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IoT Based Project for Railway Locomotive Monitoring System, Alert on Emergency & Updating Parameters to Central Server

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Abstract – *The main objective of this project work i.e.,design the electronic hardware using the 32bit ARM Microcontroller 2oo2 architecture to existing Indian locomotive and update the parameters to the central server. Monitoring of parameters includes like Engine Temperature, Alternator Voltage, Alternator current, Air temp, locomotive speed etc. Control system also integrates with Vigilance Control Device (VCD) to know the alertness of driver and if he is not responding of timely nature then apply the locomotive brakes to save the life of passengers in safe manner & updating the status to Central Server.*

KeyWords **:** MICRO-CONTROL-SYSTEM,REAL-TIME-SENSORS PARAMETERS, VCD, CENTRALSERVER, NETWORKMODULE ETC

1. INTRODUCTION

Using the two controllers for hardware module preparation. One of the controller s using the arm controller which is LPC1768 m3 cortex series which can ported with RTOS for advanced hardware module up gradation. System is failed safe with watch dog features from external interfacing or internal on chip. Power on reset the controller on initial start up. Second controller is ATMEL AT2560 which is rich set of many pins for controlling the many external interfacing. Power supply module is designed with output short circuit protection. Upon the shortcut the power supply input Pwm switching pulses stop for dc-dc converter. Which in turn safe the main controller and other hardware modules.

Sensors are advanced monitoring to know weather sensor is malfunction or wrong connected. By knowing the output of the sensor. Suppose if sensor is short circuit then more current flows then normal reading range current. So we can display fault to user that sensor is short circuit or malfunction. On every power on two controlling system are initialized with power on self test algorithm to test it internal modules weather working normal or not. If any abnormality is found, power on self test become fail and module is shutdown in fail safe condition. And as two controllers are we can implement the 2oo2 architecture driving the same input to the both the controllers and taking the decision upon the two controllers input received. If both the controllers get same op then logic can be executed. So for this uart communication can be connected with two controllers.

1.1 Classification of Control system

i. Locomotive control system ii. VCD control system

1.2 Central server

It maintains the Real time sensor received data of all locomotive parameters and sends the message alert if it parameters in danger zone limit. We can create our own server and HTML pages to user for realistic .

2. Locomotive control system

Electronic Locomotive control system module is designed used arm controller with safety controlled logic algorithm. It collects the data from all real time sensors mounted on various location on locomotive system, updates the data to driver control desk Lcd display, Central Server using Network Module. If any sensor crosses it restricted parameter zone value then its alerts the driver using the Lcd display and fault is logged in internal memory and also gets VCD status data from VCD control system

3. VCD control system

Electronic VCD Module is designed used arm controller and time cycles precisely maintained using real time clock upon the VCD start time cycles are in running condition and cycles condition is shown to driver in every time cycle with respective output, safety logics are implemented in digital Input pin and failure of device, bypass mode is auto initialized in failure of device and loco motive brakes applied and alert to user that device is malfunction. Upon reset switch toggling status is logged into internal fault log memory. User acknowledge button can be interfaced through many switches like horn, sander, headlight, foot pedal etc.

working: Locomotive Control System monitors the real time data of voltage, current, engine temperature etc , update data on driver control desk and update data to central server which will be use full for engine performance analysis and fault diagnosis. VCD control system monitors the diver alertness. It starts upon the locomotive speed above 0kmph and brake released condition. VCD unit works under 4 time cycles. Healthy status is shown through led light by flashing for every one second. Upon VCD start on

time cycle 0 from 0 sec to 30 secs – normal

time cycle 1 from 30 sec to 45 secs – Led on

time cycle 2 from 45 sec to 59 secs – Led on & buzzer on

time cycle 3 60sec – Buzzer on & Locomotive brake applied

In any time cycle ,if driver acknowledge the VCD acknowledge button then time cycles resets and start from timecycle0. If user is not responding for acknowledge then it moves from time cycle 0 to time cycle 1 . still if driver not respond with acknowledge button then moves to time cycle 2, still if driver not respond for acknowledge button moves to time cycle 3 then apply the locomotive brake & show VCD time out fault log on Lcd display on driver control desk.

Which shows the drivers alertness and if he un conscious then saves the life of many passengers by applying brake. Upon brake application driver can reset system by toggling the reset switch provided after 2mins after application of brakes. If it is locomotive is in maintenance, then it can bypassed by manual or bypass mode by terminal user entry.

