International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 06 Issue: 02 | Feb 2019 www.irjet.net p-ISSN: 2395-0072

IOT BASED MULTISENSORY SYSTEM TO ENHANCE RAILWAY SAFETY

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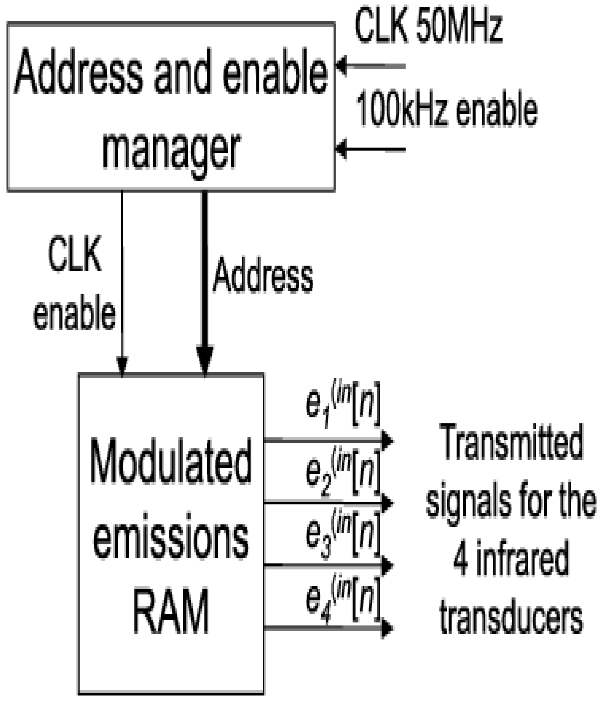
Abstract - *Due to the continuous development of the high speed railway lines and the growth of automatic systems, it is becoming more and more necessary to install safety elements to prevent accidents. For that purpose, this project proposes the design of a multisensory system, which consist of infrared (IR) and ultrasonic (US) sensors, which are placed at opposing sides of the railway tracks, respectively, in order to establish optical and acoustic links between them. When the train arrives at the particular location then the details about that train will be given from the database. Now, check the train details, if match then and only then, the parameters will be measured and the speed of train regarding to that parameters will be sent to the loco pilots display. In the parameters, this project measures the rainfall in mm, temperature, fog, humidity and route vibrations. Also, the time required that present train to pass that location will be measured. On the basis of these all parameters, the allowable speed of the train at that particular location will be sent to the loco pilot. In addition, all these information will be sent to the database. Now, information about train will be sent to another train which will be next arrived at that location. If there is any change in parameters, then according to that parameters allowable speed of train will send to that trains loco pilot. Overall, it can be stated that the aim of this article is to provide a detailed examination of the state-of-the-art of different technologies and services that will revolutionize the railway industry and will allow for confronting today challenges.*

I. INTRODUCTION

The future of the railway industry is expected to rely upon smart transportation systems that leverage technologies over a large rail network infrastructure to reduce its life-cycle cost. New services,such as integrated security, asset management, and predictive maintenance, are expected to improve timely decision-making for issues like safety, scheduling, and system capacity. Smart railways represent a combination of interconnected technological solutions and components, as well as modern transportation infrastructure like automatic ticketing systems, digital displays, and smart meters.Likewise, these systems require seamless high data rate wireless connectivity and integrated software solutions to optimize the usage of assets, from tracks to trains, to meet the ever-growing demand for energy-efficient and safer services. The driving factors of the smart railways are expected to enforce the growth of the industry. These factors include the increasing importance of sustainability, government regulations, demographics (i.e., growing traffic of passengers and freight, aging population, and rapid urbanization), macroeconomics (i.e., limited public funding and government deficit, government initiatives and partnership models), microeconomics (i.e., price sensitivity, demands for an improved passenger experience, stakeholders interests), the growing importance of smart cities, the incredible pace of telecommunications and technological change, and the need for mobility.Many approaches can be pursued in order to improve information delivered by a sensor system. A signal processing based on the modeling of the sensor characteristic can be used in order to reduce undesired effects influencing the sensor signal. In this case we deal with an inverse reconstruction problem in which the measured quantity is calculated using a priori knowledge, e. g. collected during calibration processes. A further approach is to model the dependence on a steering quantity and to solve the corresponding inverse identification problem. In this case a set of sensor operating points are available at the same value of the measured quantity permitting new possibilities for improving sensory information. This kind of sensor systems can be called varied input sensor (VIS) and closes the gap between single sensors and multi sensor systems. Multi-sensor systems reach many advantages through integration of redundant and diverse sensor signals in order to achieve advantages, such as a better accuracy, a higher reliability or a better dynamic response.



