



IOT Based Fault Control in Railway Track System

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ABSTRACT: This project concern to a process for monitoring the condition of train tracks and more specifically has the object of the identification of defects detected by monitoring equipment on the tracks to be examine to allow maintenance crews to subsequently find these defects. When the supply is given to the device, the DC motor gets start through relay driver circuit. Two IR sensors are fixed in front of the train which is used to find out the crack on the track. Each sensor will produce the signal related to the position with the rail. If the track position is normal both the sensor gives the constant sensed output. If any sensor misses their output condition to fail then there is defect on that side. The sensor will inform this by giving alarm and sends information to the smart phone android app in IOT based via GPRS MODEM. Ultrasonic sensor is used to detect the obstacle in the track if any obstacle detected means the Arduino automatically transmits the message to nearby station via IOT using GPRS MODEM. The location of this rail will automatically sends to each station via IOT using GPRS MODEM.

KEYWORDS: GPRS Modem, IOT, Fault control.

I.INTRODUCTION

[4]In Indian railway scenario, most commercialized transport is being carried out by the railway network and therefore any problem in the same has the capacity to induce major damage to the economy-notwithstanding the societal effect of loss of life. This paper put forward a cost effective yet robust solution to the problem of railway crack detection utilizing a method that is unique in the sense. This project discusses the technical and design aspects in detail and also provides the proposed robust crack detection algorithm (RRCD).

[8]Present industry is increasingly shifting towards automation. The two basis components of current industrial automations are programmable controller and robot. In order to support the monotonous work and to serve the mankind, there is a general tendency to develop an intelligent operation. PIC Microcontroller is the heart of the device which handles all the sub devices connected over it. The microcontroller has been used here. It has flash type reprogrammable memory and some peripheral devices to play this project perform. [1]IR sensor is used to detect the crack in rail road, when the crack is detected its latitude and longitude values are send as a message to nearby station by using GPS and GSM service. Then Ultrasonic is used for the surveying process. Then other important component is PIR sensor it is used to detect the presence of humans in track.[2]A practical methodology to non-destructively localize cracks and estimate the sizes of the cracks in beam-type structures using changes in frequencies. [4]Utilizing simple components like GPS module, GSM Modem, IR Transmitter and Receiver based crack detector assembly is very useful in railway crack detection. [11]Crack detection method has been explored which uses microwave sensors to observe the rail surface. [13] When a cracked rail is encountered along the route, the circuit will be interrupted or open, resulting in a changed flux pattern. This pattern change is detected by a flux sensor, and the geographic location of the crack in the rail is determined. [14]Crack detection method in railway system utilizes the change in infrared emission of the rail surface during the passage of a train wheel. Initial data from this infrared method are dispense from studies of both laboratory-based three-point bend specimen and a short section of rail.

This paper proposes a work of detecting the crack in the railway track using IOT and also presents the details of the implementation results of the robust crack detection system utilizing simple components inclusive of a GSM modem and IR, Ultrasonic based crack detector assembly. The proposed methodology has been designed for robust implementation in the Indian scenario.

II. PROPOSED METHODOLOGY

[1] This project discusses the technical and design aspects in detail and also provides the proposed railway track crack control system. This project also presents the details of the implementation results of the railway track crack control system utilizing simple components inclusive of a GPRS modem and IR based crack detector assembly. The proposed method has been designed for robust implementation in the Indian scenario.

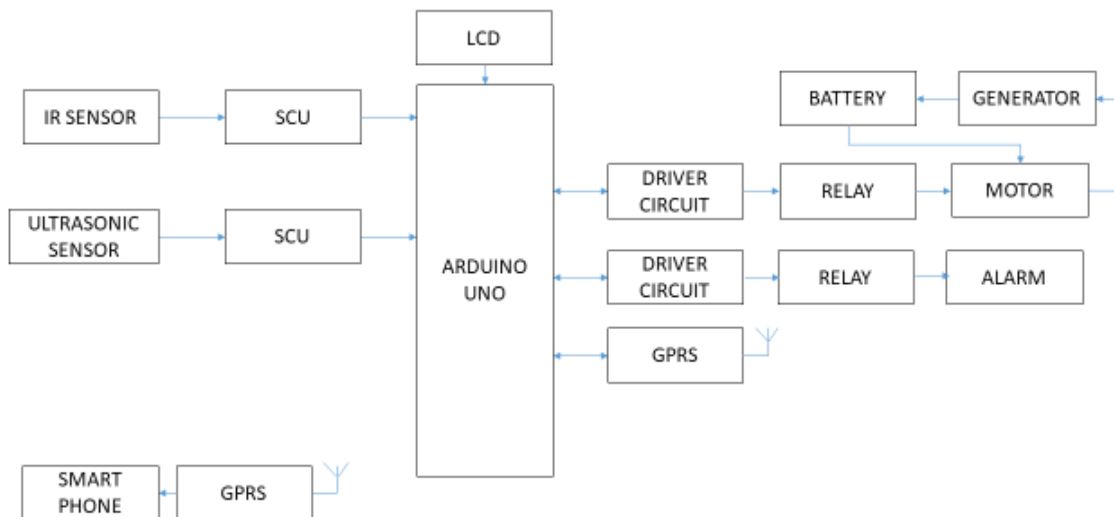


Fig. 1 Block diagram of IOT based fault control in railway track system.

