

Smart Train Accident Detection And Prevention System Using Iot Technology

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Abstract - The point of this paper is to plan and foster a finger impression based train motor getting to framework with a perspective on lessening manual working and to avert unauthorised users. As of late, train commandeer has been on the increment as equipped burglars center around taking vehicles, particularly the pristine ones. This is accomplished with the utilization of a finger impression module, ATmega328P microcontroller and Liquid Crystal Display (LCD) module. Correspondence based train control (CBTC) [8] is a control mechanism which use bidirectional train-ground to operate the trains in a safer manner. Since there is problem in controlling the train via remote operation and its transportability, wireless networks can be incorporated to manage the execution of train control system.

For that we used ESP2866 wifi module which is used for uploading the train engine drivers database into the server. However we can avoid this collision and prevent the train from accident by utilizing the impact identification innovation which can be made by ultrasonic sound .This technology is used to detect the obstacle and it gradually slow down the speed of the train by applying the air brake to stop the train before the mishap occurs.

Keywords: *fingerprint module, IOT, Sensors, accident detection, accident prevention.*

I. INTRODUCTION

The railroad is the most generally perceived and famous eco-accommodating transportation framework. It is for the most part used for an agreeable

and safe journey. As a result of low passage and high volume limit, almost everyone can bear its expense. .

Yet, these days we see more number of accidents happening in rail route correspondence. These mishaps have happened because of the obstructions in the railroad track which can't be recognized at the right time. This cause more accidents to occur which takes the lives of numerous passengers. In our country, the limit of a train is right around 2000 individuals. Be that as it may, once in a while it turns ruinous when the train makes a crash with other objects.

Therefore, this project aims to manage with the safety of the train which will assist to avoid collision with other object. This project, uses an anti-collision device [7] that relies on GPS system for positioning and a distance-measuring system based on ultrasonic sound with PIC 16F877.

II. LITERATURE SURVEY

In article [1] titled “ARM Hardware Platform for Vehicular Monitoring and Tracking” from this paper it is inferred that the system tracks the speed, position and identity of the vehicle to which it is planted upon. Information is gathered using a microcontroller ARM7 TDMI-S core processor and different modules are involved to display the information on Graphical User Interface. In paper [2] titled “Implementation of ZigBee Based Train Anti - Collision and Level Crossing Protection System for Indian Railways” the key insights of this paper is the

importance of communication in bidirectional train grounds to avoid collision. It is useful in level cross gates where there is high possibility of collision. The proposed idea is organised as follows: First we introduce a finger print module which helps to identify only the authorized person is operating the train and the next section deals with the detection and prevention of train accidents.

III. EXISTING SYSTEM

In our existing system, as of now, the Indian railways uses manual operation of the train engine control start /stop without using the Biometric authentication system. This framework includes running information through calculations for an accurate output. By using PIN identification number, it always correctly identifies the user or other registered individuals. Biometric identification is used for accessing the engine unit.

Fingerprint recognition system is cheap contrasted with other biometric frameworks, and it is easy to use, has high unwavering quality and can be used in a variety of environments. Without utilizing the biometric we can't accomplish the legitimate securable information correspondence between the networks. Biometric systems is a strong security system for many different applications and it can likewise implemented in the automobile industry. The development made in the railway sector increases traffic density on the railway sectors. This increased traffic density indeed resulting in more train accidents.

IV. PROPOSED SYSTEM

Our proposed system is looking forward of the train engine control (start, stop) with the help of a biometric based authentication system. Before starting the train engine, the engine will give the finger print access to the system, if it is recognized, the message will go to the server with the help of the ESP2866 module (IOT).

If the drivers access the wrong finger print, the valve will close temporarily, so no one can operate the engine without permission from control section. The status of the authentication is displayed in the LCD systems, if there is wrong authentication a buzzer is used to alert the people around the engine to intimate unauthorized drivers. Biometric based train protection

is a complete useful methodology for the IRCTC for security management.

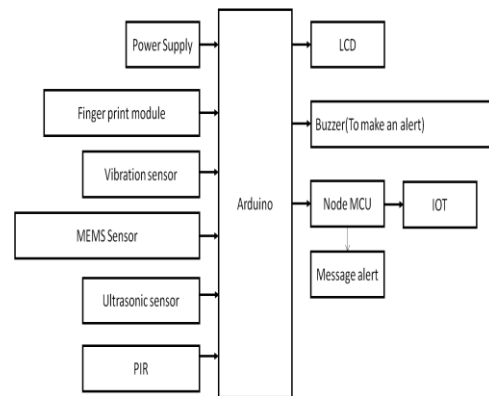


Fig.1 Prototype Functional Diagram

The above Fig.1 presents our proposed system. Microcontrollers depend on a host computer for developing and compiling programs.

We initialized this technique for safety and security purposes. The PIR sensor, Ultrasonic sensor, MEMS sensor, vibration sensor are connected to the Arduino microcontroller. These sensors are used for monitoring the human in the track and the obstacle avoidance. The sensors data are transferred to the node MCU. These data will be sent to the IOT web page directly. The fingerprint module is used for authentication of the driver to start and stop the engine.

