates radio waves. In addition to their use in broadcasting, transmitters are necessary component parts of many electronic

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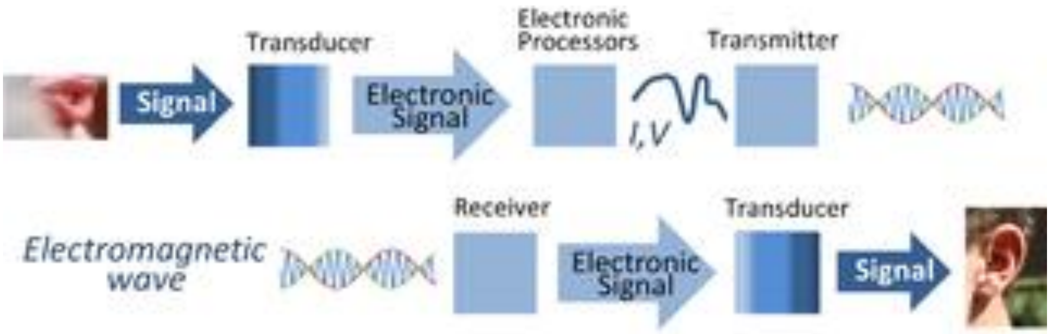
devices that communicate by radio Each system contains a transmitter, This consists of a source of electrical energy, producing alternating current of a desired frequency of oscillation. The transmitter contains a system to modulate some property of the energy produced to impress a signal on it. The transmitter sends the modulated electrical energy to a tuned resonant antenna, this structure converts the rapidly changing alternating current into an electromagnetic wave that can move through free space.

VII RECEIVER

The electromagnetic wave is intercepted by a tuned receiving antenna; this structure captures some of the energy of the wave and returns it to the form of oscillating electrical currents. At the receiver, these currents are demodulated, which is conversion to a usable signal form by a detector sub-system. The receiver is "tuned" to respond differently to the desired signals, and reject undesired signals. Early radio systems relied entirely on the energy collected by an antenna to produce signals for the operator. Radio became more useful after the invention of electronic devices such as the vacuum tube and later the transistor, which made it possible to amplify weak signals. Now a days radio systems are used for applications from walkie-talkie children's toys to the control of space vehicles, as well as for broadcasting, and many other applications. A radio receiver receives its input from an antenna, uses electronic filters to separate out the wanted radio signal from all other signals carry by this antenna, amplifies it to a suitable level for further processing, and finally converts through demodulation and decoding the signal into a form that usable for the consumer, such as sound, pictures, digital data, measurement values, navigational positions, etc.

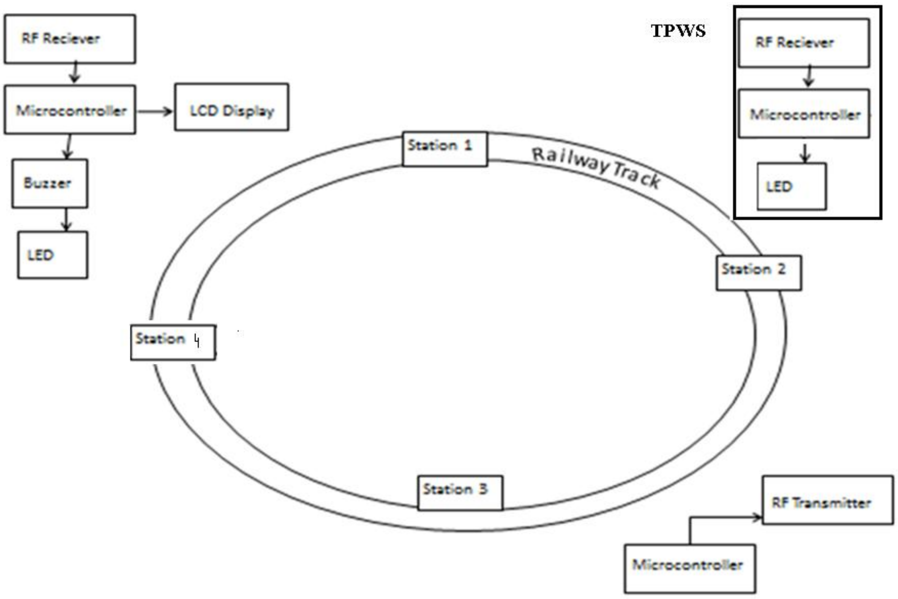


Transducing information such as sound into an electromagnetic pulse signal, which is then sent as an electromagnetic radio wave from a transmitter. A receiver intercepts the radio wave and extracts the information-bearing electronic signal, which is converted back using another transducer such as a speaker.

VIII. HISTORY

The history of railway transport in India began in the mid-nineteenth century. The core of the pressure for building railways In India came from London. In 1848, there was not a single kilometre of railway line in India. The country's first railway, built by the Great Indian Peninsula Railway (GIPR), opened in 1853, between Bombay and Thane. In 1900, the GIPR became a government owned company. The network spread to the modern day states of Assam, Rajputhana and Madras Presidency and soon various autonomous kingdoms began to have their own rail systems. In 1905, an early Railway Board was constituted, but the powers were formally vested under Lord Curzon.[13] It served under the Department of Commerce and Industry and had a government railway official serving as chairman, and a railway manager from England and an agent of one of the company railways as the other two members. For the first time in its history, the Railways began to make a profit. In 1951 the systems were nationalised as one unit, the Indian Railways, becoming one of the largest networks in the world. Indian Railways is divided into 16 zones, which are further sub-divided into divisions. The number of zones in Indian Railways increased from six to eight in 1951, nine in 1966 and sixteen in 2003. Each zonal railway is made up of a certain number of divisions, each having a divisional headquarters. There are a total of sixty-eight divisions.

IX. BLOCK DIAGRAM



X. CONCLUSION

In winter season, due to low visibility or foggy weather the main problem is occur for locomotive is visibility of signals because in that season it is almost impossible for locomotive to see the signals outside by his naked eyes. Many signals are visualize by the locomotive during running train like semaphore signals, curvature, gradients, emergency signals etc. We will work on semaphore signals and reduce the problem of seeing that signal outside because by the help of cab signalling, establish a TPWS in the cabin of locomotive so that locomotive need not to see the signals outside.

REFERENCES

1. http://www.irfca.org/~mrinal/history_ir.html
2. http://www.indianrailways.gov.in/railwayboard/view_section.jsp?lang=0&id=0,1,261
3. https://en.wikipedia.org/wiki/Transmitter
4. "Definition of RADIO FREQUENCY". *Merriam-Webster*. Encyclopædia Britannica. n.d. Retrieved 6 August 2015.
5. https://en.wikipedia.org/wiki/Cab_signalling
6. http://www.indianrailways.gov.in/railwayboard/uploads/directorate/signal/downloads/TPWS.pdf