

RFID Application for Railway Hazards Finding

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Abstract— Indian railway is 4th rank railway chain in the world. Due to this there are so many problems like collision, accidents, delay etc. are related to trains. To avoid these problems we used RFID application for identification of railway track and automatic track changer. In this setup, we used RFID tags which are allocated at railway track and RFID reader attached in railway engine. Because of this, train follows its path perfectly with help of RFID reader which reads tags continuously on railway track. If route is appropriate then train perform continuously, in case route is wrong then train stop automatically and ‘WRONG PATH’ information shows on LCD display located in train engine. The next advantage of our model is automatic track changer. When train reach at some distance before track changer that time track change automatically according to perfect route due to wireless communication. Our model is useful for perfect track identification and perfect track change.

Key words: RFID, Tags, Reader, Track changer, Track automation

I. INTRODUCTION

The train accidents are mostly happens because of mechanical and human errors. Due to this so many trains are cancelled, this directly effect on huge money loss of Indian railway. We can avoid these things by automation of our railway system. The easiest and cheapest automation can be done by with help of RFID and RFID module. Transmitter and receiver RFID module is used for communication. Identification of every track is different because each RFID has there unique code. RF module is used for communication between train and control station. This system performs on wireless communication. The author worked on a model that leads to minimize problem faced by railways. There are so many advancement settle in India to manage the problem of accidents and traffic problem in train[1]. The ACD (Anti collision device) is made by konkan railways for tracking position of train by using GPS technology. It is helpful and in use in southern region of India[2]. For identification of rail tracks separated by a

distance 10-15 feet is insufficient because of sureness and limitations of GPS in our country. This system is useful for stopping collision between trains but does not accept factors based on the environment. So author has the system by using RFID technology to automation of railway[3]. The author manufactured a unique feature of automatic track changer which can works according to availability of trains on tracks. Track changer is like a small piece of track for joining the tracks. This system fully performs on wireless communication with the help of RFID and microcontrollers. RFID is cost effective and they have unique identity. The figure of model give better explanation of it[4]. The system used RFID, embedded system, FLIR cameras is useful for obstacles overcome on railway track and any other environmental hazardous problems. FLIR camera captured image and that image converted into electrical signal by image signal unit and it sent to signal generator[5]. System by using ZigBee module is use for two way communication. Where RFID tag located on track before half to one km of track changer and RFID transceiver module is located besides to RFID tags but out of track. Here wireless communication for track changer did due to ZigBee module[6]. RFID system is also use for high speed trains RFID is beneficial because it can easily track fast moving train than that of other technologies which are used in past. Capability of RFID reading is more reliable and fast in any insufficient time due to this issues like collisions and accidents can controlled. Hence it used for safety also[7]. System used transceiver-receiver pair for wireless communication between train and control station. RFID tags connected to track and RFID reader connected to train engine .Due to this train get its perfect route[8]. In this model train regulated with the help of microcontrollers. The microcontrollers programmed is belongs to way of train. So train follow instruction of microcontrollers. If train start it follow the program of microcontroller. In the case, if train chooses different path because of mechanical or human error then train stopped automatically in short time and accidents can be avoided.

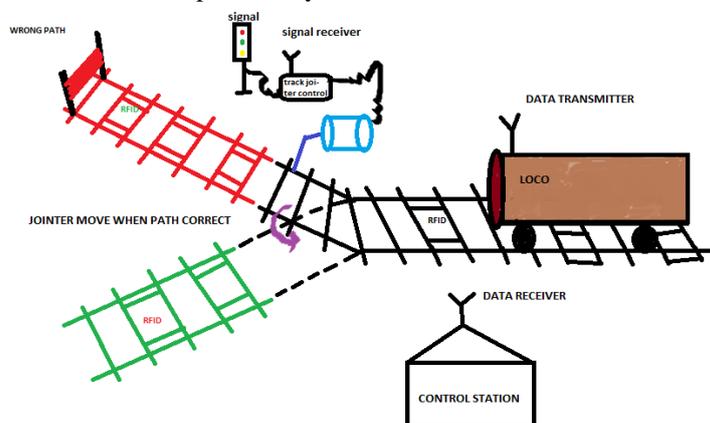


Fig. 1: Schematic representation of the Identification of railway track

II. METHODOLOGY

A. Construction of System

Firstly we make program for our system by using MICRO C PRO for PIC that installed in microcontroller using computer. After that for making circuit we use Eagle software by which we get PCB design for our circuit. After that we make photo print of that design then we take copper

