Double Mode Automatic Wireless Railway Gate Control System Using Android App

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ABSTRACT: This paper describes the automatic railway tracking and gate control system using android app and WI-FI module for saving human lives and avoiding major disasters in railway track.   Railway gate may be saved for the road users to prevent accidents in terms of train speed at level crossing. The system can operate in two modes. One mode is for unmanned railway gate and the other for manned gates. In manned gate control mode, the system receives the input signal from the android phone and sends information to the gate motor driver for opening and closing the gate. The gate is closed, when the train enters in the specified range and the gate is opened. In the unmanned gate control gate, the system receives input from the vibration sensors placed under the track. Usually the vibrations sensors will detect automatically close the gate until vibrations cease to exist with a safety time window.

KEYWORDS: Major disasters, android mobile, unmanned rail gate, vibrations

I.   INTRODUCTION

At the level crossing between the railroad and highway there are many railway accidents happening. To prevent this type of railway accidents and to reduce man power we use an android app and WIFI module in railway gate control system
In everywhere at level crossing between railroad and highway there are many railway accidents happening
due to the laziness and carelessness in manual operations or lack of workers. This system uses

MSP430 microcontroller as the main component. MSP430 microcontroller is the heart of our system. Android app is mainly designed for sending the Wireless signal to the WI-FI module. The android app has two buttons open to open the gate and close to close the gate.

II.   RELATED WORK

In the present day scenario a lot of accidents occurring more due to the rational technique and lever jamming. So, this paper describes about the controlling of rail gate using the microcontroller [1]. The gate is controlled by wireless system using Android app and the WIFI module. [2] In the unmanned mode the system receives input from the vibration sensors and automatically closes the gate [9]. The output is displayed on the LCD whether the gate is to be opened or closed.
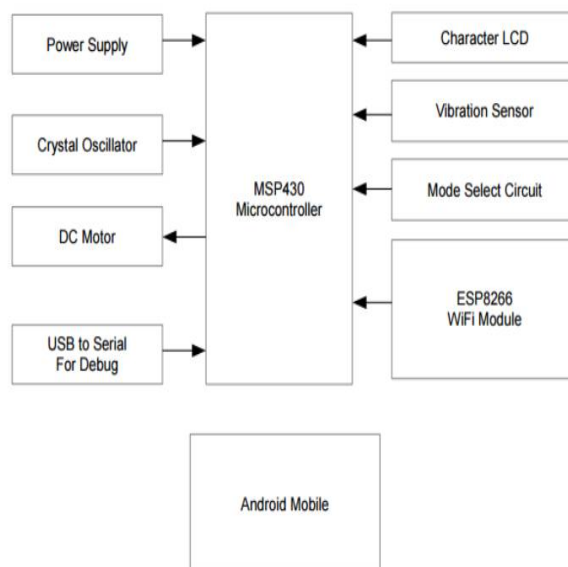
Fig 1: The system for Automatic wireless railway gate control

III.   MSP430 MICROCONTROLLER

MSP is the mixed-signal low power Microcontroller. MSP430 is specifically designed for Ultra-Low-Power applications. Its flexible clocking system, multiple low power modes enable ultra low power optimization. The MSP430 CPU has RISC architecture.
Features of MSP430 microcontroller are : Ultra low power architecture , Low power consumption, Low operating voltage (from 1.8V to 3.6V), Large register files, Prioritized and nested inputs

- Flash options : 512 KB
- RAM options : 66 KB
- ROM options : 16 KB
- ADC options : 12-bit SAR
- GPIO options : 74 pins

Other integrated peripherals: USB, LCD, DAC, Comparator, DMA, 32x32 multiplier, power management module, watchdog timer, Real Time Clock, Temperature sensor

IV.   ENERGIA SOFTWARE

 Energia is an open source and community   driven integrated development environment and software framework. Energia provides an intuitive coding environment as well as asturdy framework of easy-to-use functional Application Programming Interfaces & libraries for programming a microcontroller.
Many TI processors comes with inbuilt energia software, primarily those available in the Launch Pad development system. The Energia development environment contains a text editor for writing code, a toolbar with buttons for common functions, a message area, a text console and a series of menus. It connects to the Launch Pad hardware to upload programs and communicate with them.