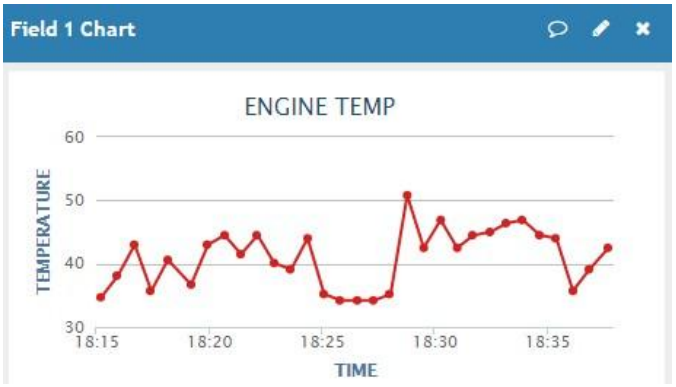

Chart -1: Engine Temperature

Locomotive control system continues monitories the engine temperature and updates to the central server and if temperature crosses the danger parameter value alert the driver

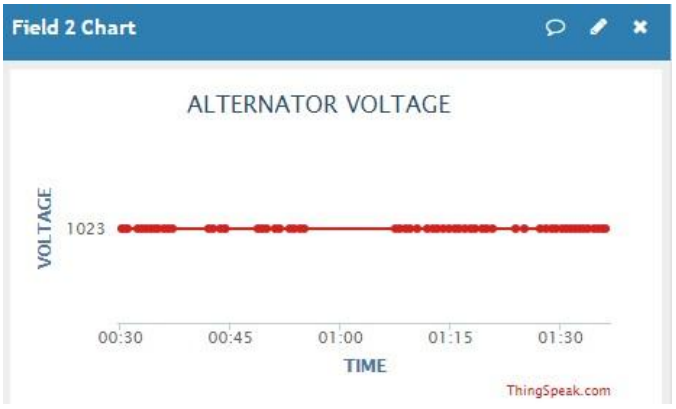

Chart -2: Alternator Voltage

Locomotive control system continues monitories the Alternator voltage and updates to the central server and if sensor parameter value crosses the danger zone alerts the driver.

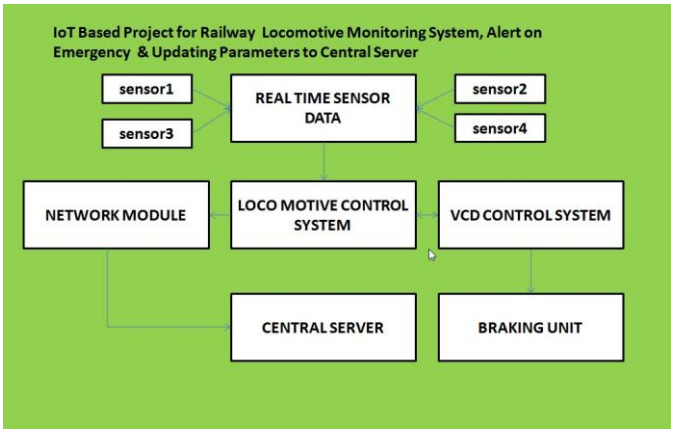

Fig -1: IoT Based project for Locomotive monitoring sys.

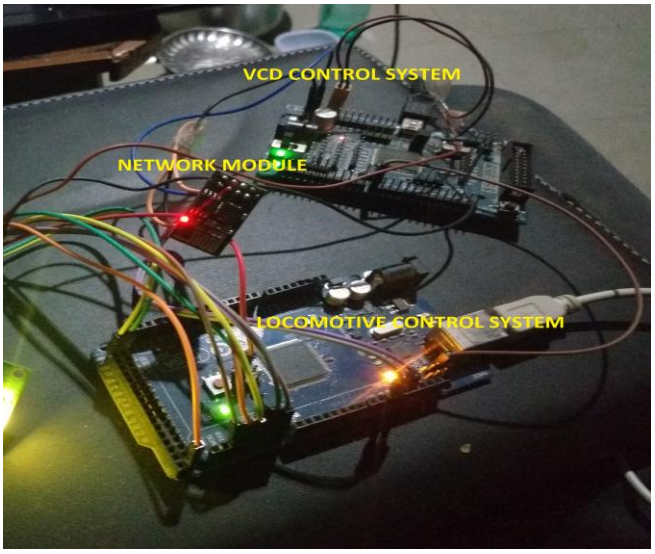

Fig -2: Electronic unit hardware module of system.

