# CAN PROTOCOL DRIVERLESS TRAIN CONTROL SYSTEM

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## Abstract

*This paper addresses the train running autonomously without any human operators. Provides information to avoid train to train collisions, over speeding problem, signaling errors and unmanned railway crossing incidents. This afford a way for a passenger to know the train location, speed and direction in real time from anywhere in India through his mobile phone.CAN protocol interconnect all the train compartments with embedded network to ensure safety and security of passengers during disasters occurring within trains such as bomb blasts and fire outbreaks. This make obtainable way for a passenger to know the train location, speed and direction in real time from anywhere in India through his mobile phone. The CAN node is used to ensure the safety and comfort of the passengers. It also have audio speakers to inform the passengers about the approaching station and also to provide alert messages during a crisis situation.*

***Key Words:*** *mobile phone, CAN protocol*

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## 1. INTRODUCTION

Generally when we are on railway platform waiting for a train, eager to know about the current location and expected time of arrival of train. Now, for this we completely depend on announcements made by the enquiry staff. At present the information of the running trains are monitored with the help of manual monitoring which is not perfect. In this project the exact location and speed movement of the train can be monitored in real time basis. This project has been developed for a train which provides precise location through interactive mode on mobile phones, laptops, leading to the elimination for telephone enquiry. The new classification would be more useful all through winter or foggy endure stipulation as passenger hardly get in sequence about Passenger trains because this project use GPS data to monitor trains and offer genuine time in order about the position of the train to users. This proposed work aims to design a system that run the train autonomously without human operators and also provides alert messages during crisis situation. Here we propose an approach to achieve efficiently design user friendly for driverless train control system application especially target at preventing accidents such as train to train collisions, over speeding problem, unmanned railway crossing incidents etc.

## 2. LITERATURE SURVEY

CAN technology is adopt by most automotive industries nowadays. As per Chuliang the paper presents a virtual instrument based control system for research and enlargement of the automotive and railway industries. This resourceful low rate proficient and realistic arrangement contains the applications of data acquisition, controller area network (CAN), harmful engine exhaust emissions reduction, and spot welding[1]. The system must be proficient to be employed in various automation industries due to its flexibility. The detailed applications of the system presented here, addresses the monitoring of car engine exhaust emissions, CAN application in reducing car engine exhaust emissions and monitoring of automotive and railway spot welding. The disadvantages are the data as of the gas sensors is require to be collected and compared for each processing. The virtual control system is used for only three applications such as DAQ, CAN and harmful engine exhaust emissions reduction. According to Chuliang, in this paper introduces a built network for data CAN transmission following the data acquisition from the necessary temperature sensors mounted on a car engine and a train bogie in two respective tests[2]. LABVIEW is the only useful software during this network design based in the lead of the industrial widely use. The network should be capable to be functional in various transportation industries suitable to its elasticity, extensibility and achievability. The disadvantages are separate PC's are used to operate as DAQ and CAN system for data sharing instead of using both the system in same PC.By using only LAN network we can transfer the data from DAQ PC to CAN PC.More CAN nodes cannot be extended to build a complex and functional CAN network This article introduce a method by means of ARM as the main controller and double gateway in a control computer in a car[3]. This system make use of the high presentation of ARM, high speed reduction of CAN bus communication control networks and instrument control as a result as to get full sharing of data between nodes and improve their collaborative work. This system features efficient data transfer among different nodes in the practical applications. The system leads to easy data sharing but it is done between different control systems[4]. The process maintenance is hard to carry out. The electric system uses a single point to point

communication approach which results in large cabling problem.

## 3. EXISTING SYSTEM

RAIL RADAR is the new technology launched by Indian Railways recently, which updates train position on a map every time it crosses a station on its way. This system does not provide real-time tracking since each station is located at least 1 km apart in cities and 10-20 km apart in remote places. It does not use GPS which is a major drawback because the train location is virtually unknown until it reaches the next station that may be 5 to 20 minutes away. HUMAN ERROR is one of the major reasons for train accidents. Every year we end up with at least 2 or 3 major train accidents purely based on human errors. Train to train collisions, over speeding trains and signaling errors are typical cases where hundreds of lives have been lost. Most of the time the reason would be on errors from drivers and signal operators. Another important problem is SAFETY AND SECURITY of passengers within trains. Terrorist organizations want to make the country unsafe and one of their ways is to plant bombs and explosives in of lives. The driver has got no way to know the happenings trains. Although security is available in railway stations, it is still not enough to prevent such attacks. Also, we hear news such as fire outbreak that originated in one compartment that quickly spread to other part of the trains resulting in loss of huge number behind the engine. Lives are also lost when people/vehicles try to cross the tracks without noticing an approaching train. Human error is one of the major reasons for train accidents. The onboard passengers are not able to know the approaching station