Features of Energia :

Simple & easy-to-use code editor & compiler with built-in Serial Monitor/terminal. Features a robust framework of intuitive functional APIs for controlling microcontroller peripherals (i.e. Digital Read, digital Write, Serial. Print, etc). Higher level libraries are also available (i.e. Wi-Fi, Ethernet, displays, sensors & more)

V. ESP8266 WI-FI MODULE

ESP8266 WIFI module is a microcontroller unit with integrated TCP/IP protocol stack that can give any microcontroller access to your WIFI network. This module has on-board processing and storage capability that allows it to be integrated with sensors and other specific devices through GPIOs

The CPU of ESP8266 runs at 160MHz. Flash : 40MHz – 80MHz Temperature range : -40 C to 125 C

ESP8266 has 8 pins, 4 pins are arranged in 2 rows. The first pin on the top left is GND. The two pins right from the Ground are GPIO 2 and 0. The pin on the top right side is the RX pin and the lower pin on the left side is Transmitter pin. These are the pins for communication. The middle pins at the bottom are Chip Power-Down(CH_PD) and RST(reset).

WIFI direct (p2p). Integrated TCP/IP protocol stack. Integrated power amplifier and matching network. 1MB flash memory

Flash Memory : This memory can be both programmed and erased electrically. Power down leakage current of <10 micro amps.

Integrated low power 32-bit CPU. Wake up and transmit packets in < 2 milli seconds. Stand by power consumption of <1.0 milli watts. 64Kb instruction RAM. 96Kb data RAM
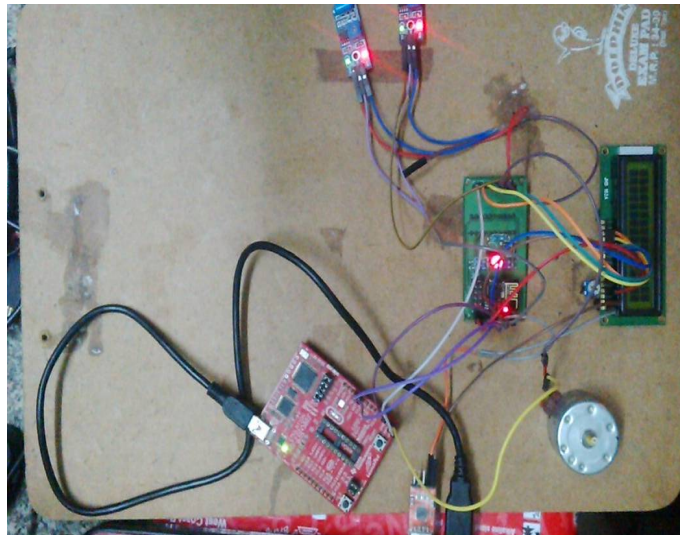

