https://doi.org/10.46335/IJIES.2023.8.7.3 **e-ISSN: 2456-3463**
Vol. 8, No. 7, 2023, PP. 12-18

International Journal of Innovations in Engineering and Science, www.ijies.net

Can Data Implementation On IOT Cloud Server Data Using Telematics

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***Received on**: 13 April, 2023* ***Revised on**: 07May,2023* ***Published on**: 09 May,2023*

***Abstract –** Internet of Thinks this technology has been generally used in the research of geological information technology .cloud computing technologies are widely used in daily life and work. Especially in the fields of geological information surveying and mapping, A Controller Area Network (CAN bus) is a vehicle bus standard designed to allow microcontrollers and devices to communicate with each other. In this paper reduce wire complexity by using only two wires.*

***Keywords** - IOT, cloud, computing, CAN Module, ATMEGA328, GPS, vehicle monitoring*

I -INTRODUCTION

CAN bus have been successfully applied to many key control systems? By developing the new module and improving the design and optimization of the control algorithm, a modular architecture can be created for the integration of sensor data and distributed hardware control in the field of agricultural Internet of things, and the control architecture can be improved [1]. The Smart Vehicle Monitoring and Tracking System (SVMTS) The proposed system, uses IOT some sensors in order to detect the distance between the vehicle to prevent the collision and detect the accident relatively in less time that sends an alert to rescue team and family members. In the case of theft, the owner will be able to track the location of the vehicle using GPS via Mobile app. This application helps and gives the best result to overcome the lack of emergency facilities [4]. Cloud computing has begun to perforate into all areas of life, such as the management, analysis, storage and actual mapping of geological information. It solves the problems of difficult management and storage of geological information data in the past, and makes the management of geological information develop towards improvement and Informatization [5]. Controller Area Network is a communication protocol that can be used in a Distributed Control Systems. It was first developed by Robert Bosch to communicate between subsystems present in the modern automobiles. This CAN Bus allows different controllers or processors on the bus to communicate with one another via messages that are passed on the bus. The CAN Bus operates at speed of less than 1 Mbps and the message lengths are typically 50 to 100 bits in length. It is well suited as a communication network between sensors and the microcontroller [8]. Thanks to the progressive worldwide Smartphone penetration, the vehicle and navigation industry has gained new ways to collect data, which in turn has come to benefit drivers, vehicle owners, and society as a whole. There are several reasons to prefer Smartphone-based vehicle telematics over implementations that only utilize vehicle-fixed sensors [9]. Drinking and driving is already a serious public big problem, which is likely to emerge as one of the most noteworthy problems in the near prospect. The existing system provides an environment where the driver cannot start the ignition when the driver is drunk above the limit[10]. IoT-based Data Storage Systems in cloud computing are face three pairs of conflict requirements, which are distributed execution with united management of infrastructure resources, multi-tenant storage with isolated performance, and scalability with flexible. In addition, by the use of Cloud platform for IoT data exchanging, processing and integration, different requirements are given for mass, real-time and unstructured data processing covering different levels such as data representation, data storage and data analysis[13]. Frameworks seem to focus on real-time data. It also provides communication from various distributed devices to a central Web server.

II- RELATED WORK

Presently, the adoption of Internet of things (IOT)-related technologies in the Smart Farming domain is rapidly come out. The increasing number of sensors used in diverse applications has been provided a massive number of continuous, unbounded, rapid data and requires the management of distinct protocols, interfaces and intermittent connections. A low-cost, low-power, and low data-rate solution is proposed to fulfill the requirements of information monitoring for actual large-scale agricultural farms, which we will need axiomatically in the future. This paper designs a heterogeneous data acquisition and control system for differentiated agricultural information monitoring terminal. Based on the IoT-CAN bus architecture, the system can adapt different sensors and actuators, realize information exchange, and facilitate modular splicing deployment. At the same time, the heterogeneous network data interface is standardized, and the analytical storage of heterogeneous data is standardized. at the last, it verifies that IoT-CAN protocol architecture is better than Robo CAN and CAN Open, and systems in agricultural environment. It solves the problems of hardware difference and heterogeneous data in monitoring system, which is of great significance to the establishment of heterogeneous data standard of agricultural information [1]

The adoption of smart environments is becoming more and more important in many application scenarios such as healthcare, asset management and environmental monitoring. In emergency services, there are also very attractive use cases on next generation emergency services, presenting challenges that must be addressed in order to satisfy the requirements of both citizens and emergency service professionals. This chapter shares two interesting use cases illustrate emergencies where the use of telematics and smart devices do enable improved emergency situational awareness for citizens and emergency services. Leveraging on the example of the eCall initiative, a tough explanation is given on how next generation emergency services may further explore the promising new smart technologies to improve the communication dynamics with citizens and to attain increased effectiveness and performance in their daily mission to protect [12].

