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Smart Satellite Technilogy in Railways

1 Sagili Mallem Kondaiah, 2 T.Rama Mohan Reddy
1 M.Tech (ES) from Akshaya Bharathi Institute of Technology (ABIT), Siddavattam, Kadapa District, A.P., India

2 Assistant professor in Electronics and Communication Engineering, Akshaya Bharathi Institute of Technology (ABIT), Siddavattam, Kadapa District, A.P., India

ABSTRACT

Applications of Global Navigation Satellite System (GNSS) in Railways are become more and more frequent. So far, the focus has mostly been on non-safety related applications, such as in passenger information systems and for freight logistics, which are typically not standardized. When moving GNSS application into the domain of safety, such as for train control systems, a much better understanding of GNSS behavior is needed. Despite of the multiple past rail research projects, the necessary level of knowledge on the characterization of the satellite-based positioning performance within the rail environment is missing. This is especially true for the use of GNSS in standardized applications, such as the European Railway Traffic Management System (ERTMS), where performance of GNSS receivers should be harmonized to achieve standardized, guaranteed performance and thus interoperability between on-board units of different suppliers. The ERTMS system has been developed over the last two decades to eventually replace all existing national train control and train radio systems which have significantly hampered cross border rail traffic in Europe, but also the opening of rail networks to open competition between operators.

INTRODUCTION

Rail is a vital service to global society and the transport backbone of sustainable economy. It has an unprecedented opportunity to achieve the sustainability which is required for the twenty first century. By this Rail will be able to respond to the expected growth in transport demand, both passenger and freight. In this study, we analyzed raw GNSS information obtained in a real railroad line condition to demonstrate the truth of GNSS. These answers will be very important for proposing a better positioning algorithm and for railway reliability idea. GNSS data were derived from a large number of test runs of more than deuce 2,000 kilo meter along several railway lines in the field of the West Japan Railway system Companionship in Japan. First, we evaluated the accuracy to establish the GNSS position computer error under real railway lines based on precise character place. The precise reference billet were prepared using local RTK-GNSS fixed positions, GNSS velocity , IMU , and a speed sensor equipped on the train. We analyzed the temporal multipath errors for each satellite to show the error distribution. Furthermore, to improve the accuracy of these data, several method acting including signal strength check, impostor -range check by Doppler frequency, and data showing by using the true distance between two antennae, were proposed. As a result, it was confirmed that large errors and

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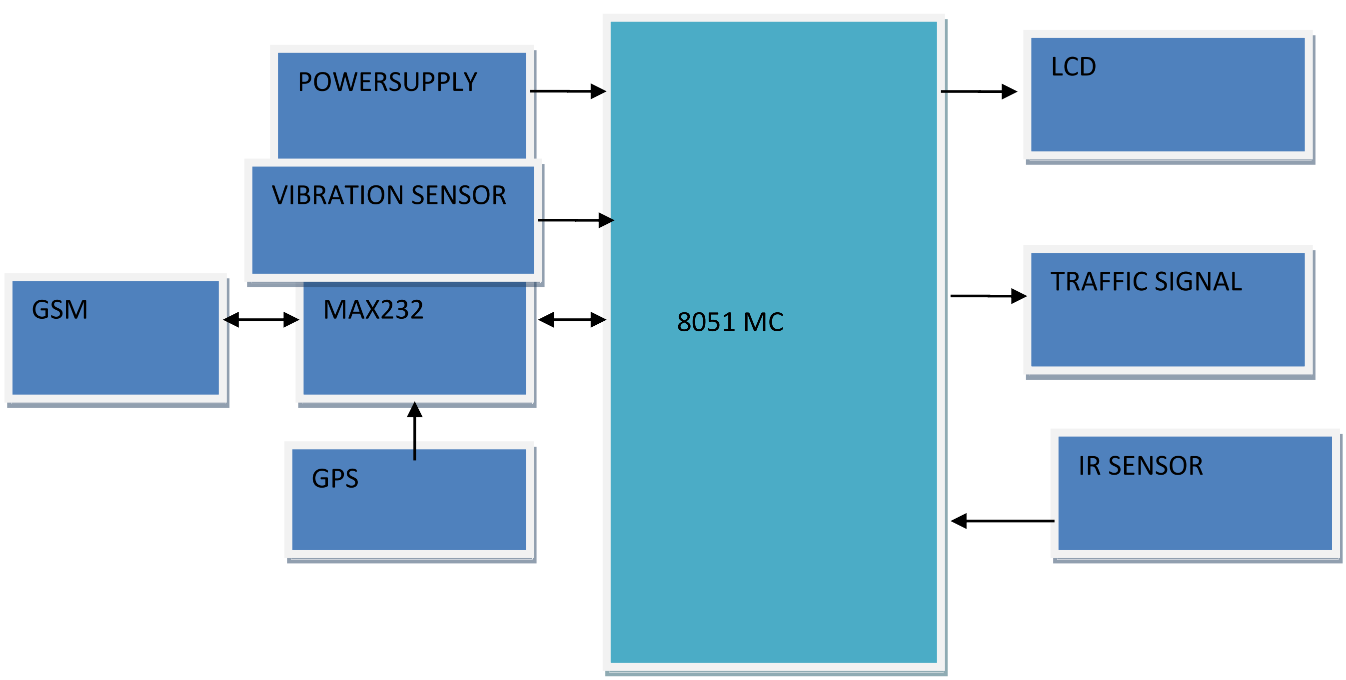
jumps were greatly reduced. For example, the percentage of large horizontal error over 5 m was reduced approximately 66% by using our proposed multipath spotting techniques.