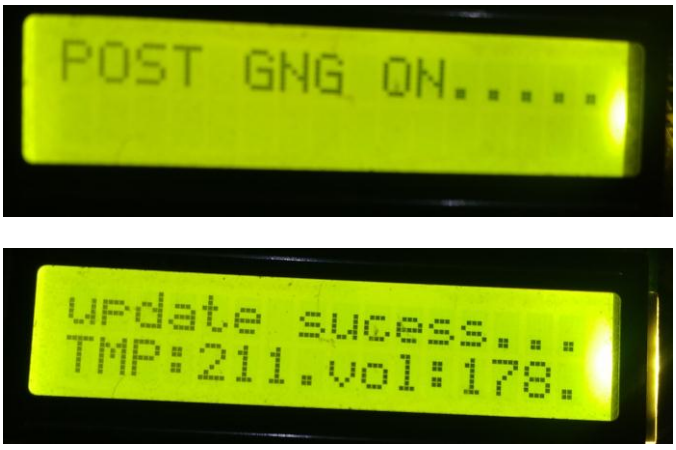

Fig -3: Driver desk control panel display.

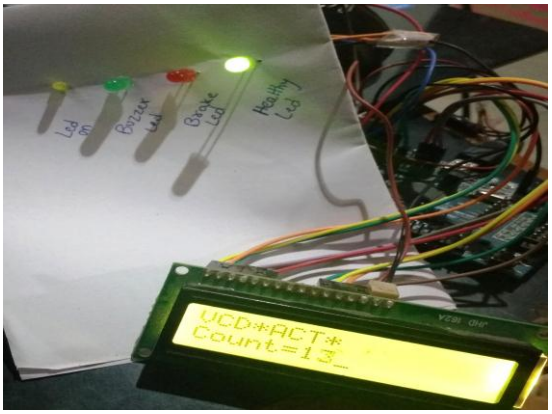

Fig -4: VCD control system with driver display & led indications.

Fig -5: VCD control system with driver display & time cycle 1 lapsed led on.

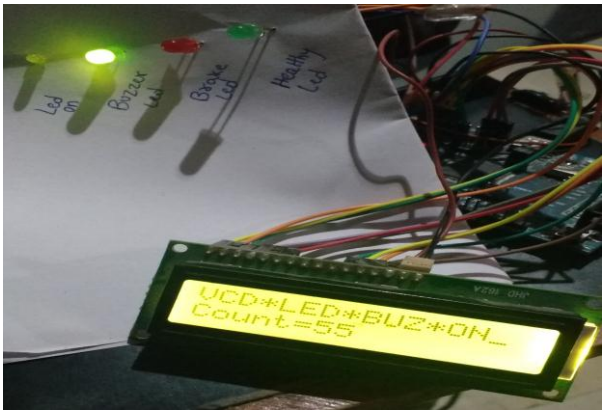

Fig -6: VCD control system with driver display & time cycle 2 lapsed buzzer on.

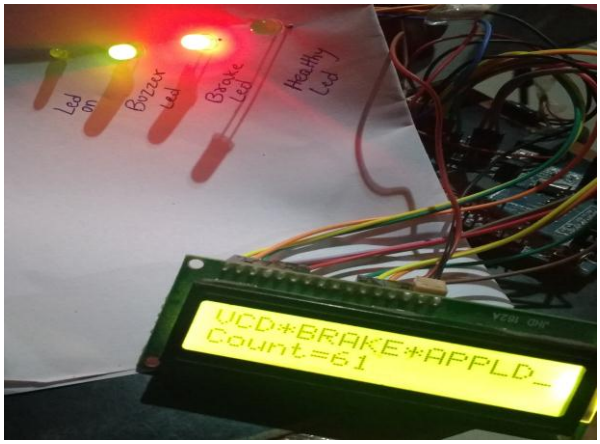

Fig -7: VCD control system with driver display & led indications.

Fig -8: VCD control system with driver display & bypass mode through manual.

3. CONCLUSIONS

After completion of project, IoT based locomotive monitoring system helps in getting real time parameters values from live train, which is useful for analysis of locomotive and fault diagnosis, VCD control system monitors the continues driver alertness and apply the locomotive brakes upon the driver un conscious.
Which saves the life of many passengers and logs the fault in internal eeprom of locomotive control system.

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