Innovative Journal for Opportunities and Development in Science & Technology,
Volume 3, Issue 4,May 2023
Paper Id: – IJ2023V3I4 -23 A-E
ISSN 2582-6026

IOT BASED SMART ENERGY METER AND COST MONITORING SYSTEM FOR EV CHARGING STATION

[1]Dr. R. S. Pawase, [2]Ms. Snehal Bombale , [3]Sangita Jorvekar, [4]Sampada Kakad, [5]Sakshi Kunde

[1]Asst. Prof., Dept. of Electronics and telecommunication, AVCOE, Sangamner
[2]UG Scholar, Dept. of Electronics and telecommunication, AVCOE, Sangamner
[3]UG Scholar, Dept. of Electronics and telecommunication, AVCOE, Sangamner
[4]UG Scholar, Dept. of Electronics and telecommunication, AVCOE, Sangamner
[5]UG Scholar, Dept. of Electronics and telecommunication, AVCOE, Sangamner

ABSTRACT- In the world of emerging technologies, automobile manufacturers all over the world are currently developing electric vehicles with different features based on the requirements of the people. Electric individuals are interested in using electric vehicles transportation because they are environmentally beneficial .Because they are powered by batteries, electric vehicles are becoming more and more popular.The Smart Energy Metre (SEM) has been created in the proposed concept power level indication and alert system for ele ctric vehicles.Through IOT, this gives the user graphical representations of current and voltage information. The user can use this metre determine the battery's state and the location of the charging station.The battery is calculated and monitored using a voltage sensor.Light indications warn the user if the battery is low.
When the battery colour otherwise glows in green colour. Communication between user and vehicle during which the customer requests SEM is usually done in a short period i.e., less than a minute. /Relay is used for switching purposes, it controls the flow of charge in the system.

Keywords: Current Sensor, Voltage Sensor, WIFI/GSM Module, IOT web Server

I. INTRODUCTION

The first electric cars appeared in the 1890s.Due to their higher price, slower top speed, and shorter battery life than conventional vehicles powered by petroleum, electric vehicles initially have lower demand.Nissan Leaf, Ford Focus Electric, Tesla Model, and Chevrolet Volt are a few examples of electric ehicles.Electric vehicles come in different varieties.These three types of electric vehicles include battery, hybrid, and fuel ce ll.Vehicles that run entirely on chemical energy stored in rechargeable battery packs are known as battery ele ctric vehicles. They lack any secondary sources, such as internal combustion engines or hydrogen fuel cells. An internal combustible engine is replaced by electric motors and motor controls in a batterypowered vehicl e. Hybrid Electric Vehicle: A hybrid electric vehicle (HEV) is a type of hybrid vehicle that combines a conventional internal combustion engine (ICE) system with an electric propulsion system (hybrid vehicle

ISSN 2582-6026

drivetrain). The presence of the electric powertrain is intended to achieve either better fuel economy than a conventional vehicle or better performance. Fuel Cell Electric Vehicle: A fuel cell vehicle (FCV) or fuel cell electric vehicle (FCEV) is an electric vehicle that uses a fuel cell, sometimes in combination with a small battery or super capacitor, to power its on-board electric motor. Fuel cells in vehicles generate electricity generally using oxygen from the air and compressed hydrogen. Most fuel cell vehicles are classified as zero-emissions vehicles that emit only water and heat.