The Arduino UNO has 14 input/output pins to which all other devices get connected to it. The IR sensor and the ultrasonic sensor detect the crack and the object in the railway track. The detected crack and the object will get sensed in the form of signal. A signal conditioning unit (SCU) is a device that converts one form of signal into another. A driver circuit is an electrical circuit or an electronic component used to control another circuit or component. [3] The alarm and the motor will electrically get operated by a relay switch. The generator converts mechanical energy into electrical power which can be used for external circuit. The generator will generate the energy and recharge the battery while the motor starts running. The battery provides a static potential power or electrical charges to other devices. A liquid crystal display (LCD) displays the detected output.

III. HARDWARE DESCRIPTION

An Arduino/Genuino Uno is a microcontroller board created on the ATmega328P. It has 14 digital input/output pins, 6 analog inputs, 16 MHz quartz crystal, USB connection, power jack, ICSP header and a reset button. It holds everything needed to support the microcontroller. The Arduino/Genuino Uno board can be driven through the USB connection or with an exterior power supply. The power source is selected inevitably. A liquid crystal display (LCD) is a tinny, flat electronic visual display that uses the light modulating properties of liquid crystals (LCs). LCs do not emit light directly. An Infrared sensor (IR sensor) is an electronic device that measures infrared (IR) light radiating from objects in its area of view. Outward motion is sensed when an infrared source with one temperature such as a human, passes in front of an infrared source with another temperature such as a wall. The signal conditioning unit receives input signals from the analog sensors and gives a conditioned output of 0-5V DC equivalent to the entire range of each constraint. A relay is an electrically functioned switch. Current flowing through the coil of the relay generates a magnetic field which

attracts a lever and changes the switch contacts. The Global Positioning System (GPS) is the functional Global Navigation Satellite System (GNSS). [11]Using a group of at least 24 Medium Earth Orbitsatellites that transmit precise microwave signals, the system enables a GPS receiver to determine its location, speed, direction, and time. The General Packet Radio Service (GPRS) is the 2G and 3G cellular communication system's in global system for mobile communications (GSM) concerned with mobile data service. GPRS is a packet built wireless data communication service intended to substitute the current circuit switched services existing on the second-generation GSM and time division multiple access (TDMA) IS-136 networks. The Internet of things (IoT) is the network of physical devices and other items embedded with electronics, software, sensors, actuators, and connectivity which allows these things to connect, collect and exchange data.

IV.SOFTWARE DESCRIPTION

Android Studio is theIntegrated Development Environment (IDE) for the development of android application for Google's Android operating system. It is available on Windowsto download, macOS and Linux based operating systems. It is a spare for the Eclipse Android Development Tools (ADT) as the primary IDE for native Android application expansion. Android Studio was publicized on May 16, 2013 at the Google I/O conference. In early access the preview stage initial from version 0.1 in May 2013 then entered beta stage initial from version 0.8 which was out in June 2014. The first constant build was released in December 2014, starting from version 1.0. The present stable version is 3.3, which was released in January 2019.Android Studio supports all the programming languages of IntelliJ and CLion e.g. Java, C++, and more with extensions, such as Go; and Android Studio 3.0 or later supports Kotlin and Java 7 language features and a subcategory of Java 8 language features that differ by platform version. Exterior projects backport some Java 9 features.Some new language features up to Java 12 are usable in Android.

V. RESULT AND DISCUSSION

The growth in science & technology is a non-stop process. New things and new technology are being invented. As the technology grows day by day, we can imagine about the future in which thing we may occupy every place. The proposed system based on Arduino microcontroller is found to be more compact, user friendly and less composite which can readily be used in order to perform several monotonous and repetitive tasks. However it is designed keeping in mind about the need for industry, it can extended for other purposes such as commercial & research applications. The principle of the development of science is that “nothing is impossible”. [3]This project relates to a process for monitoring the condition of train tracks and more specifically has the object identification of defects detected by monitoring equipment on the tracks to be checked and to allow maintenance crews to subsequently find these defects. This project presents the implementation results of the railway track crack control system using simple components inclusive of a GPRS modem and IR based crack detector assembly. This is cost effective railway track crack detection system with greater accuracy and High speed information transferring after crack detection.

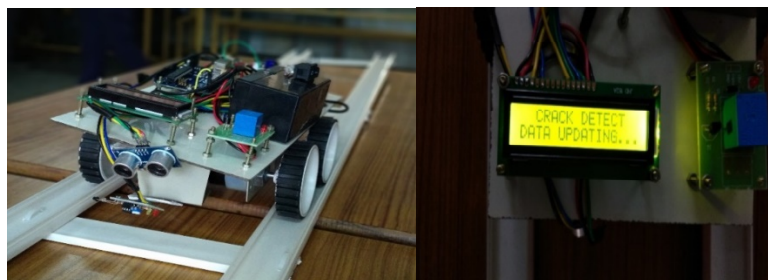


Fig.2 Crack detection model



VI.CONCLUSION

This project concern to a process for monitoring the condition of train tracks and more specifically has the object of the identification of defects detected by monitoring equipment on the tracks to be examine to allow maintenance crews to subsequently find these defects. This project also presents the details of the implementation results of the railway track crack control system utilizing simple components inclusive of a GPRS modem and IR based crack detector assembly. The prototype will be useful in railway system. The main objective of the system is to provide cost effective railway track crack detection system with greater accuracy and High speed information transferring after crack detection. The detected crack will be get updated through GPS and GSM.

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