Fig 2 : prototype of overall system

USE OF ESP8266 WIFI MODULE: The ESP8266 WIFI module provides the WIFI access to the microcontroller.passing by. The system receive this input
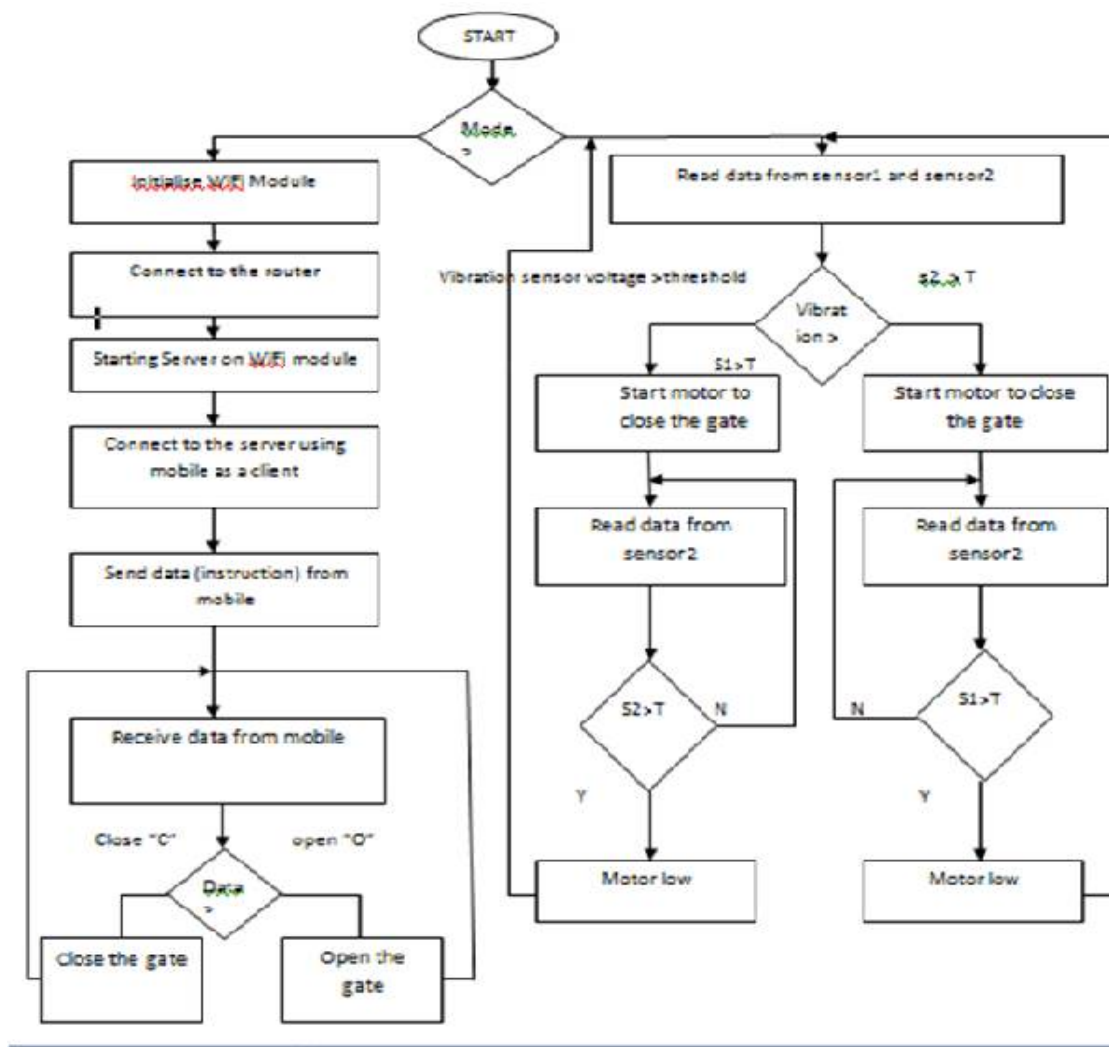
VI.   FLOW CHART

VII.   MODULES OF RAILWAY CONTROL SYSTEM

a. VIBRATION SENSOR :

Vibration sensors are those sensors used for measuring the vibrations occurring from the devices displaying, and analyzing linear velocity, displacement and proximity, or acceleration. It has 3 pins vcc, ground and data. Vibration sensors are the sensing elements that detect the vibration of the train coming or passing by. The system receives the input from the vibration sensors that are placed under the track. Usually the vibrations coming from the train persistent for seconds which the system will detect and automatically close the gate. The output of the vibration sensor is analog in nature.

b. MODE SELECT CIRCUIT :

The mode select circuit is usually used to select either of the modes. In our project, we have mainly two modes
  1. Manned mode
  2. Unmanned mode

Here the mode select circuit is used to switch from manned mode to the unmanned mode and vice-versa.

c. ANDROID MOBILE :

The android mobile has the android app which sends the message to the WIFI module. The android app has two options open and close. When we choose open/close the WIFI module receives the signal and gives as input to the microcontroller and the gate automatically opened/closed.