PROPOSED SYSTEM

Worldwide Navigation Satellite System (GNSS) in Railways are turned out to be increasingly visited. Up until now, the spotlight has generally been on non-security related applications, for example, in traveler data frameworks and for cargo coordination, which are commonly not institutionalized. When moving GNSS application into the space of security, for example, for train control frameworks, a greatly improved comprehension of GNSS conduct is required. In spite of the different past rail research extends, the important dimension of learning on the portrayal of the satellite-based situating execution inside the rail condition is absent. This is particularly valid for the utilization of GNSS in institutionalized applications, for example, the European Railway Traffic Management System (ERTMS), where execution of GNSS recipients ought to be orchestrated to accomplish institutionalized, ensured execution and along these lines interoperability between ready units of various providers. The ERTMS framework has been created throughout the most recent two decades to inevitably supplant all current national train control and train radio frameworks which have fundamentally hampered cross outskirt rail traffic in Europe, yet additionally the opening of rail systems to open challenge between administrators.

BLOCK DIAGRAM



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POWER SUPPLY

Power supply is a single supply voltage 5V. In some cases, the ripple in a transmitting burst may causes voltage drops when current consumption rises to typical peaks of 2A. To the power supply must be able to provide sufficient current up to 2A.

GPS Module (Neo-6M):

It stands for Global Positioning System, which gives the current date, time, longitude, latitude, altitude, speed, and travel direction / heading among and other data of any device. It can be interfaced with normal 5V Microcontrollers with the help of the inbuilt 3V-5V converter unit. It consists of 4 Pins are 5V, TX, RX, and GND. This standalone 5V GPS Module does not require external components. It consists of internal RTC Back up battery and can be directly connected to USART of the microcontroller.

GSM (SIM900A):

GSM which stands for Global System for Mobile Communication is a digital mobile telephony system. SIM900 can fit almost all the space requirements in the M2M application with dimensions of 24mm x 24mm x 3 mm. This is a GSM/GPRS-compatible Quad-band cell phone, which works on a frequency of 850/900/1800/1900MHz and can be used not only to access the Internet, but also for oral communication (provided that it is connected to a microphone and a small loud speaker) and for SMSs and calls. The processor is also in charge of a SIM card which needs to be attached to the outer wall of the module. The module works on voltage between 3.4 and 4.5 V.

VIBRATION SENSOR

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The vibration sensor with certain acceleration is fixed in the vehicle. When a vehicle meets with an accident, the vibration sensor detects the signal. If vibration range exceeds above certain level (15mA), then it sends instruction to microcontroller.

