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Smart Railway System using GSM based GPS

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ABSTRACT: In the Railway system, normally we use bridges or staircase to cross the platforms. Sometimes it is very difficult for aged & physical challenged people to cross through bridges .Our project find the solution for this problem. In this project we are going use the movable platform which is also known as mobile platform where people use to cross the platform. This happens through IR sensors. Micro controller is used to send the signals. Based on the motion detection, the platform will act accordingly so that all the pedestrians can cross the platforms with out any difficulty .Our another application of the project is Automatic Railway track crack detection system using GSM Module and GPS. Generally, there are more accidents occurring because of the cracks in between the railway tracks. In this application, we are detecting the crack of a track using IR sensors, the GSM (Global system for Mobile communications) Module, GPS (Global Positioning system) and Arduino module. It implements efficient method of detecting the cracks.

KEYWORDS: IR Sensors, Servo Motor, Arduino 328p, GSM Module, GPS.

I.INTRODUCTION

The main purpose of this project is to build the smart world using updated and advanced technologies, because present generation is almost busy in their respective work and they do not have time. So we developed this project basically to avoid human efforts. In railway stations usually we used to cross the platforms by using bridges and staircases. It is very difficult for the physically handicapped persons and elder persons using the bridges or staircase. So for them specially escalator and lift came into an action, but even that also became difficult and non-convenient for edged persons and it consumes lot of time[1]. So, that the reason, our project is developed. This project is helpful to reduce such problems because here we are using the automatic movable railway platform. In this application, IR sensors are used to sense the motion of train that approaching the platform, if the motion of the train is detected, then the movable platform is moved away until the train leaves platform, immediately after the departure of the train, the platform will again gets connected to the other platform[2].

And in our another application of this project, it is to find out whether there is any cracks present on the railway tracks. In India, the major issue is that making transport with safety and sustainability[3]. So, this project will help us to carry out better transportation. At present ultrasonic testing is used in India, in order to find out the cracks on the railway tracks but it is not fully effective, because this ultrasonic sensors testing includes limited testing distance and it is very time consuming process and we have no guarantee that manual testing gives better result. So we are using automated testing to find the cracks, also we are using solar panel to produce power for requirement of our project, so that there is no need to change the battery. In this application, we are using the GSM modem and sensors, if a crack is detected the sensor sends that signal on the micro controller then, it is send to a GPS receiver ,it will find out the exact location where the crack is occurred using GSM module and send the information to higher authorities[4]. So, here we can save the time because it is an instant and automatic process and it does not require much man power also. So, it is an efficient as well as effective method.

II.LITERATURE REVIEW

Acy M. kottali[5]; The research work carried out by the mentioned author mainly focus on the difficulty of the physically handicapped and elder persons by establishing AT mega 16A micro controller and DC motor based system to control the



platform. The main purpose of this paper is to completely avoid difficulty for people. In this paper they used stepper motor which does not give high accuracy.

In “Automated platform bridge in Railway stations” paper[6], the author Muhammad Ali Maizidi has introduced the system that is Automatic Mobile surface platform. It also helps for transferring heavy weighted goods and this paper also provides information to the passengers by using NFC information cornrrs which is arranged at different places in the railway systems. This system works on information received by the sensor but it is not that efficient.

In this particular paper, the authors Rijoy paul, Nima varghese, Unni Menon[7]. Proposed a technique, the paper is titled as "Railway track Crack Detection Rijoy". In this method Raspberry pi 3 software, Image processing techniques and ultrasonic sensors are used to find out the cracks on railway track. And they used GPS module as well as WIFI for sending the information to the inspection people.

In our further referred paper "Rizvi Aliza raza, Khan pervez Rauf, Ahmad shafeeq[8], performed crack detection, these authors mainly they are keeping effort on "Crack Detection On Railway Track Using Image Processing". This procedure will replace the inspection manually with an automated inspection. This also helps to detect the cracks immediately and it will reduces the accidents. Here they used a video camera to take the pictures of the tracked crack. But by using camera, we are not sure whether it click the pictures at the right time.

