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Manifestion Of Water Quantity And Fire Safety In Railway Coaches Using Iot Module

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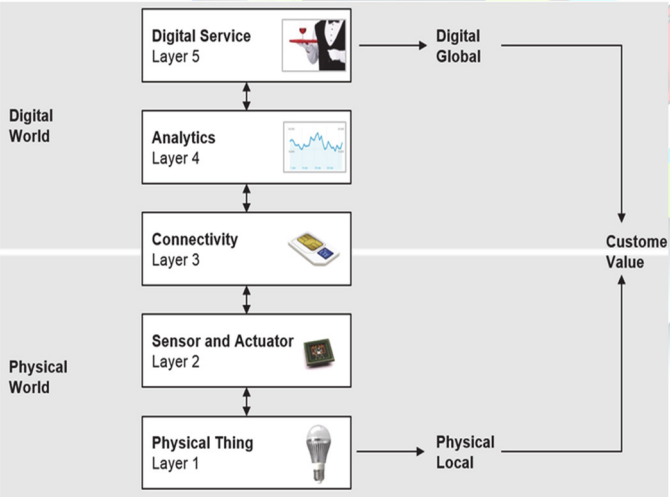
ABSTRACT: Water is an essential resource for all life on the planet. Water is the key to development and sustenance of all communities. Under conditions of increasing stress on this essential renewable but scarce natural resource, effective and efficient management of water is emerging as an urgent contemporary issue. The realization of its limited availability in space and time has necessitated the designing of new globally viable water management regimes aiming at striking a balance between the use of water as a basis for livelihood and its protection to help ensure its sustainability through present to future generations. If water is a basic resource necessary for sustaining all human activities, so we need to use this resource efficiently. The purpose of this project is to introduce Railways water management using Internet of Things.It is very clear by the name only that the Internet can be used for different sectors. One of such sector is water and fire accident management in railways.



Layers of IOT Fig.1

I. INTRODUCTION

With the advancements in the day to day life, fire-safety has become one of the primary problems. Fire hazards are fatally dangerous and denigrating regarding business and home security, furthermore devastating regarding human life. The obvious way to minimize the kind of loss is to respond to these emergency situations as quickly as possible.By 2025, it is predicted that maximum things of day to day life will connect to the internet each second. It's not surprising then that the implications of the Internet of Things (IoT) are far-reaching and have already begun to affect what we do, when we do it, and how we do it. It will become even more interesting knowing that 99% of physical objects that may one day join the IoT are still unconnected. In India right now we are having more than 300 million active smart phones .By using such system we can connect with internet and check out entire world in our hand, just we need to connect our personal resources(like car maintenance , water tanks level) to internet by using different kind of facilities like WIFI ,LAN etc. By which we can get their information directly from internet and make our day to day life easier.

The purpose of this project is to introduce Railways water management using IOT. The term IOT stand for Internet of things .It is very clear by the name only that the Internet can be used for different sectors. One of such sector is water management in railways. Ensuring minimum rights and safety of the garment workers has become a burning issue nowadays. The workers of garment factories are facing some labyrinths and broken out of fire is surely one of them. The investors are losing their interest and the prominence of this sector is getting toneless. In this paper, we have propounded a system which is capable to detect fire and can provide the location of the affected region.

These particular frameworks, outfitted with smoke, temperature and pyro-electric detectors can easily identify the troublesome random predicaments, because it is equipped with the aid of a control mechanism which can instantly warn pertaining to venture thorough steps with ease. In these fatal predicaments, earlier detection effectively combined with quick warning system will probably produce lesser loss regarding property and life.

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We can observe some sort of flame or smoke alarm system in our neighbourhoods, especially inside the property or even remote places with a faraway spot depending on need.