—Just like it has irreversible reshaped social life, the fast growth of smartphone ownership is now beginning to revolutionize the driving experience and change how we think about automotive insurance, vehicle safety systems, and traffic research. This paper summarizes the first ten years of research in smartphone-based vehicle telematics, with a focus on user-friendly implementations and the challenges that arise due to the mobility of the smartphone. Notable academic and industrial projects are reviewed, and system aspects related to sensors, energy consumption, cloud computing, vehicular ad hoc networks, and human-machine collaborate are examined. Moreover, we highlight the differences between traditional and smartphone based automotive navigation, and survey the state-of-the-art in Smartphone-based transportation mode classification, driver classification, and road condition monitoring. Future advances are expected to be driven by improvements in sensor technology, evidence of the societal benefits of current implementations, and the establishment of industry standards for sensor fusion and driver assessment [9].

This work aims to design an autonomous vehicle that able to sensing the surrounding environment. The self driving vehicle can moves in certain path between two points A and B. Autonomous vehicle have five electronic control units (ECU0 through ECU4) will communicate over a control area network (CAN) bus. Every control unit ECU0 and ECU1, controls three of the ultrasonic sensors installed in the front and back of the vehicle. The middle ECU2 consists of ultrasonic sensor and global positioning system (GPS) to provide the main control unit ECU4 with current location to take the decision to move and send it to the moving control unit ECU3. ECU3 controls the motor drivers, that able to take a fast decision depending on the data collected from other ECUs. ODROID-XU4 is the main control unit that

https://doi.org/10.46335/IJIES.2023.8.7.3 e-ISSN: 2456-3463
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connected to a Microsoft camera 5000 and internet flash. ECU4 captures all data published on the CAN bus and classified based on the identifier of each ECU according to emergency or location data. GPS sensor updates the location on Google maps every 5 second and stops the vehicle if the vehicle reaches to point B producing a good internet of things (IoT) application.

Industrial automation systems play a crucial role in controlling several process- related operations. Due to the implementation of a wide variety of industrial networks with their geographical distribution over industry, the floor data transferring and controlling capability has become more advanced and the need for a reliable, fast , high level communication network arises which can be satisfied by Controller Area Network .Our proposed system implements the CAN protocol in Industrial Automation. In this system, a single node consists of various sensors which monitors and provides process variables to ATmega328 Microcontroller. This is then connected to a CAN controller which interchanges data with ATmega328 Microcontrollers using serial peripheral interface. CAN controller does the process of control, error management and bit stream conversion. This serial data is connected to the CAN transceiver for the CAN bus establishment. Many such nodes are connected to the CAN bus. On the other end of the bus, the master NXPlpc1768 which has inbuilt CAN ports receive and control the datas and process variables from the nodes by using CAN protocol. This master NXPlpc1768 is improvised with the inclusion of IoT which uses internet connectivity by using Ethernet shield that sends datas and process variables from the remote location of the industry to the user at any geographical area [8].

III- METHODOLOGY

A. Arduino Nano

Table1: Arduino Nano Specification

Operating parameter	**Specification range**
Microcontroller	Atmega328
Architecture	AVR
Operating Voltage	5 V
SRAM	2 KB
Clock Speed	16 MHZ
Analog IN Pins	8
EEPROM	1 KB
PCB Size	18 x 45 mm

Arduino Nano circuit board with Arduino IDE is capable of reading analog or digital input signals from different sensors, activating the motor, turning LED on/off and do many other such activities. All functionalities are performed by sending a set of instructions to the ATtmega328 main microcontroller, on the board via Arduino IDE. The Arduino board also includes Power USB, Power (Barrel Jack), voltage regulator, crystal oscillator, voltage pins (3.3v,5v,gnd,vin), A0 to A5 analog pins, icsp pin, power led indicator, tx and rx leds, 14 digital input/output pins, Aref, and Arduino reset

The Arduino Uno is a microcontroller board , based on the ATmega328.The Uno board functioning is different from all other boards in that it does not use the FTDI USB to serial driver chip. Instead, the Atmega328 is programmed as a USB to serial converter. The ATmega328 is a low power CMOS 8 bit microcontroller based on the AVR enhanced RISC architecture structure

The Arduino project started in 2003 as a program for students at the Interaction Design Institute Ivrea in Ivrea, Italy,[2] aiming to provide a low-cost and easy way for novices and professionals to create devices that interconnect with their environment using sensors and actuators. Common examples of such devices intended for beginner hobbyists include simple robots, thermostats and motion detectors.