"Lad, P & Pawar , M(2016)[9] This paper describes the evolution of " Railway Track Detection System ", this system is mainly consisting of PIR sensor, GPS module ,GSM modem. This system operates at night time and day time as PIR sensor used to detect even living beings on the tracks.The GPS and GSM was used for identification, transmission of geometric parameters to the nearest railway station of crack detection.

III.PROPOSED SYSTEM OF SMART RAILWAY SYSTEM USING GSM BASED GPS

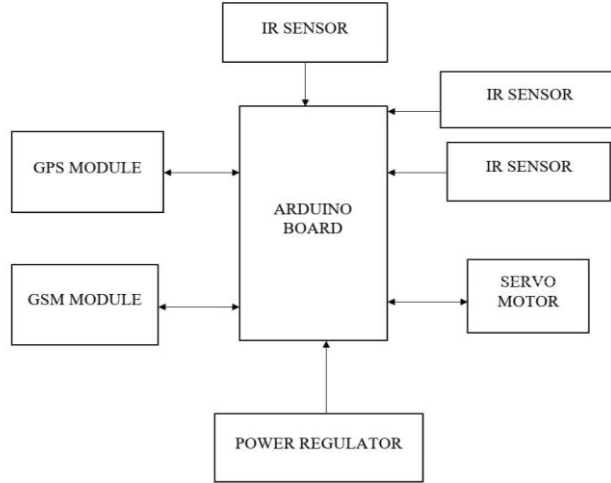
When the train moves through the track IR sensor senses the train and pass over the signal to the micro controller, then the micro controller comes into an alert condition. At that time, the LED will be in ‘ON’ condition, that is led is signaled red LED. The infrared sensor again senses the departure of the train and it sends the information to the microcontroller, then the LED glows green, so by using the servo motor the platform is moved to other platform. Here we are using servo motor because, servo motor is highly accurate and effective, it also produces high acceleration. So it is advantageous than DC motor and stepper motor.

The Railway track crack detection system consists of micro controller (Arduino UNO),GSM,GPS,IR sensors and servo motor. In this, the micro controller is brain of the system and it controls the function of the circuit. The various other components of the system are inter linked with the micro controller. The hardware components should have proper and regular power. The system contains IR sensors with micro controller, which are used for check the damages or any cracks present on the track on the railway line. A GPS receiver is interlinked with the micro controller to examine the perfect location of the crack on railway track. They use SMS to send messages for higher authorities by using GSM. The servo motor helps the robot to move in front direction, we can also know the location coordinates of our particular robot, where it is moving.

Block diagram

In the block diagram, we can see that three infrared sensors and power adapting that is power regulator is given as inputs to the Arduino board. And Servo motor, GSM and GPS modules are connected to the output, because their applications gives us the output.

Here, the GPS,GSM and servo motor are connected in two way- direction, because GPS and GSM acts as both transmitter and receiver, because GSM will receive the signal with the help of micro controller as well as it sends information to the GPS module.