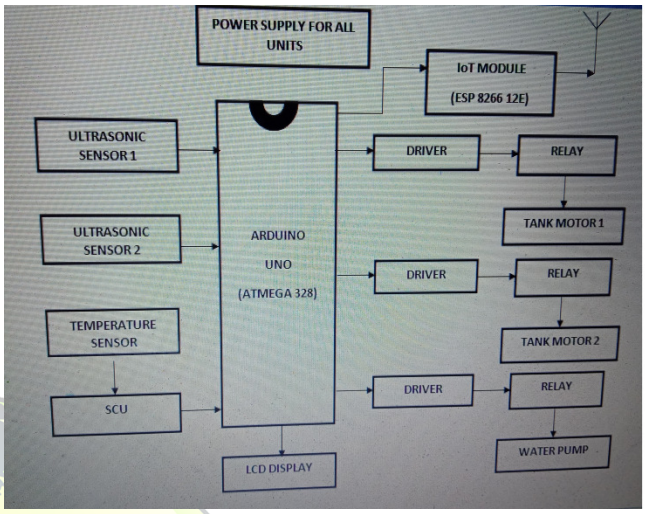
One such example is the Indian Railways. Today Indian Railway have vital problem in the shortage of water this is not only because of scarcity of water rather it is more because of lackof information .Till today our Indian Railways is checking the shortage of water manually when the train is at standing position and it is very difficult to check water level manually in Railway tanks. This also requires large manpower for checking each bogie individually. Also there is one more problem that there is no record of amount of water used per day at every station.

In today's day all such problem can be resolved by using latest technologies like IOT, sensor and Microcontroller (that is embedded system). Thus with the help of our project we can provide many facilities such as

1.)It can provide information about the shortage of water in tank of each boogie to the next station before the train reaches there.
2.) It can reduce the manpower as there will be prior information about which selected Boogie tank have less water hence it reduces cost expenditure of Manpower.
3.) It also helps in maintaining everyday record of water utility. Hence in this way it also provides the transparency which can beat the corruption

II. PROTOTYPE IMPLEMENTATION

In our system, the ultrasonic sensor and temperature sensor detects the accurate level of water in the tank and fire accident occurrence in the coaches and gives signal to the Arduino uno microcontroller . The microcontroller processes the data and serially transmits to ESP 8266 – 12E NODE MCU module .The Ultrasonic sensor are very accurate to indicate distance.The sensors are connected to the Analog to Digital Converter circuit, which in turn is connected to ADC pin in microcontroller. The ADC conversion processinvolve quantisation and sampling of continuous-time and continuous-amplitude analog signal to digital signal.Ultrasonic ranging module having name HC - SR04 provides a wide range for distance calculation from 2cm - 400cm non-contact measurement mechanism, the ranging accuracy can reach to 2mm. The modules consist of ultrasonic transmitters, receiver and control circuit. The basic principle of work: Using IO trigger for at least 10us high level signal.



Block Diagram Fig.2

The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back. If there is any obstacle in front of signal then signal reflect back to ultrasonicreceiver. The distance is calculated by using time duration in which the signal come back. Distance = (high level velocity x duration of sound (340M/S) / 2.Fires are one of the most widespread causes of deaths by accident. Instant alerting to the fire department is necessary to ensure immediate action. Every minute can save many lives in such situations. So here we propose an IOT based automatic fire department alerting system that instantly and automatically alerts the fire department and informs about the situation so that immediate action can be taken.The temperature sensor (LM35) is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in ^{o}C). The LM35 generates a higher output voltage than thermocouples and may not require that the output voltage be amplified. This sensed data then send to ESP12E WIFI module contain Tensilica L106 microcontroller for processing this module sends this data over internet by connecting WIFI router. We can monitors the water level and temperature in the coaches&control the motors to pump the water. In our project we have used two protocols for sending data on internet or cloud that are HTTP and MQTT. We have also created a website to display water level on internet which is hosted by hosting web hoster partner. This is providing 20GB virtual server in free of cost.

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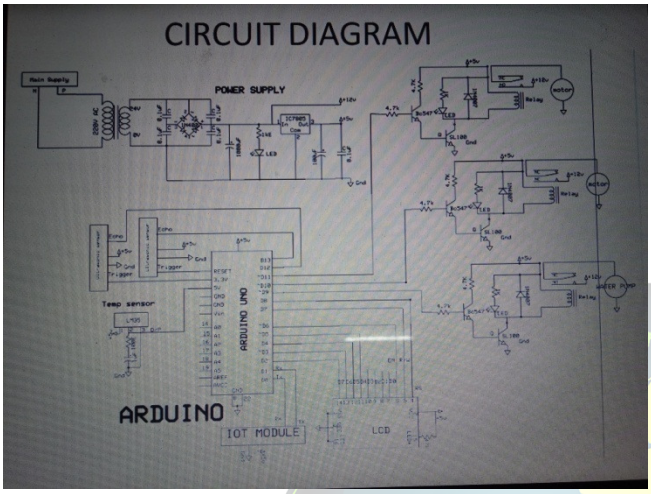
III. CIRCUIT DIAGRAM



ARDUINO UNO

Arduino/Genuino Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button.