## 4. PROPOSED SYSTEM

Driverless train control system operates on the principle of a central railway server and communication devices fixed in each trains. All the trains on that particular route will update the central railway server with their location, speed and direction information. The train unit has an onboard GPS module and a GSM module. A passenger can simply query the location of a train via SMS from his mobile phone. The train unit will reply to the user mobile with the GPS coordinates of the present location it is traveling The server collects all such information, calculates the optimum speed of travel for each train and sends this information to those trains on the route.

The train control system will send its present GPS location information periodically (typically every 30 sec) to the central railway server. This message will immediately be acknowledged with a reply message from the server that will indicate the speed to travel. The train control system will automatically adjust its speed to the speed indicated by the server. The railway server is a software application that will be running on a secured PC environment.

The onboard disaster prevention network connects all the compartments of the train with the main control node over CAN bus (Controller Area Network). CAN is a networking protocol widely used in automotive applications to interconnect different parts of the vehicle. It is also being used in industrial automation networks. In unmanned railway crossings, truck/car/humans/animals may cross a railway line. The train control system oversees this and can adapt to slow down the speed accordingly. This overrides the speed setting from the server. It has a front SONAR ultrasonic range finder for this purpose. The advantages are (i) a passenger can query the location of a train via SMS. (ii) Accuracy of GPS location is very high. (iii) Centrally controlled route server. (iv) automatic speed adjustment

## 5. BLOCK DIAGRAM

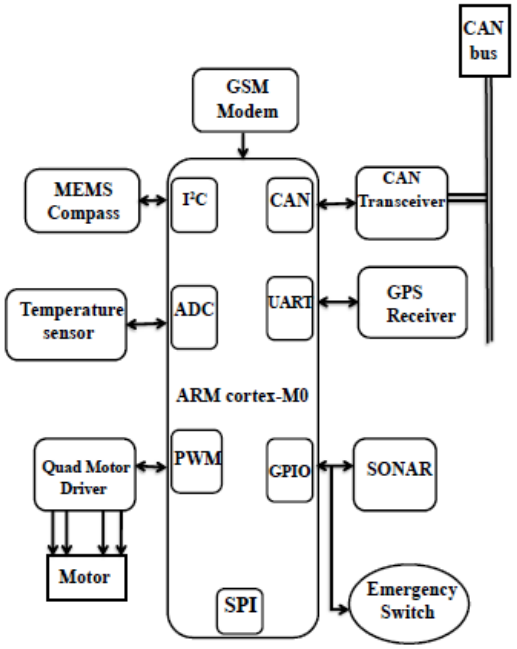


*Fig 2.1 Driving Car*

It has a front SONAR ultrasonic range finder to check any truck/car/humans/animals crossing a railway line and the train control system oversees this and can adapt to slow down the speed accordingly for this purpose.The onboard disaster prevention network connects all the compartments of the train with the main control node over CAN bus (Controller Area Network). Each CAN node has got a variety of sensors and devices to ensure the safety and comfort of the passengers. The LPC11C14 are ARM cortex-M0 based microcontrollers for embedded applications feature a high level of integration and low power consumption. The train unit have an onboard GPS and GSM module. The train control system send its present GPS location information at times to the central railway server. By using SONAR, we know how to detect the obstacles and lessen the severity of accidents. The onboard disaster prevention network connects all the compartments of

the train with the main control node over CAN bus. Metal detector sensor detects explosives by sensing the variations in the magnetic field around it. A digital MEMS magnetometer is used for this. Temperature sensor detects fire outbreaks by sensing large temperature variations.