clad shit where we construct PCB circuit. Then photo print of PCB design lay on copper clad shit and iron press put on it so that PCB design draw on that shit. After that copper clad shit wash in ferric chloride liquid for itching. By this we get PCB design of circuit on copper clad shit. Then drill all point of component where its place shows in PCB design and after that mount all our components which are useful for our whole circuit on copper clad shit and soldering it.

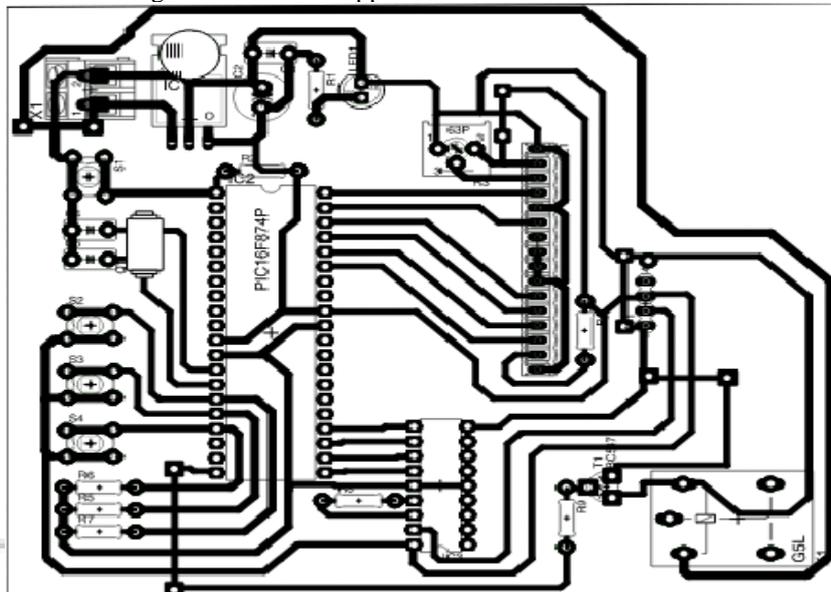


Fig: 2: PCB design of train engine system

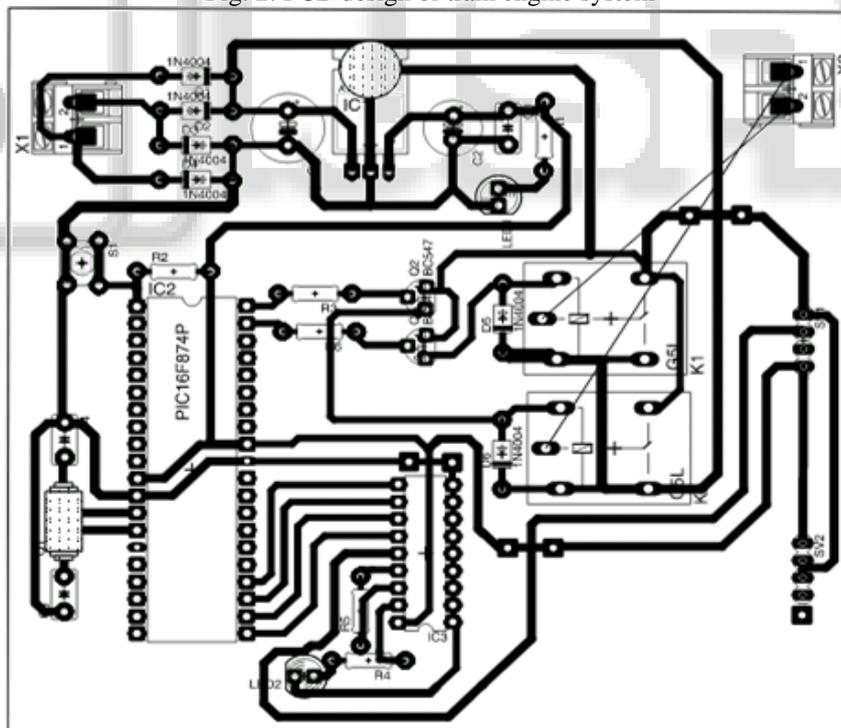


Fig: 3: PCB design of track changer system

B. Schematic Design

Schematic design which give whole information of electronics circuit better than PCB design. Schematic diagram train engine system and track changer system represent the whole information of used components in our electronics circuit. Schematic design represents instead of

text language. This design give us information about which components used in our circuit and how they are connected to each other by representation of diagram. Schematic diagram is easy way to learn about components which are used in our circuit. We can get type and properties of components which are used for connecting our circuit.