Fig.1. arduino nano

B LCD

LCD (Liquid Crystal Display) screen is an electronic display module and finds a wide range of applications. A 16x2 LCD display is a very basic module that has 2 controllers with 16 Pins which is very commonly used in various devices and circuits. These modules are place over seven segments and other multi-segment LEDs as they are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations. The status of the system is displayed using LCD.

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in color or monochrome.[1] LCDs are available to display random images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as preset words, digits, and seven-segment displays, as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements. LCDs can either be normally on (positive) or off (negative), depending on the polarizer arrangement. For example, a character positive LCD with a backlight will have black lettering on a background that is the color of the backlight, and a character negative LCD will have a black background with the letters being of the same color as the backlight. Optical filters are added to white on blue LCDs to give them their characteristic appearance.

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.

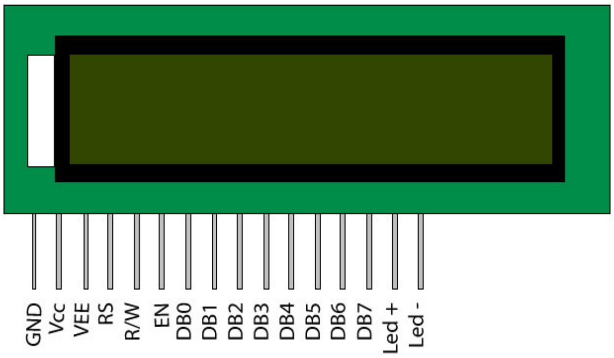

Fig.2. LCD

C NTC

NTC stands for "Negative Temperature Coefficient". NTC thermistors are resistors with a negative temperature coefficient, which means that the resistance decreases with increasing temperature. They are primarily used as resistive temperature sensors and current-limiting devices. The temperature sensitivity coefficient is about five times greater than that of silicon temperature sensors (silistors) and about ten times greater than that of resistance temperature detectors (RTDs). NTC sensors are typically used in a range from −55 to +200 °C. The non-linearity of the relationship between resistance and temperature exhibited by NTC resistors posed a great challenge when using analog circuits to accurately measure temperature. However, rapid development of digital circuits solved that problem through enabling computation of precise values by interpolating lookup tables or by solving equations which approximate a typical NTC curve.

Fig.3- NTC thermostat

D CAN BUS

The MCP2515 CAN Bus Controller is a simple Module that supports CAN Protocol version 2.0B and can be used for communication at 1Mbps. This particular module is based on MCP2515 CAN Controller IC and TJA1050 CAN Transceiver IC. The MCP2515 IC is a standalone CAN Controller and has an integrated SPI Interface for communication with microcontrollers. Coming to the TJA1050 IC, it acts as an interface between the MCP2515 CAN Controller IC and the Physical CAN Bus. The board has a 8 MHz Crystal oscillator. Even the 16 MHz version is also available. A jumper can be attached which will give 120ohm Termination. CAN_H & CAN_L are the two twists where wires can be attached over a distance for communicating with other CAN Module. CAN bus uses two dedicated wires for communication. The wires are called CAN high and CAN low. The CAN controller is connected to all the components on the network via these two wires. Each network node has a unique identifier. All ECUs on the bus are effectively in parallel and that’s why all the nodes see all of the data, all of the time. A node only responds when it detects its own identifier. Individual nodes can be removed from the network without affecting the other nodes.

Fig.4. CAN BUS Module MCP2515

E Alcohol Sensor

Fig.4. MQ-3 Alcohol sensor

The alcohol sensor used here is MQ-3 which helps to detect whether the driver has consumed alcohol. Whenever alcohol is present in air, the sensor conductivity increases and generated the required output. The sensor is highly sensitive towards alcohol, while that towards benzene, gasoline, smoke and vapour is less. The range of this sensor is up to 2 meters and it can be used for detecting alcohol with varying concentration levels. The MQ3 alcohol sensor operates on 5V DC and consumes approximately 800mW. It can detect alcohol concentrations ranging from 25 to 500 ppm.