2 LITERATURE REVIEW:

An automatic train protection is one that helps to anticipate collisions with speed restrictions and applying brakes. To boost the system availableness inside the on the market the web of Things may be a system that permits varied physical devices, sensible devices, vehicles additionally referred to as connected devices that are interconnected with each other via internet. IoT consists of varied softwares, sensors that enables to collect and exchange data. It enables the connected devices to collect data and exchange them. IoT creates direct communication of the existing physical world into the computer systems. IoT provides the aptitude that allows the objects to be remotely monitored, controlled and sensed across the network due to which there is improved efficiency, accuracy, less human intervention and a lot of dependability as a result there are economic advantages likewise The factor word employed in IoT can be Associate in Nursing object that have the power to gather and transfer data over a network while not manual intervention or help. Internet of things will connect completely different devices that are embedded in numerous systems to the net. These devices are appointed IP addresses to unambiguously establish them. Eg. Automobiles with inbuilt sensors to trace their location. The property then helps North American nation capture additional information from additional places, guaranteeing additional ways in which of skyrocketing potency and up safety and IoT security. The organizations can be benefitted a lot by IoT as they can help them in improved process efficiency, utilization of assets and productivity. With the ability to connect various devices or objects using sensors and connectivity, they can prove to be beneficial from real time insights and analytics., which would help them make smarter decisions.

Three wireless access modes can be enabled to provide good coverage inside the cars:

•Direct transmission from the Base Station (BS). The problem in this mode is that the signal from the BS has to penetrate into the car, what derives in a loss of up to 24 dB that needs to be compensated by incrementing the transmission power and the receiver sensitivity.

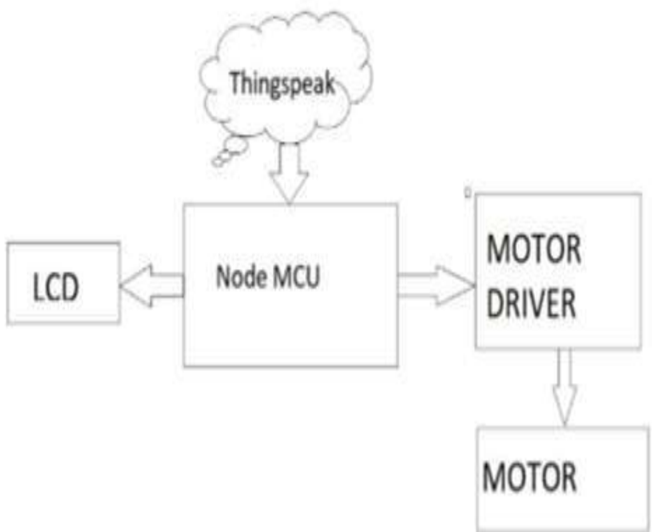
•Use of in-car repeaters. The signals from the BS are received by an on-vehicle transceiver, which forwards them to a micro-base or to a Wi-Fi signal repeater. Note that this scheme increases the signal power through repeaters, but these additional devices increase the communications delay significantly. For this reason, a topic under research is the design and implementation of transmission schemes that offer good coverage for repeaters at high speeds.

•Two-hop access mode. In this mode the transmission requires first to travel from the BS to the antennas located on top of the train, and then to the receiver placed inside the train. This approach usually avoids the penetration losses related to a direct transmission from the BS. Never the less,it is worth noting that, since high frequency bands have large attenuations and path losses, its use may derive in a limited coverage.

