REMOTE MONITORING SYSTEM FOR A BASIC INVERTER

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Abstract : *The aim of this project is to design and implement a remote monitoring system. Integrating web and embedded technology, the embedded system monitoring and controlling based on web management can be done. Managers can remotely access, monitor and maintain the on-site device through the network using a web browser without limit of region and time.*

Keywords **– Remote monitoring, Inverter, Raspberry Pi.**

I. Introduction

Integrating web and embedded technology, the embedded system monitoring and controlling based on web management can be done. Managers can remotely access, monitor and maintain the on-site device through the network using a web browser without limit of region and time.
The function of Web-based monitoring system is to collect real-time data of the on-site device, publish it through a Web form, and remotely send the data in the form of the user-defined data transmission style. The data will be published through web page form by the web server in various user defined formats.
Web technology has been extended to the development and application of embedded system. It is the end of the network era which takes PC equipment as the basic network node. How to use Embedded and Web technology to perform remote monitoring, diagnosis, management, and controlling and maintenance operation of embedded devices from different subnets and physical areas, is a problem that needs to be solved. Embedded Web based equipment condition monitoring and controlling system directly connects the equipment to network as a node. The clients do not need to install special software and may monitor and control the current condition of equipment through browsers.

II. Analysis And Design

BLOCK DIAGRAM

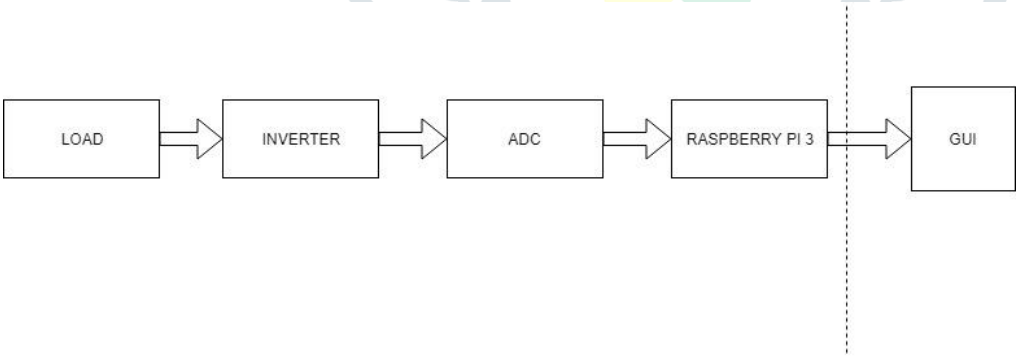


fig. 1 : block diagram

Block Diagram Operation

Transformer: A transformer is a static electrical device that transfers electrical energy between two or more circuits. A varying current in one coil of the transformer produces a varying magnetic flux, which, in turn, induces a varying electromotive force across a second coil wound around the same core. Electrical energy can be transferred between the two coils, without a metallic connection between the two circuits. Faraday's law of induction discovered in 1831 described the induced voltage effect in any coil due to changing magnetic flux encircled by the coil. Transformers are used for increasing or decreasing the alternating voltages in electric power applications, and for coupling the stages of signal processing circuits.

Inverter: A power inverter, or inverter, is an electronic device or circuitry that changes direct current (DC) to alternating current (AC). The input voltage, output voltage and frequency, and overall power handling depend on the design of the specific device or circuitry.

Mcp3204/3208: The Microchip Technology Inc. MCP3204/3208 devices are successive approximation 12-bit Analog-to-Digital (A/D) Converters with on- board sample and hold circuitry. It is an SPI-based analog to digital converter(ADC) interfaced with the Raspberry Pi 3 as shown in fig. 3.2.1. The MCP3204 is programmable to provide two pseudo-differential input pairs or four single-ended inputs. The MCP3208 is programmable to provide four pseudo-differential input pairs or eight single-ended inputs. Differential Nonlinearity (DNL) is specified at ±1 LSB, and Integral Nonlinearity (INL) is offered in ±1 LSB (MCP3204/3208-B) and ±2 LSB (MCP3204/3208-C)versions. Communication with the devices is done using a simple serial interface compatible with the SPI protocol. The devices are capable of conversion rates of up to 100ksps. The MCP3204/3208 devices operate over a broad voltage range (2.7V - 5.5V). Low current design permits operation with typical standby and active currents of only 500nA and 320µA, respectively. The MCP3204 is offered in 14-pin PDIP, 150mil SOIC and TSSOP packages, and the MCP3208 is offered in 16-pin PDIP and SOOIC packages. Figure 3.3.1 shows the functional block diagram of the mcp3204 which is an analog to digital converter.