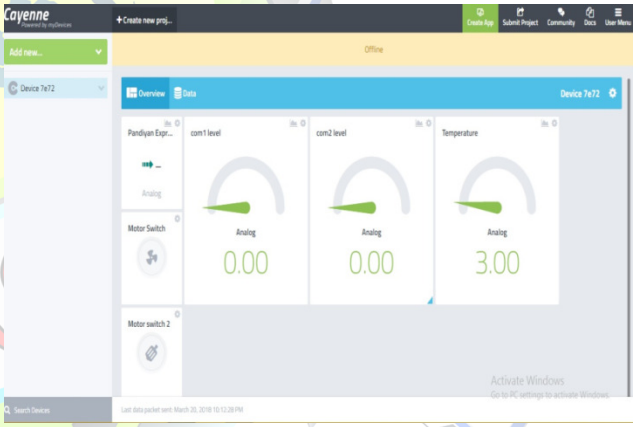
TEMPERATURE SENSOR (LM35):

The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in °C). The LM35 generates a higher output voltage than thermocouples and may not require that the output voltage be amplified.

ULTRASONIC SENSOR

Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object.ESP8266:It is a system-on-chip (SoC) which integrates a 32-bit Tensilica microcontroller, standard digital peripheral interfaces, antenna switches, RF balun, power amplifier, low noise receive amplifier, filters and power management modules into a small package. It provides capabilities for 2.4 GHz Wi-Fi (802.11 b/g/n, supporting WPA/WPA2), general-purpose input/output (16 GPIO), Inter-Integrated Circuit (I²C), analog-to-digital conversion (10-bit ADC), Serial Peripheral Interface (SPI), I²S interfaces with DMA (sharing pins with GPIO), UART (on dedicated pins, plus a transmit-only UART can be enabled on GPIO2), and pulse-width modulation (PWM). The processor core, called "L106" by Espressif, is based on Tensilica's Diamond Standard 106Micro 32-bit processor controller core and runs at 80 MHz (or overclocked to 160 MHz). It has a 64 KB boot ROM, 32 KB instruction RAM, and 80 KB user data RAM. (Also, 32 KB instruction cache RAM and 16 KB ETS system data RAM.) External flash memory can be accessed through SPI. The silicon chip itself is housed within a 5 mm × 5 mm Quad Flat No-Leads package with 33 connection pads — 8 pads along each side and one large thermal/ground pad in the centre.

IV. EXPERIMENTAL RESULTS



V. CONCLUSIONS AND FUTURE WORK

This paper has provided the implementation ofthe wireless sensor network for real time application. It is a low cost, low power andmaintaining the wireless mesh sensor network for seat availability checking and water level monitoring in train is also easy.The sensors are used to collect the data which is transmitted via ADC to microcontroller.We have made a project in which the ultrasonic sensor detects the accurate level of water in the tank and the temperature is used to senses the fire accident level and give signal to the microcontroller unit of ESP12E.Providing information about water content in train may help the passengers especially women and children to travel comfortably and with seat availability. The method is very simple to implement and cost effective and reduces the problems faced by passengers in train. We have used 32 bit ultralow power industrial based

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microcontroller Tensilica L106. By using this microcontroller we can compact our embedded system size and we can also reduce power consumptions. So we conclude that we can accurately measure water level in tanks and we can successfully send multiple sensor data on web server by using ESP12 wifi module. This wifi module uses protocols like MQTT, HTTP, TCP or UDP by which we can send our data on web server or cloud .To that data we have provided user friendly interface through any website or application and android app. In the future, the ultra-sonic sensor could be replaced by precise water level sensor, so that the system can able to perform more reliably. The size of system is also reduce by using that sensor.

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