# Design and Implementation of Multiple Sensor for Data Broadcasting using 29 Bit CAN (Controller Area Network) Bus"

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***Abstract*— This paper aims to Design and Implementation of Multiple Senso for Data Broadcasting using 29 Bit CAN (Controller Area Network) Bus" The module utilises two Sensor Devices with individual Display in a common CAN Bus. Temperature and Gas Sensor outputs are display over the OLED, simultaneously the measured data is transfer to the CAN Bus with their respective CAN ID at every 1000 mSec. The Data appears in the Data Logger window in Hex Format which is standard format for CAN Bus Protocol. CAN Frame consists of one counter also from 0x01 to 0x0F which indicated the sensor transmission and measurement is live.**

**Keywords- Anttiny 1624 with 64 bit internal, Temperature Sensor, Gas Sensor, 6x2 Display**

## I. INTRODUCTION

CAN stands for Controller Area Network protocol. It is a protocol that was developed by Robert Bosch in around 1986. The CAN protocol is a standard designed to allow the microcontroller and other devices to communicate with each other without any host computer. The feature that makes the CAN protocol unique among other communication protocols is the broadcast type of bus. Here, broadcast means that the information is transmitted to all the nodes. The node can be a sensor, microcontroller, or a gateway that allows the computer to communicate over the network through the USB cable or ethernet port. The CAN is a message-based protocol, which means that message carries the message identifier, and based on the identifier, priority is decided. There is no need for node identification in the CAN network, so it becomes very easy to insert or delete it from the network. It is a serial half-duplex and asynchronous type of communication protocol. The CAN is a two-wired communication protocol as the CAN network is connected through the two-wired bus. The wires are twisted pair having 120Ω characteristics impedance connected at each end. Initially, it was mainly designed for communication within the vehicles, but it is now used in many other contexts. Like UDS, and KWP 2000, CAN also be used for the on-board diagnostics.

## II. LITERATURE REVIEW

1. Lucia Lo Bello (2019) y. In this paper the authors have suggested a novel analysis technique for recent technological challenges and HW/SW solution for on-board embedded and network automotive system.
2. Riham Elhabyan, Wei shi,and Marc St-Hilaire(2019) The author demonstrated the advantages the performance of these protocols is mainly limited by challenges related to determining a more realistic coverage model for the sensor nodes in the networks.
3. Jobish Revanth (2020) In this paper authors concern to temperature monitoring, we can also maintain the temperature by connecting it with the temperature cooling system so that temperature can be maintained.
4. Harshal Hemane.(2020),In this paper the hardware and software set up of the UWASA Node is working on the corrections based on the test reports' true or false and validates it. The automatic performance test software and the automatic CiA DS401 test software can be used in the future to test other CANopen devices with little modification of the test cases. It's also suitable for various CAN protocols. This project is only focused on of the physical layer testing, but can also be used in data link layer testing, robust testing and communication testing. This test software and hardware has scope of optimization in the future, as needed.
5. Khalid mahmood, salman shamshad, saru kumara. (2021) emphasized the impact of EFTs, generating faults on intra –vehicle communication protocol, such as CAN and CAN-FD, leaving gaps about their impact on more robust protocol.
6. Daniel H. Pohren, Alexandre dos Santos Roque.

(2021) In this paper authors used an integrated approach in combining spatially explicit resource potential analysis with the performance of these protocols is mainly limited by challenges related to determining a more realistic coverage model.

7. Geoffrey Spencer, Francesco Mercaldo ,(2021) The author demonstrated the advantages of expanding the integration of the development of new CAN bus electronic control units designed to enable remote communication between sensors and actuators, and the main controller of forest machines.

8. Geoffrey Spencer, (2021) This paper presents the initial developments of new hardware devices targeted for CAN (Controller Area Network) bus communications in forest machines. CAN bus is a widely used protocol for communications in the automobile area. It is also applied in industrial vehicles and machines due to its robustness, simplicity, and operating flexibility. It is ideal for forestry machinery producers who need to couple their equipment to a machine that allows the transportation industry to recognize the importance of standardizing communications between tools and machines.