IR SENSOR

IR Transmitter is an LED which emits infrared rays. IR Receiver is used to receive the IR rays. Both IR transmitter and receiver should be placed straight line to each other. The transmitted signal is given to IR transmitter whenever the signal is high, the IR transmitter LED is conducting it passes the IR rays to the receiver. The IR receiver is connected with comparator.

LCD DISPLAY

The liquid-crystal display (LCD) is that uses the properties of both liquid and crystals and there is need of light to read the display. It is used to display the operating instructions and status of the output. It is has better legibility, more information.

RESULT

To guarantee the high availability of the communication subsystem required by current wagon train dominance standards, maximize the usage of radio resources and reduce the operational expenditure, both QoS guaranteed connectedness and best crusade links are employed in the proposed architecture. The QoS link is provided by the satellite net, meanwhile, the best endeavor links are provided by PLMNs operated by diverse hustler.

ADVANTAGES

It is an all-in-one system. Hence no need to carry multiple devices.

• GPS following component tracks the client persistently

• When the battery is running low, it consequently sends the area the pre-put away contacts.

• The second unmistakable component is, it additionally recognizes the concealed cameras which help in our protection.

• This gadget works without web network.

CONCLUSION AND FUTURESCOPE

So as to assess the exhibitions of the proposed PC design, a relieving of tests dependent on both city and unforgiving condition situations has been completed. A cloud based test system, where every hub has been reproduced by a virtual machine has been actualized. Two virtual machines with Ubuntu 14 .04 trey 2bit careful activity framework were introduced in Virtual Corner. In each virtual machine, a Multi way TCP skilled Linux Kernel (variant 3.16) was stacked. Each virtual machine was bunko game figured with three system connectors. Two of them were utilized to individually reenact the best exertion and the QoS ensured course, while the third one was utilized to synchronize the virtual motorcar by methods for NTP. The traffic was produced by D-ITG (Distributed Net Traffics Generator) . Both inbound and outbound traffic was observed and recorded through Wire shark. The system surroundings emulator has been written in Python. It permits to powerfully changing the insights portraying each connection at run time ceaselessly the recreation.

REFERENCES

[1] B. Minary and J. P. Lozac'h, "TR@IN-MD: The savvy railroad transport for risky products," in Proc. seventh World Congr. Railroad Res., Montreal, QC, Canada, 2006.

[2] B. Stadlmann, "Mechanization of operational train control on territorial branch lines by a fundamental train control framework," in Proc. IEEE Intell. Transp. Syst. Conf. (ITSC), Sep. 2006, pp. 50–54.

[3] I. Durazo-Cardenas, A. Starr, A. Tsourdos, M. Bevilacqua, and J. Morineau, "Exact vehicle area as a basic parameter for savvy mindful rail-track support frameworks," in Proc. CIRP, vol. 22. 2014, pp. 219–224.

[4] T. Albrecht, K. Luddecke, and J. Zimmermann, "An exact and solid train situating framework and its utilization for mechanization of train task," in Proc. IEEE Int. Conf. Intell. Rail Transp. (ICIRT), Aug./Sep. 2013, pp. 134–139.

[5] S. Dhahbi, A. Abbas-Turki, S. Hayat, and A. El Moudni, "Investigation of the rapid trains situating framework: European flagging framework ERTMS/ETCS," in Proc. fourth Int. Conf. Coordinations (LOGISTIQUA), May 2011, pp. 468–473.

[6] J. Roca and J. L. Perez, All Aboard! On Track With Catalonia's Trains. New York, NY, USA: GPS World, 1997.

[7] Precise Positioning Services in the Rail Sector, Report, Acil Allen Consulting, Melbourne, VIC, Australia, Jun. 2013.

[8] R. S. Hosse, H. Manz, K. Burmeister, and E. Schnieder, "Market investigation for satellite train localisation for train control frameworks," in Proc. fifth Conf., Transp. Arrangements Res. Sending Transp. Res. Field (TRA), Apr. 2014, pp. 1–10.

[9] A. Neri, F. Rispoli, and P. Salvatori, “An analytical assessment of a GNSS-based train integrity solution in typical ERTMS level 3 scenarios,” in Proc. Eur. Navigat. Conf. (ENC), Bordeaux, France, 2015.