

# HYBRID TRAIN WITH AUTOMATIC TRACK FAULT DETECTION AND MESSAGE ALERT SYSTEM

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**Abstract** - In this paper we utilized solar energy for traction purpose. In India the sun light accessible in adequate sum. So we can change over this sunlight into electrical energy by utilizing solar panel. For the immense measure of intensity expected to run the train is clarified in this subject. The ideal thinking of running a train on solar power is attractive but bringing it into action is a hard task. However we think about this plan to making it effective. And furthermore we are utilizing a track fault detection system using an IR sensor, GPS and GSM is also used to send the fault and caution to the operator. On train we are likewise utilizing the RFID to recognize the station and send the messages alert to the passengers that train is leaves the present station.

**Key Words:** Hybrid train, Solar panel, IR sensor, GSM, GPS, Track fault detection, RFID and Message alert.

## 1. INTRODUCTION

The Indian railways are one of the biggest network in the world and the vast majority of the general population travel through rail routes. A large portion of vitality is utilized in traction system. To save electricity in electric traction system solar power is utilized. The sun oriented power train is a stage in saving these non-renewable sources of energy.. In India where whether is for the most part sunlight is accessible entire year, It is smart thought to utilize solar energy with the end goal of transportation. In this framework, sun oriented cells are introduced on the roof top of the train. We give solar panel on the top of the coach to directly charge the battery. Numerous determinations must to think about solar based train from solar array, engine and battery. . This project a lot of depends on solar panel because it using influence if the solar train can drive or not.

We are also using the IR sensor in this project. The IR sensor is used to detect the track fault detection in the traction system. When the track is broken or the large gap is detected then the IR sensor sense the fault and alert to the stations that track fault is detected using GSM module and location of the fault is detected using the GPS module. If the track fault is detected then the train running on this track is put on hold till the track is recovered.

The RFID system is used on the train to detect the stations. When the RFID tag is comes in the range of the RFID reader that time the GSM modules sends the message to the passenger and the all routed stations that train leaves current station.

## 2. HARDWARE USED:

**2.1 SOLAR PANEL:** Solar panel is of 5V, 4W, 800mA rating which is capable to recharge 4V battery.

**2.2: IR SENSORE:** IR sensor is used to detect the tract fault in the railway track. It contains IR led and photo detector to sense the object.

**2.3: GPS MODULE:** It is used to detect the location of moving train when the fault is detected.

**2.4: SIM800C:** SIM800C module is used to send the message alert to the supervisor and the passengers.

**2.5: RFID:** RFID module is use to detect the station. When train passes from station alert message is sent to the next stations passengers.

## 3. METHODOLOGY

The basic principle of solar train is to use energy that is stored in battery during and after charging it from a solar panel during sunlight. Solar array is made up of many photovoltaic solar cells that convert sun energy into electricity. The charged batteries are used to drive the motor which serves here as an engine and moves the train in forward direction. The power produce by the solar array varies depending on the whether the sun position in the sky and solar array itself. The PV cell is producing electricity—the flow of electrons. The produced current goes in the controller and controller regulates the current and charging battery. If a load such as a D. C. Motor load is placed along the battery and switch, the electricity will do work as it flows and then motor start rotating. For 4.5 kW a current on/off 6 poles switch is placed between the motor and solar panel for rotating the motor clockwise. Solar cell converts solar energy to electrical energy.

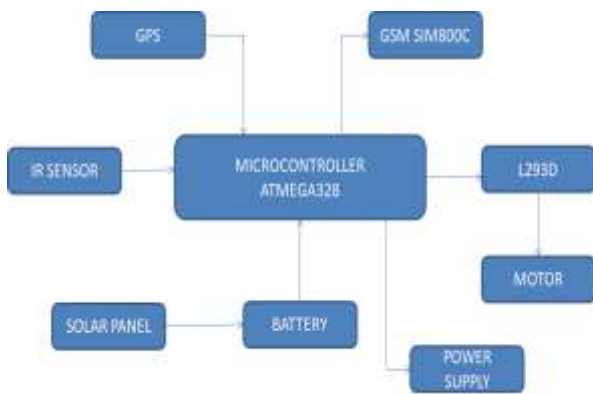


Fig -1: TRACK FAULT DETECTION

The proposed system consists of mainly three components that are Micro-controller, IR module and GPS & GSM module. IR sensor is used to detect the crack in railway track. Infrared (IR) transmitter is one type of LED which emits infrared rays generally called as IR Transmitter. The transmitted light rays are received by IR receiver on adjacent side. IR transmitter and receiver should be kept parallel and adjacent to each other so that transmitted light can fall on receiver straight. Then the location of the fault is detected by the GPS module and the alert message is send the to substations about the fault. Also message is send to the passengers that the train is delayed.

sensor has been attached to the first coach of the train as a result of this, it detects if there is a fault (Gap) in the track and the train stops accordingly. Text messages are send to the passengers using GSM module, hence the passengers are aware that their train is going to arrive shortly/going to be delayed.

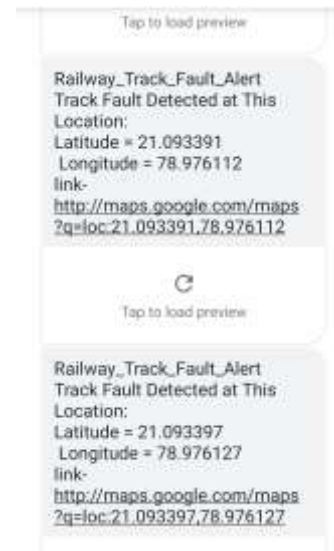


FIG. 3: TRACK FAULT DETECTION MESSAGE WITH LOCATION

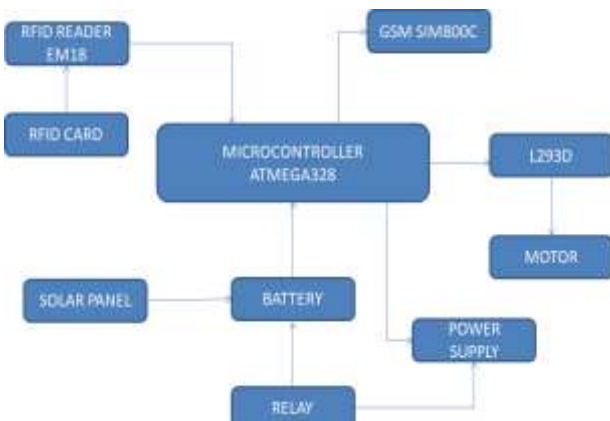


Fig -2: TRAIN

The RFID module is using to detect the current station. When the train is moving at time the RFID card is when comes in the range of the RFID reader module then the message is sends to the all registered passengers and the stations that the trains is passed from this station.

**3. RESULT:**

Our model train runs efficiently and the implementation of the track fault detection system has been carried out successfully. Also the text messages are delivered to the passengers successfully. We have done trials and testings of our project model and it works completely fine. Solar panels charges and provides the energy required to run the train. IR



FIG. 4: MESSAGE ALERT TO PASSENGERS

**4. CONCLUSION**

Concluding to the final the non-exhaustible energy are the best once for the present and future as well. The use of this energy at present may not be efficient but there is a lot of need for this energy usage in future. The advantages are move over the drawbacks. Implementing the solar power on the trains with the solar panels will be a great initiative for the railways to empower the trains with solar for the rest of the future without depending on the fuels. Also automatic track fault detection system and the passenger alert system for the passengers. It is an effective system for the all kinds of the railways also working autonomously.

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