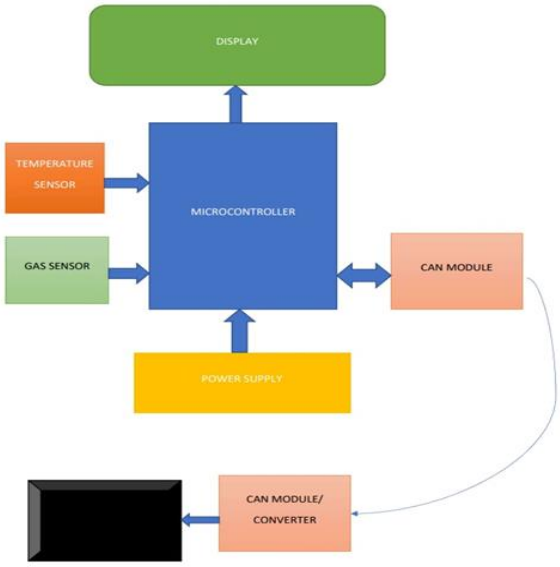
9. Frutuoso Mateus (2021) This paper presents the initial developments of new hardware devices targeted for CAN (Controller Area Network) bus communications in forest machines. CAN bus is a widely used protocol for communications in the automobile area. It is also applied in industrial vehicles and machines due to its robustness, simplicity, and operating flexibility.

10. Rosangela Casolare (2022) In this paper the authors have aim to discriminate between malicious and legitimate CAN packets with supervised machine learning. As evidenced by the experimental analysis results, the approach suggested in this paper achieved good results. For future works, as a first aim, we would like to introduce new types of attack, for example, we could conduct detailed experimentation on the replay attack. This attack permits the attacker to record CAN traffic related to the driver's actions and make the vehicle reproduce the same actions. Furthermore, the replay attack turns out to be very difficult to identify, as it is based on sequences of legitimate CAN packets reproduced from a previous transmission.

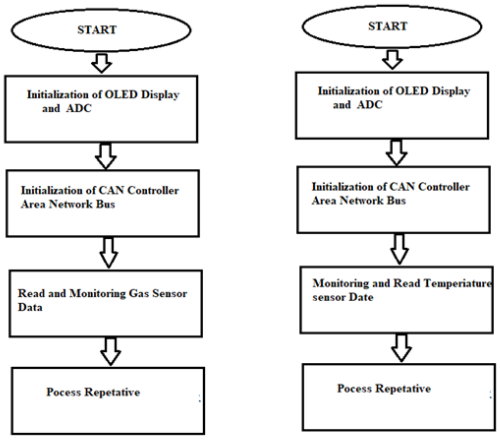
## III. METHODOLOGY

Monitoring of various parameter like Temperature, Humidity, Carbon Emission etc. are very crucial now a day in industries. Automobiles sector generally used CAN protocol for the sensor data transmission and collection to take necessary action whenever required. CAN provides multiple transducer interfacing on a single bus, this makes it more popular for industrial uses. Transmission speed and distance plays a vital role in any information broadcasting, and CAN is capable of doing it.Number of sensors are deployed in the industries to run it efficiently without an interrupt. Environmental parameters monitoring also a part of it. CAN provides the flexibility to make number of add resseson a single bus, so that it will be easy for anyone to monitor the records on a single platform and take necessary action. In our proposed project we are going to interface Temperature and Gas sensor and the measured parameter get broadcasted through a CAN bus. Here we will use 29-bit Extended Frame ID which is advanced version of CAN protocol. These sensors are directly interfaced with internal ADC of Microcontroller. Local display unit also available to check the measured data. Aim is to make cost effective solution for industries with advanced technology.

Block Diagram




FLOW CHART




WORKING

The paper title is Design and Implementation of Multiple Sensor for Data Broadcasting using 29 Bit CAN (Controller Area Network) Bus" The goal is to Proposed project consists of Temperature and Gas Sensor. The output of sensors is connected to the internal ADC of ATTINY1624. ATTINY1624 is new series of microcontroller with RISC Architecture and 12-bit internal ADC along with USART Port and SPI communication. CAN Module based on Microchip connected to the microcontroller through a SPI protocol (SS, MISO, MOSI, CLK) lines.