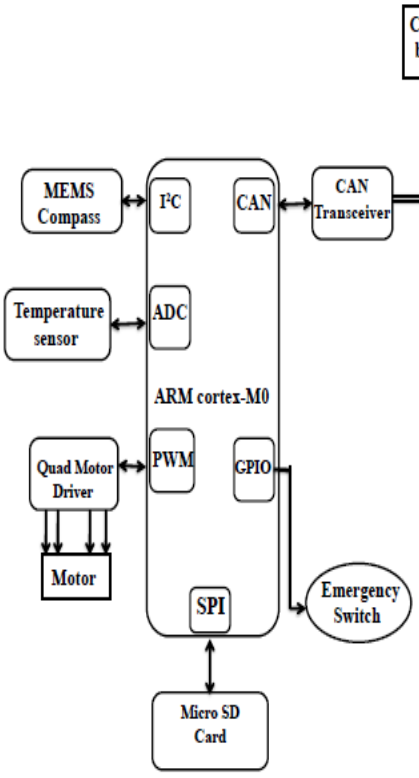


*Fig 2.2 Pulling Car*

It has a front SONAR ultrasonic range finder to check any truck/car/humans/animals crossing a railway line and the train control system oversees this and can adapt to slow down the speed accordingly for this purpose. The onboard disaster prevention network connects all the compartments of the train with the main control node over CAN bus (Controller Area Network). Each CAN node has got a variety of sensors and devices to ensure the safety and comfort of the passengers. The LPC11C14 are ARM cortex-M0 based microcontrollers for embedded applications feature a high level of integration and low power consumption. The train unit have an onboard GPS and GSM module. The train control system send its present GPS location information at times to the central railway server. By using SONAR, we know how to detect the obstacles and lessen the severity of accidents. The onboard disaster prevention network connects all the compartments of the train with the main control node over CAN bus. Metal detector sensor detects explosives by sensing the variations in the magnetic field around it. A digital MEMS magnetometer is used for this. Temperature sensor detects fire outbreaks by sensing large temperature variations. Audio announcement system is designed to announce the approaching station names found out via GPS location. This is also used to update critical emergency information with the passengers such as fire outbreak. Emergency push button to stop the train in critical situation The mp3 audio files are stored in an external 2-GB MicroSD memory card and an MP3 Decoder chip is used to play it in speaker. The microcontroller is able to access the files in memory card via a FAT-32 file system library.

## 6. RESULTS AND CONCLUSIONS

A passenger can get the location of a train via SMS from his mobile phone in the form of longitudinal and latitudinal of the train location. The message displays the Train location longitude=25.32 and latitude=45.65 on the screen. All the trains on that particular route will update the central railway server with their location, speed and direction information. The train control system will send its present GPS location information periodically (typically every 30 sec) to the central railway server. The train control system will automatically adjust its speed to the speed indicated by the server. In unmanned railway crossings, truck/car/humans/animals may cross a railway line. The train control system considers this and slow down the speed accordingly. In that case the message is Obstacle detected. Latitude=41.32 and longitude=21.87. Incase of any fire outbreaks in any compartment in train, the buzzer alert is given to other compartment and an alert message is send to central server and the train speed is controlled. The message will be Fire detected in coach 1. Latitude=41.32 and longitude=21.87 Incase some explosive element is detected in any compartment of train, the buzzer alert is given to other compartment and an alert message is send to central server. The message will be Explosive metal detected in coach 2. Latitude=41.32 and longitude=21.87 .In some emergency case, the emergency switch is pressed then the message is send to central server and the train get controlled by stopping it. The messages will be Emergency detected in coach 2. Latitude=41.32 and longitude=21.87

The project uses GPS data to monitor trains and offer real time information about the location of train to users. All the trains are monitored by a navigation system which is totally satellite based. At present the information of the running trains are monitored with the help of manual monitoring which is not perfect but with the help of this project the movement of the trains are recorded, which will also include the correct place and speed in real time basis. Passengers can also be available to see real time locations, as Centre of Railway Information System (CRIS) has integrated the GPS application with Google maps. INSAT-3C satellite will aid in location of moving trains. The GPS system is being capable of give an accuracy of about 10 meters, with a lag of about 2 minutes By using this project, the controller will only plan the running and scheduling of trains instead of co-ordination with various other stations to confirm the status of the trains.

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## APPENDICES