II. METHODOLOGY

BLOCK DIAGRAM:

IOT Based Smart Energy Meter And Cost Monitoring System For EV Charging Station:

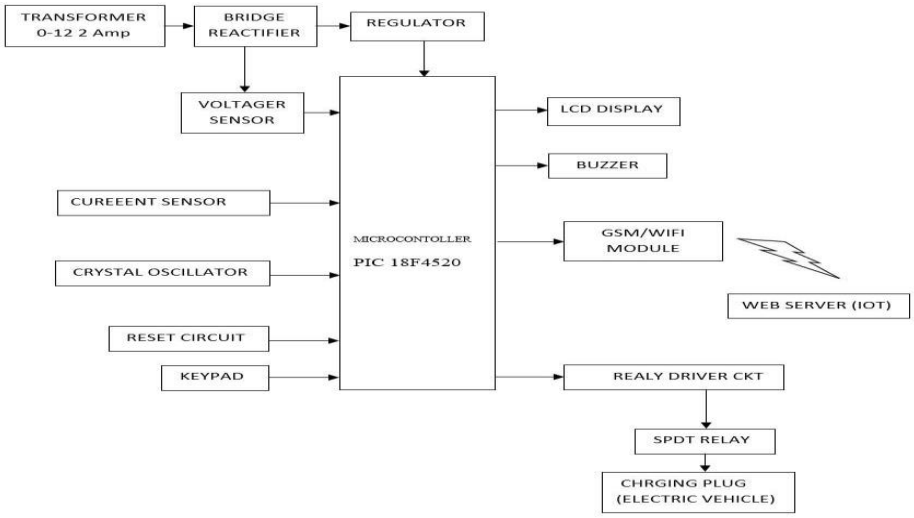

Fig.1: Block Diagram

III. PROPOSED SYSTEM

To create a Smart Energy Meter for the Electric Vehicles which will monitor the various electrical parameters of the vehicle. The parameters such as battery level, total power consumption w.r.t. time. The Smart Energy Meter helps in monitoring the battery level, it is displayed on LCD. If battery level is low it is indicated by light indicators. The project mainly aims at cost reduction and eco-friendly device which is precise with minimal inaccuracy. The system monitors these parameters accordingly and are then sent through the IOT web page to theuser.The controller is the foundation of this entire process.The above system's energy metre is connected to the internet utilising IoT, which is the internet made operational by physical devices that allows objects to exch ange data.Therefore, there is a means for consumers to periodically track their energy use so that they can mana

ISSN 2582-6026

ge it as they plan.Both customers and suppliers can use this system.
This technique reduces the need for staff during connection and disconnect upload.It is essential to alert supplie rs to any theft occurring in the sensor.This system principally monitors electrical parameters of appliances and subsequently calculates the units consumed. As WSN's are having many advantages, here we have designed smart meters predicting the usage of power consumption. However, it is lowcost, flexible, and robust system to continuously monitor and control based on consumer requirements, Wi-Fi technology for networking and communication, because it has low power characteristics, which enable it to be widely used in electric vehicle, home and building environments.

A. PIC 18f4520 Microcontroller:

It is an 8-bit enhanced flash PIC microcontroller that comes with nanoWatt technology and is based on RISC architecture. Many electronic applications house this controller and cover wide areas ranging from home appliances, industrial automation, security system and end-user products. This microcontroller has made a renowned place in the market and becomes a major concern for university students for designing their projects, setting them free from the use of a plethora of components for a specific purpose, as this controller comes with inbuilt peripheral with the ability to perform multiple functions on a single chip.

B. ACS712 Current Sensor:

The ACS712 Module uses the famous ACS712 IC to measure current using the Hall Effect principle. The module gets its name from the IC (ACS712) used in the module, so for you final products use the IC directly instead of the module.
These ACS712 module can measure current AC or DC current ranging from +5A to -5A, +20A to -20A and +30A to 30A. You have to select the right range for your project since you have to trade off accuracy for higher range modules. This modules outputs Analog voltage (0-5V) based on the current flowing through the wire; hence it is very easy to interface this module with any microcontroller. So if you are looking for a module to measure current using a microcontroller for you project then this module might be the right choice for you.

ISSN 2582-6026

C. LCD Display:

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. 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. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD.