VIII.   RESULT AND ANALYSIS

d. TRAIN DEPARTED :

Fig3: open gate mode

When the train crosses the gate and reaches the second vibration sensor then it will be displayed on the character LCD that the train has departed and the gate is opening

e. TRAIN ARRIVED :

Fig4: closed gate mode

when the train reaches the first vibration sensor and when the sensor voltage goes high then it means the train is arriving and it is displayed on the LCD that the train has arrived and the gate is closing
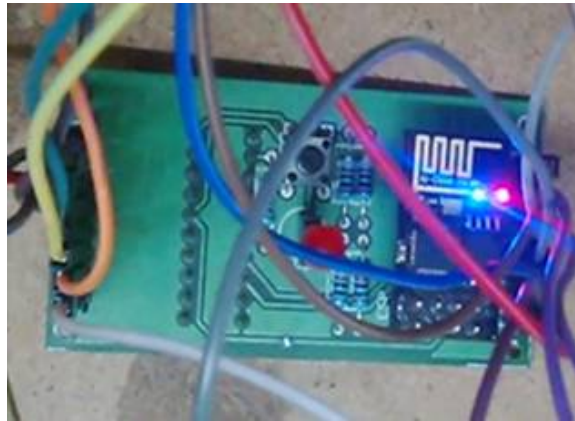
Fig 5: connection of wifi module

The wifi module creates a server with an IP address for a client to be connected. The blue LED indicates that the android mobile is connected to the WI-FI module. It also indicates that the module is receiving message from android mobile.

IX.   CONCLUSION

Finally we conclude that our project is designed to prevent the railway accidents and to reduce the man power. By using android app and Wi-Fi module we can find current longitude and latitude position of train in caves and high altitude without restriction of distance. This system improves reliability of communication up to great extent and it is low cost system. By using DC motor gate can operated automatically.

X.   ACKNOWLGEMENT

REFERCENCES

1.   Krishna, Shashi Yadav and Nidhi, "Automatic Railway Gate Control Using Microcontroller", Oriental Journal Of Computer Science & Technology, Vol.6, No.4, December 2008.
2.   J.Banuchandar, V. Kaliraj, P. Balasubramanian, S. Deepa, N. Thamilarasi," Automated Unmanned Railway Level Crossing System", in International Journal of Modern Engineering Research (IJMER) Volume.2, Issue.1, Jan-Feb 2012 pp-458463.
3.   Kalpana Sharma, J. Kumawat, S. Maheshwai, Neeti Jain "Railway Security System based on Wireless Sensor Networks: State of the Art "InIntenational Journal of Computer Application (0975-8887) volume 96-no. 25, June 2010.
4.   Ahmed Salih Mahdi. Al-Zuhairi,"Automatic Railway Gate and Crossing Control based Sensors &Microcontroller ", IN International Journal of Computer Trends and Technology (IJCTT) – Volume 4 Issue 7–July 2013
5.   G. Bhatia, A. Lala, A. Chaurasia: "Implementation of Cloud Computing Technology in Indian Railway System." In International Conference of Network Technology (ICINT 2012), IACSIT Press, Singapore.
6.   A. Kottalil, A. Ajamal, A. Babu: "Automatic Railway Gate Control System" Oriental Journal of Computer Science & Technology, Vol.6, No.4, February 2014
7.   Shaikh Mostafa, Mohabbob Hossain, Jashid Raza, Gazi Rashid: "A Radio Based Intelligence Railway Gate Crossing System to Avaiod Collision." International Journal of Modern Engineering Research (IJMER) November 2010.
8.   Chih-Wen Li; Chia-Cheng Chu; Wei-Lun Fong; Hwang-Cheng Wang, "Intelligent Level Crossing Safety Control System," in Intelligent Information Hiding and Multimedia Signal Processing (IIH-MSP), 2014 Tenth International Conference on , vol., no., pp.799-802,27-29Aug.2014.

9. Mansingh, B.Brailson; Selvakumar, K.S.; Kumar, S.R.Vignesh, "Automation in unmanned railway level crossing," in Intelligent Systems and Control (ISCO), 2015 IEEE 9th International Conference on ,vol.,no.,pp.1-4,9-10Jan.2015.
10. K. Vidyasagar, P. SekharBabu, R. RamPrasad "Anti Collision and Secured Level Crossing System", International Journal of Computer Applications (0975 – 8887) Volume 107 – No 3, December 2014".
11. Priyanka.J, C.Saranya, A.Shanmathi, C. Baranikumar, S., "Automatic level crossing gate with database collection," in Computation of Power, Energy Information and Communication (ICCPEIC), 2015 International Conference on , vol., no., pp.0388- 0392,22-23April2015.
12. Bernard Cole, " Real-time Android: real possibility, really hard to do - or just plain impossible?" Embedded.com May 13,2012

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