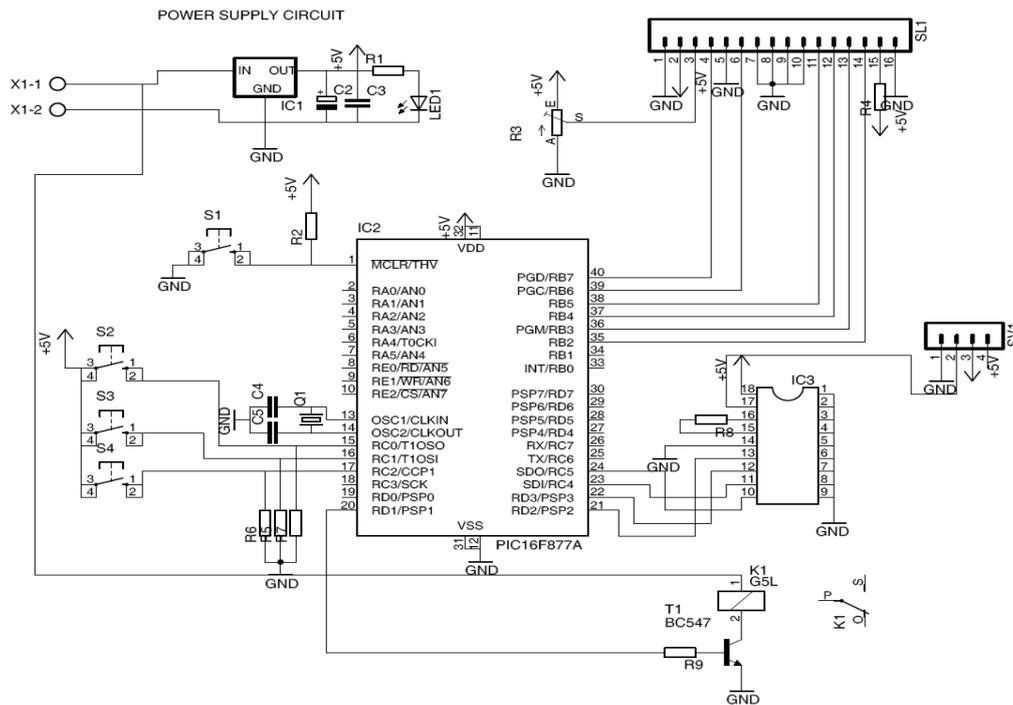


Fig. 4: Schematic diagram of train engine system

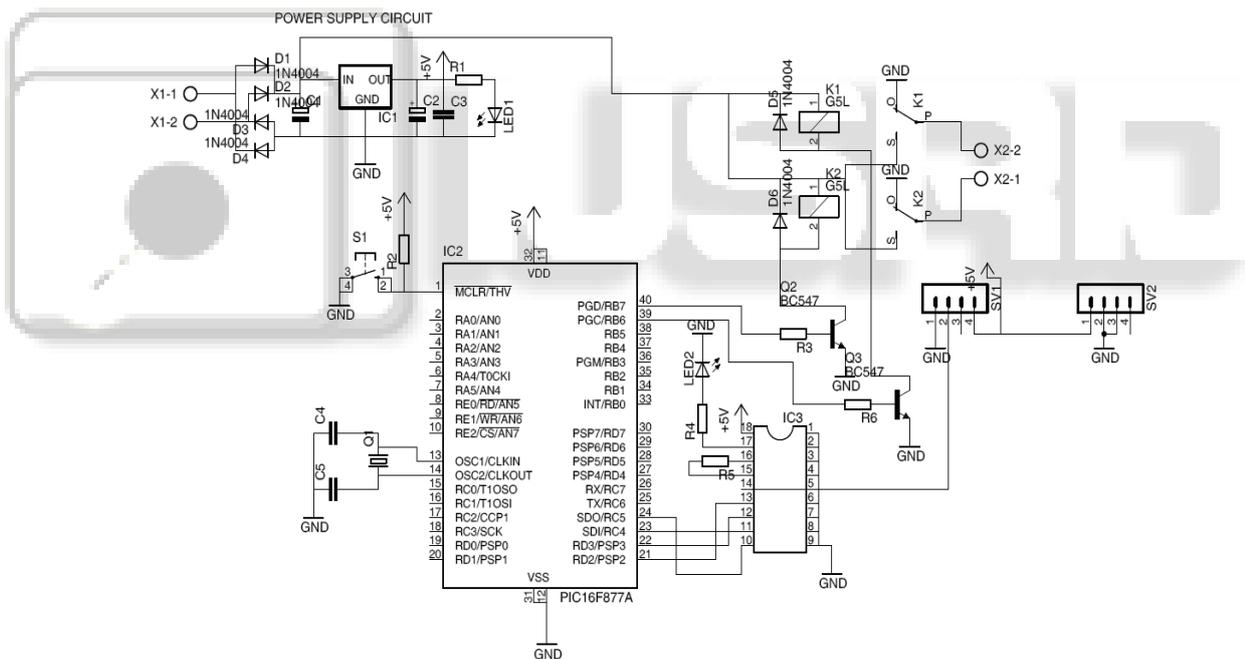


Fig. 5: Schematic diagram of track changer system

C. Study Of Proposed System

The railway is using so many new systems to improve its working. Here author fixed RFID on railway engine and RFID tags allocated on track between some distances. RFID reader consists of main coil with a power supply and RFID tag consist coil too, RFID tag is like a small chip mainly RAM of 12 bit unique code. RFID works apart from physical connection between reader and tags. When RFID reader going from area of tags that time waves of reader fall on RFID tag that time coil inside the tags induce the magnetic field. The tag captures power from it and send it to circuit in the tag. Then tag pass information encoded in the tags memory.

The RFID tag consists of

- 1) The chip of silicon that contains data.
- 2) The coil and chip is installed on the plastic cover.
- 3) The chip is joined to an antenna due to which code is transmitted.

In case of track changer system, there are two RF module transmitter-receiver pair for wireless communication. There are two IC near RF module out of these one is encoder while other is decoder for taking and giving information to microcontroller. That information comes from RF modules. Due to this control station takes decision about forward and reverse making track jointer.

D. Working Of Train Engine System

In this system, all information of route on which track run is saved in microcontroller. For this before train start from source we select destination where train can reached. After selection of destination train start from source then RFID reader reads all RFID tags which are situated on track. If

RFID tag is corrected then train engine run continue and in case if train run on wrong route that time “WRONG PATH” indication shows LCD display located in engine. When train perform its right path that time RFID reader reads all RFID tags on that route and finally train reached on its destination then engine stop automatically on that place.