D. GSM:

This GSM modem has a SIM800A chip and RS232 interface while enables easy connection with the computer or laptop using the USB to Serial connector or to the microcontroller using the RS232 to TTL converter. Once you connect the SIM800 modem using the USB to RS232 connector, you need to find the correct COM port from the Device Manger of the USB to Serial Adapter. Then you can open Putty or any other terminal software and open a connection to that COM port at 9600 baud rate, which is the default baud rate of this modem. Once a serial connection is open through the computer or your microcontroller you can start sending the AT commands. When you send AT commands for example: "AT\r" you should receive back a reply from the SIM800 modem saying "OK" or other response depending on the command send.

E. FLOWCHART OF DILEVERY ROBOT :

ISSN 2582-6026

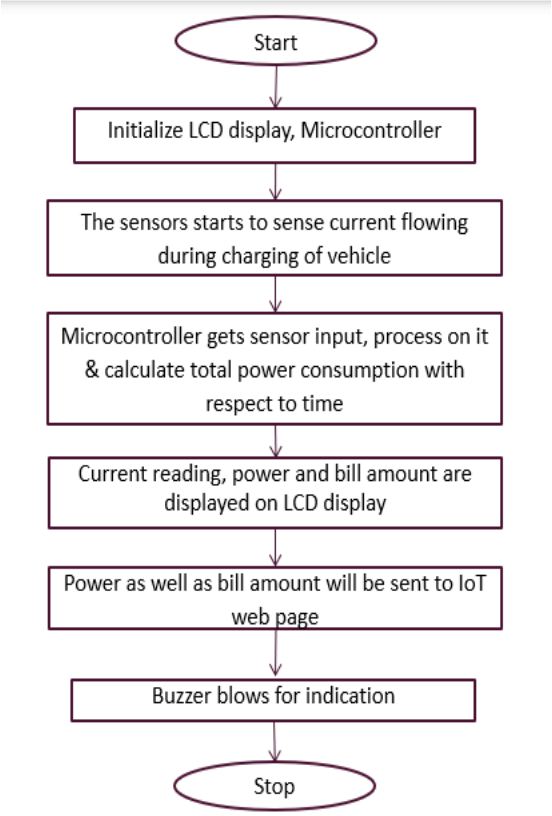

Fig 2: Flowchart of DELIVERY ROBOT

IV. CONCLUSIONS

The concept of a smart energy metre for EV charging stations has been put out by us.To ensure that the battery performance deterioration could be monitored online, we overcome the challenges associated with IOTbased ba ttery monitoring systems for electric vehicles.Monitoring factors like current and voltage as well as the conditio n of electricity usage are the goals.By integrating a GSM system, the system is able to display data like voltage and current units via the internet.By creating a smartphone app that allows users to track battery units, the meth od can be employed in smartphones.Ethernet can be used to improve internet connectivity in order to obtain a better connection than GPRS.

REFERENCES

[1] Anitha.k ,prathik, “Smart Energy Meter surveillance Using IoT” ,Institute of Electrical and Electronics Engineers(IEEE), 2019.

ISSN 2582-6026

[2] Devadhanishini, et.al" "Smart Power Monitoring Using IoT"5th International Conference on Advanced Computing & Communication Systems (ICACCS), 2019.

[3] Mohammad Hossein Yaghmaee Design and Implementation of an Internet of Things Based Smart Energy Metering" 6th IEEE International Conference on Smart Energy Grid Engineering, 2018

[4] Himanshu kpatel "Arduino based smart energy meter" 2nd Int'l Conf. on Electrical Engineering and Information &Communication Technology (ICEEICT), 2018.

[5] Rauen, Z. I., Anjomshoa, F., & Kantarci, B. (2018, October). Gesture and Sociability-based Continuous Authentication on Smart Mobile Devices. In Proceedings of the 16th ACM International Symposium on Mobility Management and Wireless Access (pp. 51-58). ACM.

[6] Mwasilu, F. et al. (2014), "Electric vehicles and smart grid interaction: A review on vehicle to grid and renewable energy sources integration", Renewable and Sustainable Energy Reviews, Vol. 34, pp. 501-516.