An Efficient Multi-Protocol Gateway Design Using ESP32 for Industry 4.0 and Electric Vehicle

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Abstract—**Viewing all electronic system connected around the world in order to interchange information i.e. THE INDUSTRIAL INTERNET OF THING (IIOT) is no more dreams, but a reality. Present situation is such that the industrial equipment companies are expanding (IIOT) by creating complex systems that integrate sensors, processors and communication to create intelligent factories, smart grids and even smart cities. Also electric vehicles are making names for themselves as upcoming technology. A Gateway is a network of node that connects two networks using different protocols together. Bridge is used to join two similar types of networks; similar to that a gateway is used to join two dissimilar networks. Through this gateway we can receive the data as-well-as sort the data and store it in cloud. So our proposed work is aimed at an effective gateway using multi-protocol which can be used in industry-4.0 and electric vehicle to perform different thing.**

Index Terms— **IIOT, Gateway, Technology, Industry 4.0, Cloud.**

I. INTRODUCTION

Next generation factories require improvements, in order to maximize profitability, more flexibility in their layouts, more information about the process and manufactured products, more intelligence in the processing of these data and an effective integration of the human experience interaction .However, as new technology is introduced into the factory sector, some rules must be respected. The main thing of industries is that production cannot stop. New technologies must be compatible with old systems, and interoperability between vendors should be facilitated. Furthermore, the solutions should provide a means to support real-time operation, cyber security and in some cases, safety. Effective integration of the human experience interaction .However, as new technology is introduced into the factory sector, some rules must be respected. An IOT gateway provides a bridge between devices in the field (factory floor, home, etc.); the cloud, where data is collected, stored and manipulated by enterprise applications; and the user equipment (Smartphone, tablets etc.). The IOT gateway provides a link which can be used to communicate between devices and cloud. A Gateway is a network of node that connects two networks using different protocols together. Bridge is used to join two similar types of networks; similar to that gateway is used to join two dissimilar networks. Through

this gateway we can receive the data as-well-as sort the data and store it in cloud. The CAN module will be connected to the car which will send the status of battery, fuel, engine etc. The cloud is used to collect the data and then analyze it in a proper way which will be sent to the user. The cloud which we are going to use first is Ubidots which has simple cloud computing operations. Then we will be using AWS (Amazon Web Server) which will handle big data.

II. LITERATURE SURVEY

A. Study on IoT Architecture and Gateway Technology

It was published in 2014 contains the information about IOT architecture and gateway technologies. From this research paper we learn about the gateway and how different communication protocols are connected using gateway. Figure1 shows the processing module structure. Paper also explained about upcoming technologies in the market related to gateways and also the impact of new gateways on IOT world.
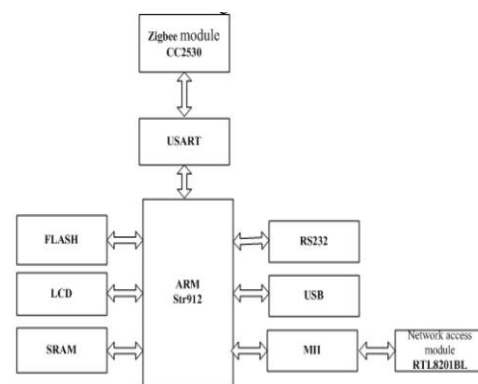

Fig. 1. ARM Based processing module

B. Smart Vehicles Management System by Using Gateway, Hand-Set and Vmp

It was published in 2007 explained about all upcoming smart vehicles and brief us about all the technologies present in vehicle which make it as smart vehicles. Paper also contains the information about CAN module and how it can be used in vehicles to vehicles communication. And paper has detailed

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description about the role of gateway in smart vehicles. Below Fig. 2. Shows the block diagram of the gateway.
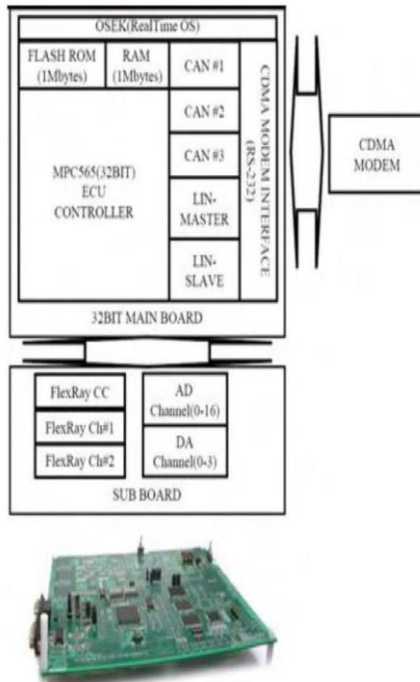

Fig. 2. Block Diagram and picture of gateway system

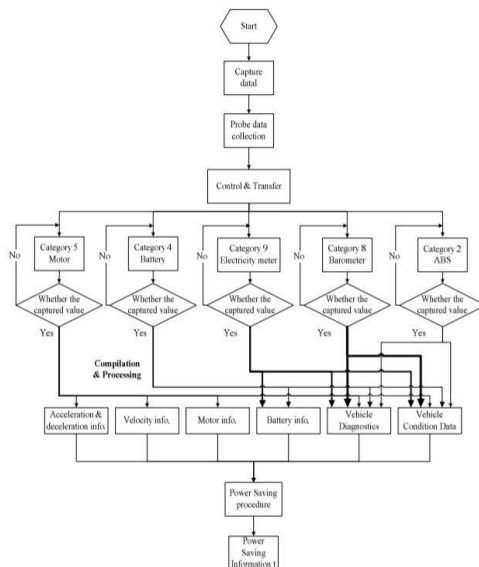*C. Telematics Gateway and Power Saving Method for Electric Vehicle*

Fig. 3. Flow chart of Power saving application scenario

It has thorough detailed about electric vehicle and also contain information regarding its characteristics. It contains the information related to gateways in electric vehicles and also contains description related to batteries, its mechanism of charging and discharging, control etc. Figure below shows the diagram of the power saving application.

III. CONCLUSION

We attempted to make a Gateway using ESP32 that can be used with Electric Vehicles and Industry 4.0. This gateway would work as communication device between the point of collecting the data and sending the data. The role of gateway in Industry 4.0 is to collect the data from source to a device which can process it and then transmit it to destination. Between the process of collecting and receiving data there may be different protocol present depending on application. Our aim is to use this gateway in Electric Vehicles where we planned to use CAN module for Vehicle to Vehicle communication. The primary work of gateway is to combinable collect information and passes on to cloud for further analysis.

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