F GPS

The Global Positioning System is utilized to track and Monitor the location through satellite system. Whenever Accident happens somewhere, GPS device starts working to Track the exact location of the vehicle. GPS is very efficient Anti-theft device which used to trace the location of stolen Device.

G GSM Module:

Fig 5- GSM Module

A GSM modem consists of GSM Module along with some other components such as a communication interface (like Serial Communication: RS-232), power supply and some types of indicators. We can connect the GSM Module with an external computer or a microcontroller with the help of this communication interface. The GSM module used here is SIM900.

Specifications:

- It requires a supply voltage between 3.4V to 4.5V
- Frequency bands:SIM900A
- It also helps to provide GPRS connectivity with the help of GPRS multi-slot class 10 (default).
- It Supports UART interface
- It also Supports single SIM card[13]

Working of Project

In this project, two can bus modules are use one is CAN Bus transmitter which is connected with Arduino Nano ATMEGA328 microcontroller and other is CAN Bus receiver which is connected with another Arduino Nano ATMEGA328 microcontroller. At transmitter section of CAN Bus module, two sensors namely temperature sensor (NTC) and alcohol sensor (MQ3) are connected with ATMEGA328 microcontroller. Where NTC sensor is use as a temperature protection for protecting circuit from overheating. And MQ3 sensor use to detect alcohol, benzene CH4, LPG, CO. This two sensors transfer the data in analog form to the controller and from controller data gets transfer to the CAN Bus transmitter. CAN Bus transmitter transfer these analog data to CAN Bus receiver which convert the analog data into digital form. Microcontroller receive the data from CAN Bus receiver and these same data is display on LCD after each 20 sec.

https://doi.org/10.46335/IJIES.2023.8.7.3 **e-ISSN: 2456-3463**
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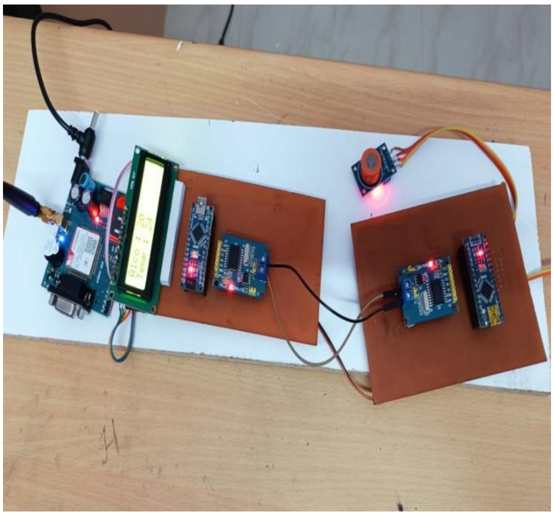
As the GPRS system connected with microcontroller the data is broadcast on cloud server using AT Commands through things speak channel. Before invention of CAN Bus module, sensors in the vehicle require number of wires for the connections to transfer the data from the sensors? Due to which there is chances of short circuit and burning of vehicles. To overcome this problems, Boash company invent CAN bus Module, CAN module is vehicle bus standard design to allow microcontroller and other devices to communicate with each other. CAN bus reduce the number of wires into only two wires? It provides accurate data for broadcasting without dedicated wiring.

IV -OUTPUT



V- RESULTS

Table 2: Result compared to existing work

Sr.no	Parameter	Article name & year	Existing work	Proposed work
1.	Microcontroller used	Alcohol Detection System to Reduce Drunk Driving(2021)	Arduino Uno 2KB [SRAM]	Arduino Nano 8KB [SRAM]
2.	Temperature sensor	IoT Based Distributed Control System Using CAN)2018	LM35 Operating temperature range (°C) -40 to 110	NTC Operating temperature range (°C) -55 to 125
3.	Accuracy	Early Identification and Detection of Driver Drowsiness by Hybrid Machine Learning (2021)	83.25% Accuracy	100% accuracy

VI- CONCLUSION

This paper designed and implementation of a CAN data on IOT cloud server. We have successfully designed, implemented and tested the CAN data on cloud server. Our proposed method can provide microcontroller and other devices to communicate with each other using only two wires. In this method, we used telematics system and IOT cloud server. In which telematics deals with long distance transmission of computerized information and IoT massive network that supports IoT devices and applications. This includes the underlying infrastructure, servers and storage, needed for real-time operations and processing.

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