One Graphical LCD also interfaced with it. Microcontroller continuously measures the sensor output and display it on LCD. At every 5 second it transfers the recorded data to CAN bus through a CAN module. AT Receiver end one more CAN converter is available, which receives the data and display it on computer. One can transmit data at 1Mbps rate, but we will use standard 250kbps baud rate for data exchange.

## IV.SYSTEM REQUIREMENT

HARDWARE REQUIREMENT

1.OLED Display
2.Gas Sensor
3.Temperature Sensor
4.Controller Module
5.ATTINY 1624 with 64 bit internal ADC along with CAN Transmitter Module.

SOFTWARE REQUIREMENT

ATMEL Studio for code compilation, VB Application for Remote Terminal Unit.

IMPLEMENTATION

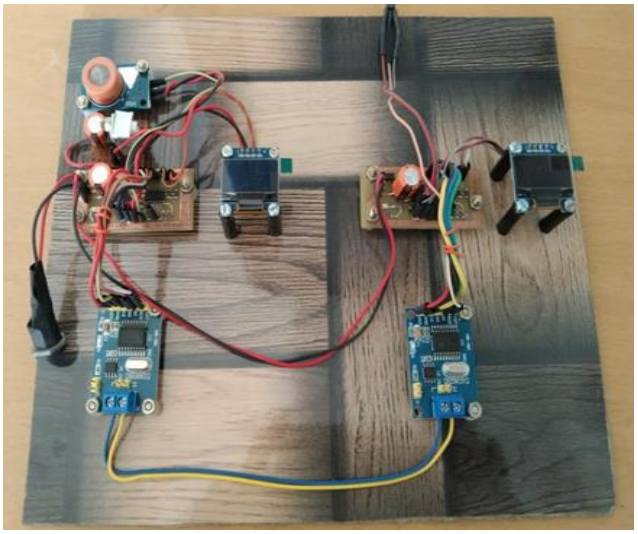
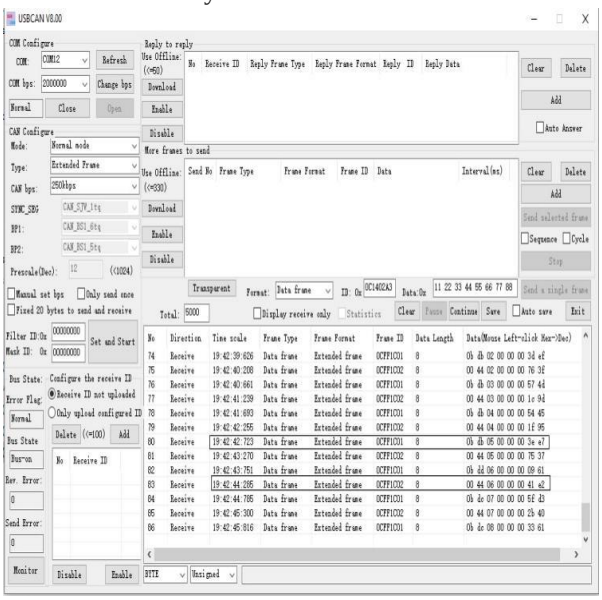


**Fig. shows the experimental setup of the system**

## RESULT

The results of the paper demonstrated significant improvements Can protocol really solve the multiple point data collection problem which is serious concern for industries. Extended 29 bit frame provides extra facility to increase the nodes. Transmission speed also is very high upto 2Mbps which plays very vital role in scientific laboratory and automotive industries.



## IV.CONCLUSION

There is no data conflicts as we have assigned individual CAN Frame ID to sensors. Each sensor transmitting the

hex data without any interruptions. The delay between the two frames are also within the limits. The main advantages is that we can assign any CAN ID to the Sensors. CAN frame has provision of counter through which we get idea about the current situation and sensors are working properly? The Data analyzer having a feature of data logging so that we can save the CAN frame Data for further analysis and applications.

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