Flowchart of Smart Railway System using GSM based GPS

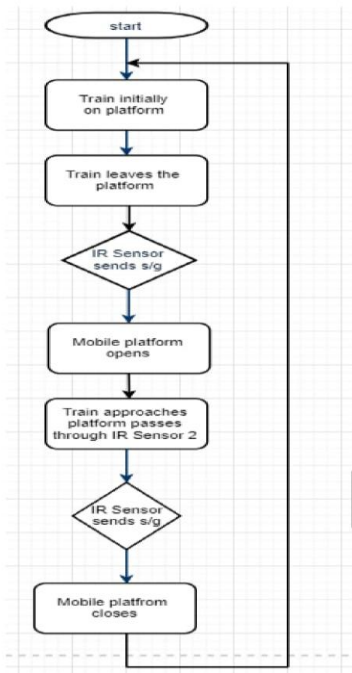


Fig1: Flowchart for Movable Platform

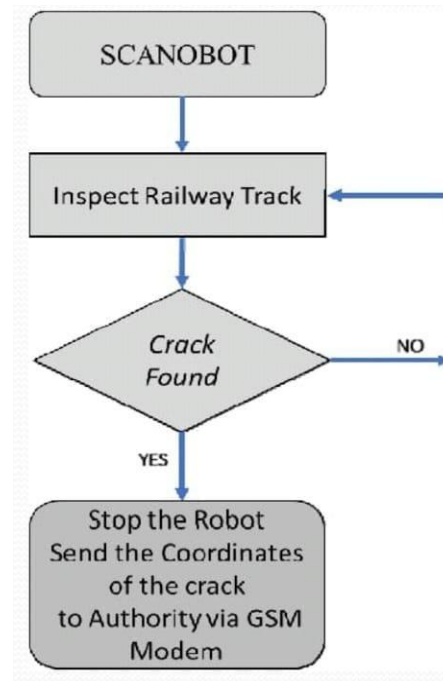


Fig2: Flowchart for track crack detection

Initially, in the Fig1 flowchart, if the train is on the platform, it waits for the train to leave the platform, after the IR sensor sends signal to microcontroller, then the mobile platform opens. If the train approaches the platform through IR sensor2, the sensor sends signal so that mobile platform closes.



In the Fig2 flowchart, there is scanning robot, which inspects the cracks. If any crack found, then the robot will get stopped and it will send the location coordinates of the crack to the higher authority via GSM, and if there is no crack found, it continues the inspection.

IV.EXPERIMENT AND RESULTS

The result of the project is when the train arrives on platform, then platform is moved and indicated with LED is in red colour. When the train departs from platform then it is indicated with green LED . So,then people can move with the indication which is shown as figure through LED with the help of servo motor.

The result of track crack detection is if there is any crack on railway track,then sends message to higher authorities using GSM and GPS module, it sends the location details like longitude and latitude as we see in the shown figure below:

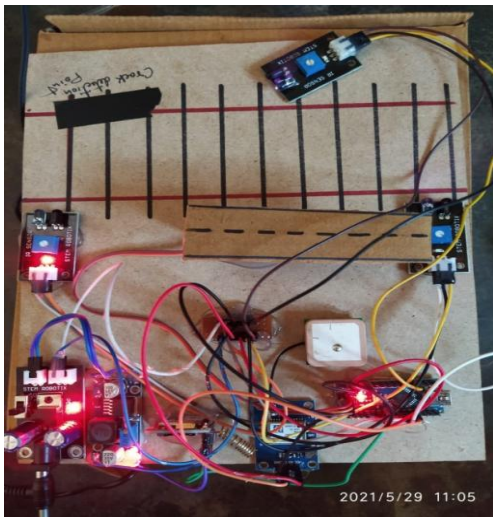


Fig 3: Automatic Movable Platform

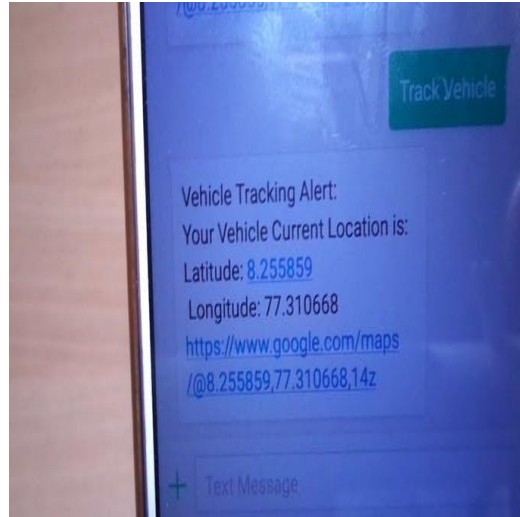


Fig4: Location coordinates of Track Crack

V.CONCLUSION

In our project, the train is continuously tracked, opening and closing of the platform is made robotically. It is done in an beneficial manner. Using of staircase is not needed and it is an effective method in scheduled manner that the train goes according. While detecting the crack on the track using IR sensor, checks the crack and the message is sent to pre-registered number, so that we can reduce most of the railway accidents and also it reduces economical losses.