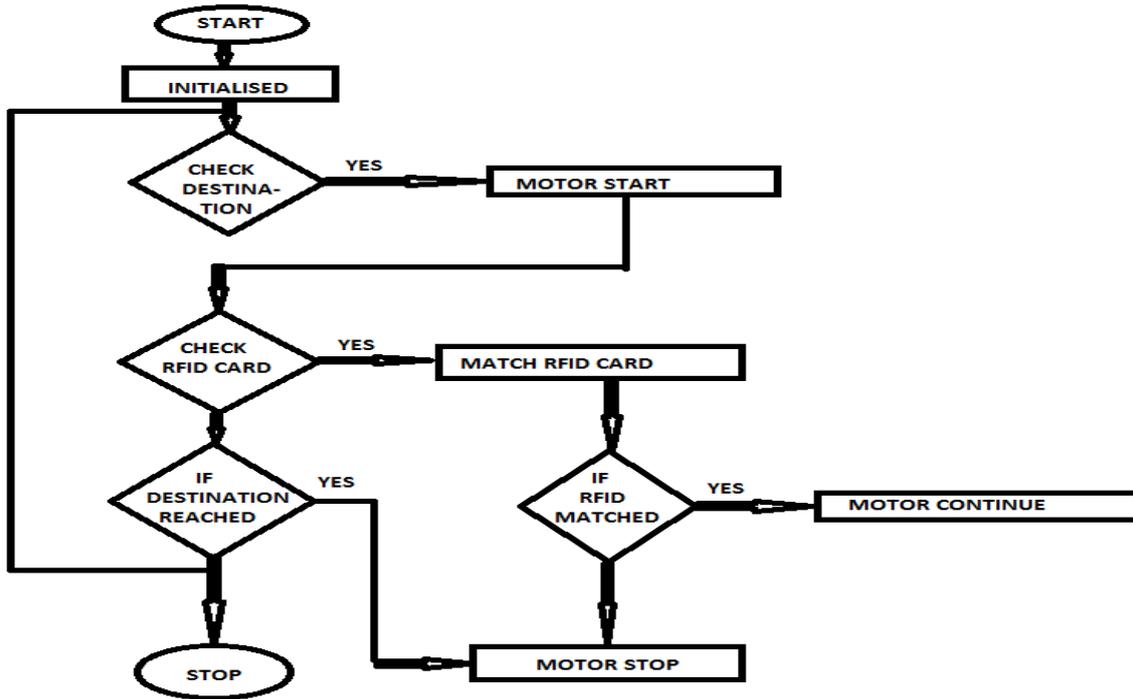


Fig. 6: Flowchart of engine system program

E. Working of Track Changer System

In case of track changer system, when train start it reached near last RFID tag, that tag read RFID reader because all information of every tag stored in microcontroller. Here we used pair of RF module, one is transmitter and other is receiver module. Train engine consists of RF transmitter module where control station consists of RF receiver module. Transmitter-receiver module pair is used for wireless communication between train and control station. When train start from its source after that RF reader consisted on train engine read every tag on its route. When train comes on last RF tag before track changer which is situated at distance near about half to one kilometer before track changer. When train reached on last tag before track changer that time RF transmitter module situated on train engine give wireless information to control station by RF receiver module and because of this, control station take decision to forward or reverse. In any case, if some malfunctioning occurred at track changer system then train can followed wrong route that time we can avoid our train from any accident because we use RFID tag on route. Due to this we get “WRONG PATH” information on LCD display in engine locomotive and train stop automatically within seconds. By this we can’t follow any wrong route.

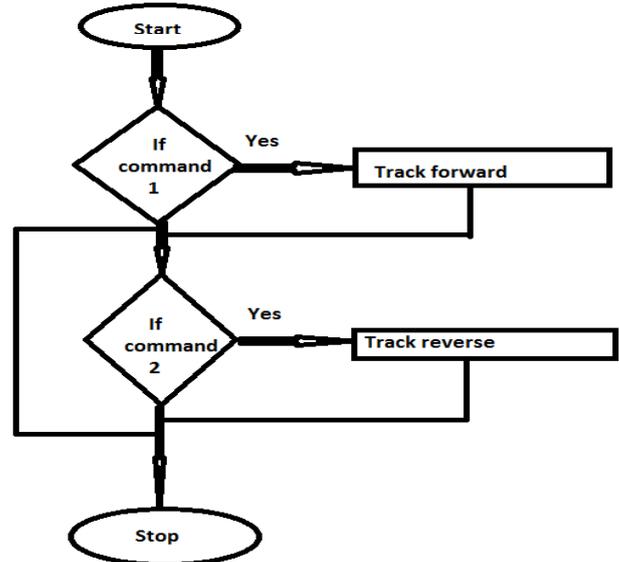


Fig. 7: Flowchart of track changer system program

III. CONCLUSIONS

- The model made by author is only idea. If it implemented then it can modify the working of railway. It can reduces the collisions and accidents of train.
- This approach is cost effective and RFID tag installation is easy. RFID has cheap availability. Buildup and repairs of infrastructure for this system is so easy.
- After installation this system gives many other features than the present running technology of railways.

- We can track the train at every point clearly. This model is useful for exact tracking feature. High speed trains also run and manage by this system.
- RFID system provides reliability and safety to railways.
- Automation takes place of manual functioning and it is better and reliable than manual functions.

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