V. EXPERIMENTAL RESULTS AND DISCUSSION

The proposed system is implemented in the designed manner successfully as shown in the prototype Fig. 2

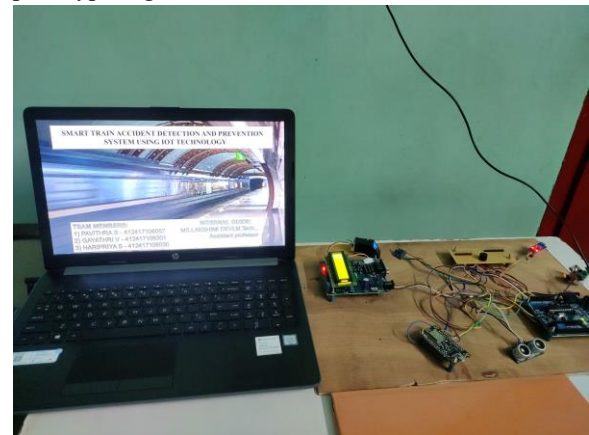


Fig. 2 . Working Prototype Model

The technology used in this system can detect and prevent accidents in early stages. The ultimate aim is to ensure the safety of the passengers and public by preventing them from accidents. There are a few uncontrollable limitations that can be observed in the project namely bad weather, which could affect the sensor variations and considerable delay in results and message alerts. Tracking the geographical position of the train with the help of GPS [5] is shown in Fig. 3. This system is very important for detecting the possible accidents that may take place in the station.

Fig. 4 depicts the sensor measurements of the project which is planted in the Head and Tail compartments of the train, indeed displayed in the IOT web page. It basically has the readings of the sensors which are monitored closely with respect to its minimum threshold for any anomaly.

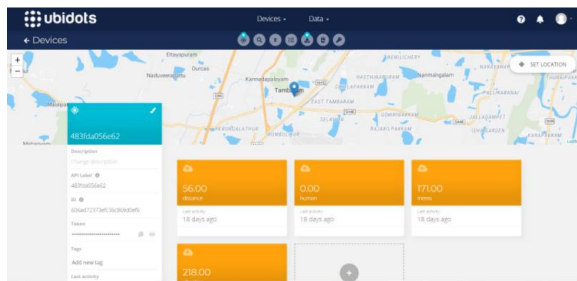


Fig.3 Location of the train is tracked

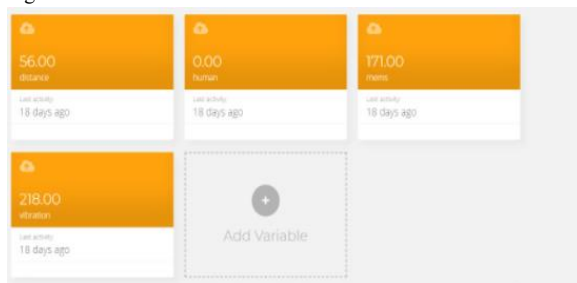


Fig. 4 Parameters Measured through sensors are updated in the webpage

VII. CONCLUSION

The technology used in the system can detect and prevent accidents in early stages. The ultimate aim is to ensure safety of the passengers and public by preventing them from accidents [7]. This system accomplished with the utilization of a finger impression module. All the components and sensors are controlled by Atmel AT89S52 Microcontroller and also supervises the transmission, reception and displaying the track of the train. An Ad hoc network [10] is formed by the wireless devices involved among the railway stations and between trains to communicate with each other. According to the experimental results, When this system is implemented there will be a drastic reduction in the number of train accidents from

occurring. Indian railway department has not yet implemented this technique till now. If this system is implemented in real time, it is ensured that nearly 70% of the train accidents can be avoided.

REFERENCES

- [1] Saurabh S.Chakole, Vivek R. Kapur, Suryawanshi Y. A. "ARM Hardware Platform for Vehicular Monitoring and Tracking", Communication Systems and Network Technologies, International Conference IEEE 2013.
- [2] Arun P, Careena P, Madhukumar S, Sabarinath G Implementation of Zigbee Based Train Anti-Collision And Level Crossing Protection System for Indian Railways in International Journal of Latest Trends in Engineering and Technology (IJLTET) Vol.2, Issue1 January 2013 ISSN: 2278- 621X.
- [3] Sehchan Oh, Yongki Yoon, Yongkyu Kim, Automatic Train Protection Simulation for Radio based Train Control System, Radio-Based Train Control Research Team, Korea Railroad Research Institute IEEE 2012.
- [4] Shubhangi Deshmukh & V.V. Shete," Developing ARM Based PDA Using Inferno OS" in International Conference on Computer Communication and Informatics IEEE 2012.
- [5] Sameer Darekar, Atul Chikane, Rutujit Diwate, Amol Deshmukh, Prof. Archana Shinde, "Tracking system using GPS and GSM: practical approach", International Journal of Scientific & Engineering Research Volume 3, Issue 5, May-2012.
- [6] Teodor Neagoe, Ernest Karjala ,Logica Banica "Why ARM Processors are the Best Choice for Embedded Low-Power Applications "in 16th International Symposium for Design and Technology in Electronic Packaging (SIITME), IEEE 2010.
- [7] Bhatt, Ajaykumar A, "An Anti-Collision Device (ACD) Network A Train Collision Prevention System (TCPS)" in International Railway Safety Conference (IRSC) - Goa (India), October 2007.
- [8] Standard for Communications-Based Train Control (CBTC) Performance and Functional Requirements, IEEE Std. 1474.1-2004 (Revision of IEEE Std 1474.1-1999), pp. 0_1-45, 2004.
- [9] P. Fraga-Lamas, T. M. Fernández-Caramés, L. Castedo, "Towards the Internet of smart trains: A review on industrial IoT-connected railways",Sensors, vol. 17, no. 6, pp. 1457, Jun. 2017.
- [10] Jain P.C., Vijaygopalan K.P., "RFID and Wireless Sensor Networks",Proceedings of ASCNT, CDAC, Noida, India, pp. 1-11, 2010.