VII.LIMITATIONS AND FUTURE STUDIES

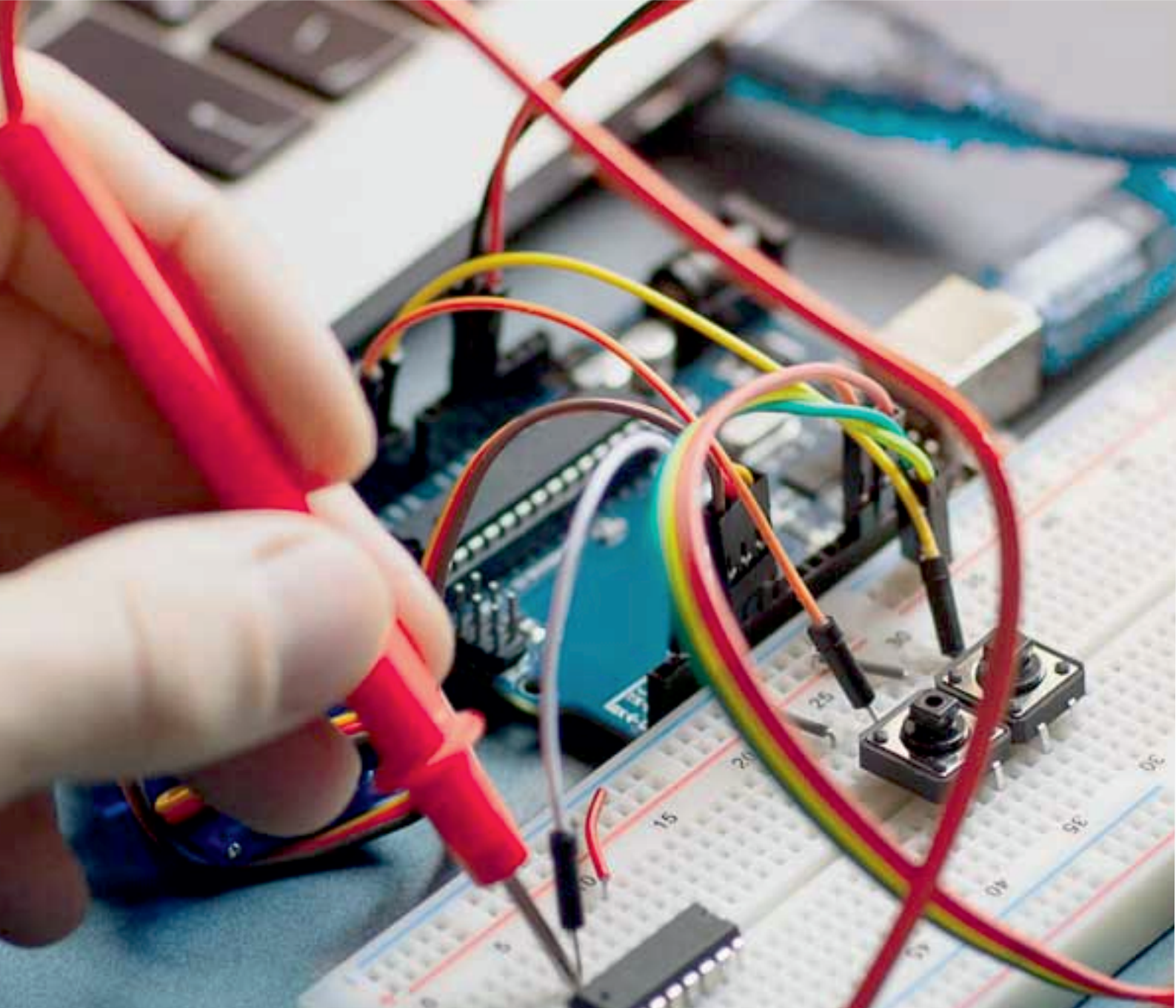
As, power supply from the battery is a little disadvantage, we can still improve the efficiency, accuracy of this project by giving solar panel as power supply and if we implement the fuzzy logic, the system will be more clear. So, in this way we can increase the efficiency.

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