3. IOT

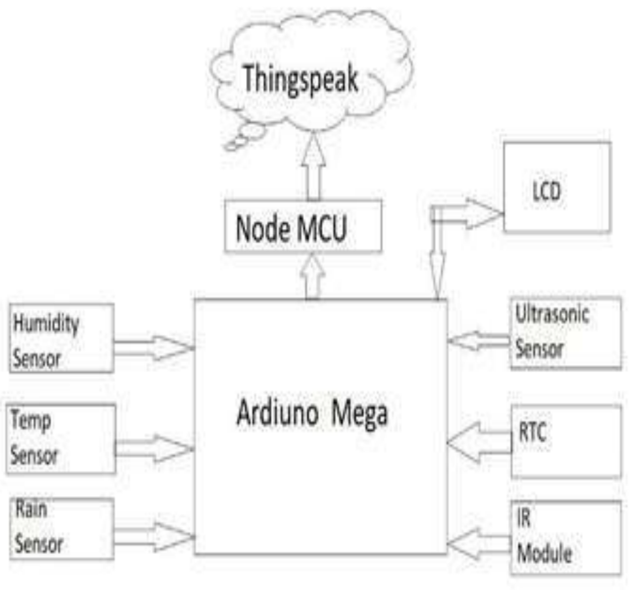
The edifice wherever I even have a reservation is aware of I am returning and also the approximate time of my arrival as a result of I even have allowed Apple and Google to trace my location. It also knows that I am hot and sweaty from my trip because of the temperature and moisture sensors that are part of my smart watch. The bedroom i'll keep in is presently dormant (no lights, drapes closed, the temperature is at optimized dormant levels). Upon my arrival, the valet is aware of it's Pine Tree State. He opens my door and also the automobile adjusts the seat as a result of it detects the valet. My preference is to hold my very own bag, thus I am not accosted by the supervisor. Once in proximity of the edifice lobby, a secure key app is on the market on my smart phone. By the time I reach the elevator, the space temporary worker has adjusted to coincide with my smart watch sensors. The light level, music and privacy settings are to my necessities. Because I am hot and perspiring the space conjointly prepares quandary for a shower I'll most likely take when getting in the space. As I approach, the secure key app unlocks the space door. Once settled for the night, {the room the space the are} detects the lights are clothed, it changes the temperature setting to my sleep preferences.

Communication Systems in Railway ScenariosRailway lines can be categorized mainly into one of four classes: urban, urban/inter-city, inter-cityand/or high-speed. It is necessary to analyze lines or networks separately, given that their differencesmay have impact on their requirements . Furthermore, railway communication systemscan be divided into three main application groups: safety and control, operator, and customeroriented networks. In this Section, the communications in the most representative railway scenarios(Figure 2) are described: train-to-infrastructure communications, inter-car communications, intra-carcommunications, communications inside the station, infrastructure-to-infrastructure communications, and wireless sensor networks. In the following subsections, future directions of wireless systems inrailways are addressed.



In this situation, each space during this explicit edifice chain has multiple sensors and actuators. Every rental car has multiple sensors and actuators. I am sporting multiple sensors and actuators, like a watch vibration for alerts. When a train begins its operation, it needs to perform self-diagnosis to ensure initial safety control. When it is in operation (in driving), various types of IoT sensors for monitoring collect data to proactively perform safety control.

Interior IoT sensors, such as humidity sensor and fire sensor, for regular monitoring can take constant or close to constant data collection rates. Communication network within a vehicle can be formed in a combination of wired and wireless connections of IoT sensors. Some of the IoT sensor data are utilized for actuators without data transmission to external network and other data collected from sensors are transmitted to external network. To deliver the IoT sensor data in an orderly manner, a single or multiple gateways of a train to outside communication networks. The all collected data in sensors are transmitted to cloud server through node MCU. This architecture is beneficial when the number of sensors is large and coverage of whole sensor network is also large to some extent. Channel access for IoT sensor network can be prioritized according to data type and the priority of sensor data depends on situation even when they are obtained from the same sensor. Safety-critical IoT sensor data can be immediately transmitted to the external network by assigning a higher priority in contention or special time slots or even a separate gateway. In transmitter side all the data istransmitted to receiver thing speak server and it shows the data in LCD to the railway pilot.



1. Proposed System Architecture for transmitter

4. TRAIN-TO-INFRASTRUCTURE CONNECTION

This scenario requires two types of links among the Access Point (AP) transceivers located in the train and the fixed network infrastructure. These links must be bidirectional, with high data rates and latencies lower than 100 ms while travelling at speeds up to 350 km/h or even higher. Jointly with an availability of 98–99% mandatory to comply with Reliability, Availability, Maintainability and Safety (RAMS) requirements. Several works exist in the literature related to the characterization of train-to-ground wireless links . Generally, train-to-infrastructure systems communicate with wayside units using GSM-R or can cause in GSM-R has been analyzed exhaustively in the literature. Furthermore, in the case of high-speed scenarios, Wang et al. present a survey on channel measurements and models. Infrastructures are connected in real-time and require bidirectional links with high data rates and low latencies. The information is transferred between the cameras or the IoT infrastructure and the APs deployed on the trains, stations, platforms, and the wayside along rail tracks.

6. CONCLUSION

In this paper, a configuration is planned that may avoid the accidents that may be caused thanks to the broken tracks. Since with the enlargement of railways and large increase in variety of trains the main drawback rising is that the maintenance of the tracks. With the upper frequency of trains running on tracks the possibilities of developing damages within the tracks are terribly high. Solely betting on manual work is time taken and typically may also be life risky. Also with the restricted variety of workers it's terribly tough to spot the matter and solve it in restricted time. Since the railway networks are terribly wide swollen with restricted manpower so the possibilities are terribly high that tracks fractures might get forgotten. If these harm gets unheeded then a serious mishap might occur. IoT and cloud computing are 2 major advancements within the technology that may facilitate solve this drawback. This technology isn't solely reliable however conjointly value effective as compared to manual expenses. Since this technology would cost a good amount therefore it can be implemented in the regions where the train frequency is very high as they are very prone to develop fractures. For example in Cities. In rural areas where trains frequency is very less and thus chances of rail fracture is very low, manual work may success.

REFERENCES

[1] Gautam S, Nemade S, Sakla T. Simulation of an anticollisionsystem for railways on same track. International Journal of Engineering and Technology(IJST). 2010; 2(9):483237.

[2] Senthil Kumar P, Nadira Banu AR Kamal. Optimal Integrity Policy for Encrypted Data using Cloud Computing in Secure Storage. Indian Journal of Science and Technology (IJST). 2016 March; 9(11):110

[3] John Livingston J, Umakeshwari A. Internet of Things (IoT) Application using IP address enabled Sensor Node and Web Server. Indian Journal of Science and Technology (IJST). 2015 May; 8(S9):20712.

[4] A Noureldin, et al., "Performance Enhancement of MEMS-Based INS/GPS Integration for Low-Cost Navigation Applications", IEEE Trans. V.T., vol. 58, no. 3,pp.1077-1096, Mar. 2009.

[5] M Malvezzi, et al., "A localization algorithm for railway vehicles based on sensor fusion between tachometers and inertial measurement units", Proc. of Inst. Mecha. Engine. Part F: Journal of Rail and Rapid Transit, vol.228, no.4, pp.431-448, Apr. 2013. Val, I.; Arriola, A.;

6. Lehner, A.; Rico García, C.; Strang, T. On the performance of TETRA DMO short data service in railway VANETs. Wirel. Pers. Commun. **2013**, 69, 1647–1669.

7. Van Den Abeele, D.; Berbineau, M.;Wahl, M. Procede de Transfert de Donnees D'alerte Entre un Vehicule Ferroviaire en Panne et un Centre de Controle, Dispositif Associe. International Patents WO2010125321 A1, 4 November 2010.

8. Aguirre, E.; López-Iturri, P.; Azpilicueta, L.; Falcone, F. Characterization of wireless channel response in in-vehicle environments. In Proceedings of the 2014 14th Mediterranean Microwave Symposium, Marrakech, Morocco, 12–14 December 2014; pp. 1–4.

9. Elhillali, Y.; Tatkeu, C.; Deloof, P.; Sakkila, L.; Rivenq, A.; Rouvaen, J.M. Enhanced high data rate communication system using embedded cooperative radar for intelligent transports systems. Transp. Res. Part C Emerg. Technol. **2010**, 18, 429–439.

10. Ms.Arunkumari.G 3 Ms. A. Sivasankari 1 , Ms. P.Bhuvana 2, Cloud Computing Ambiance Using Secluded Access Control Method, International Research Journal of Engineering and Technology (IRJET),1054 to 1058.

11. Mrs.G Sangeetha Lakshmi 2 and Ms. A. Siva Sankari 3 M s. G. Arun kumari 1Task Oriented & Arrangement On Low Power Consumption In Mobile Cloud Computing Using Supply Detection Algorithm, International Research Journal of Engineering and Technology (IRJET), 156-163.

12. Mrs.G Sangeetha Lakshmi 2 and Ms. A. Siva Sankari 3 M s. G. Arun kumari 1, Recent Advancements and Future Challenges in Submarine Acoustic System Using Sensor and Resource Innovation Algorithm, International Journal For Research In Emerging Science And Technology, 77 to 84.