Raspberry Pi: One powerful feature of the Raspberry Pi is the row of GPIO pins along the top edge of the board. GPIO stands for General-Purpose Input/Output. These pins are a physical interface between the Raspberry Pi and the outside world. Figure 3.3.3 shows the GPIO header pins of the Raspberry Pi 3.

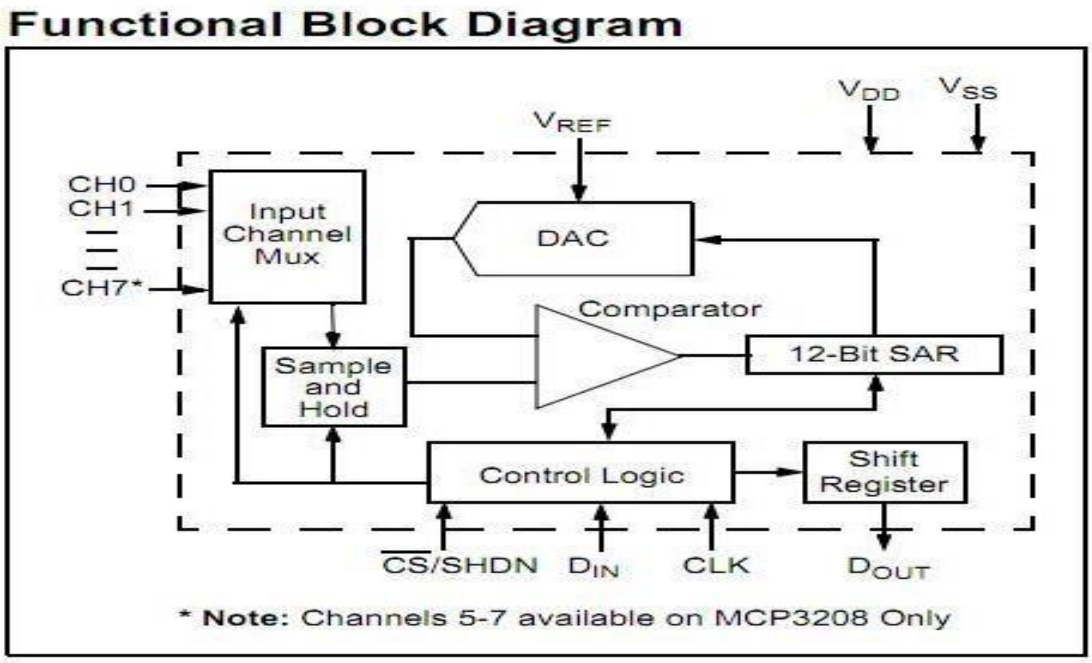


fig. 2: mcp3204 functional block diagram

Basic Circuitoperation:

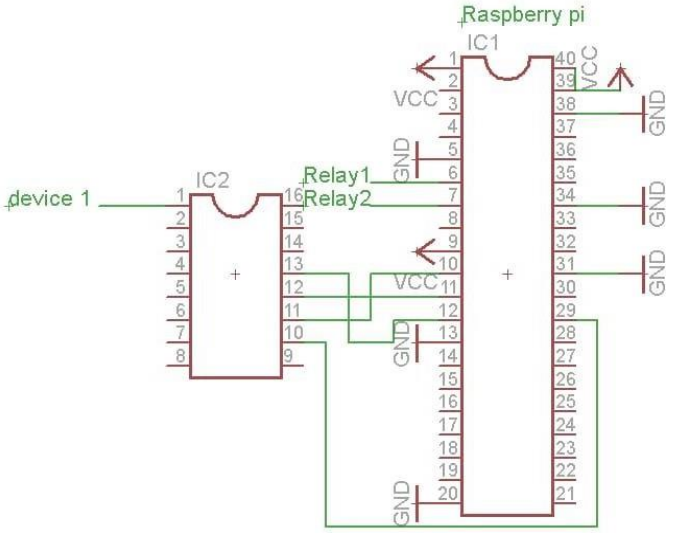


fig. 3: circuit diagram

Working:
Raspberry Pi acts a central unit of the system where the data coming, is stored and uploaded on the website simultaneously in real time. Figure 3.5.1 shows the circuit diagram of the whole system .Main components of the system are a transformer which is used to apply load to the inverter. The inverter is used to convert DC voltage to AC voltage, since the data is in analog form it should be converted into binary from for that an analog to digital converter is used .
ADC used here is MCP3204. This will convert the analog values of current and voltage parameters to binary form to display it on the website.
The data will be stored on the MySQL database. This is the basic working of the whole system.
Figure 3.5.2 shows the hardware of the system which consists of transformer, inverter, battery, and raspberry pi as the main components.

Inverter Operation:

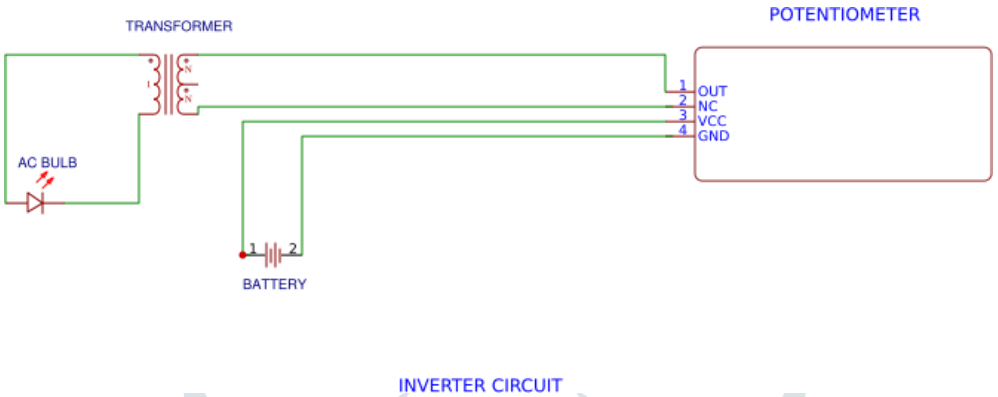


Fig. 4: Inverter Circuit Diagram

- The basic function of the inverter is to convert the DC input to AC.
- Here, a battery of 12V DC is connected to the transformer.
- The transformer is an electrical device which transfers electrical energy from one electric circuit to another using principles of electromagnetic induction, and without changing the frequency.
- The transformer converts the DC voltage from the battery to AC voltage.
- It has four terminals of which two are connected to the potentiometer and the other two are connected to the ACbulb.
- The potentiometer is used to vary the AC voltage coming from the transformer.

Interfacing Of Mcp3208 With Raspberry Pi

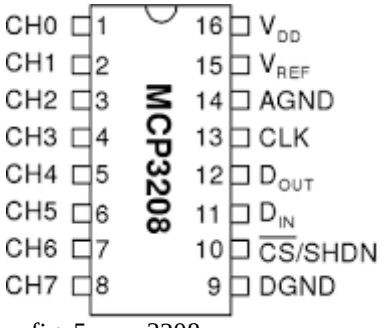


fig. 5: mcp3208

Figure No:8 shows pin configuration of MCP3208 which is an analog to digital converter.

Table no. 1: Interfacing Rpi3 with MCP3208

MCP3208	RPI 3	PIN NUMBER
VDD	+5V OR 3.3 V	02
Vref	+5V	02
Agnd	GROUND	06
CLK	GPIO 11	23
Dout	GPIO 9	21
Din	GPIO 10	19
CS	GPIO 8	24
Dgnd	GROUND	06

Software Used:

1. Python Programming Software
2. HTML
3. CSS
4. PHP
5. MYSQL

Hardware:

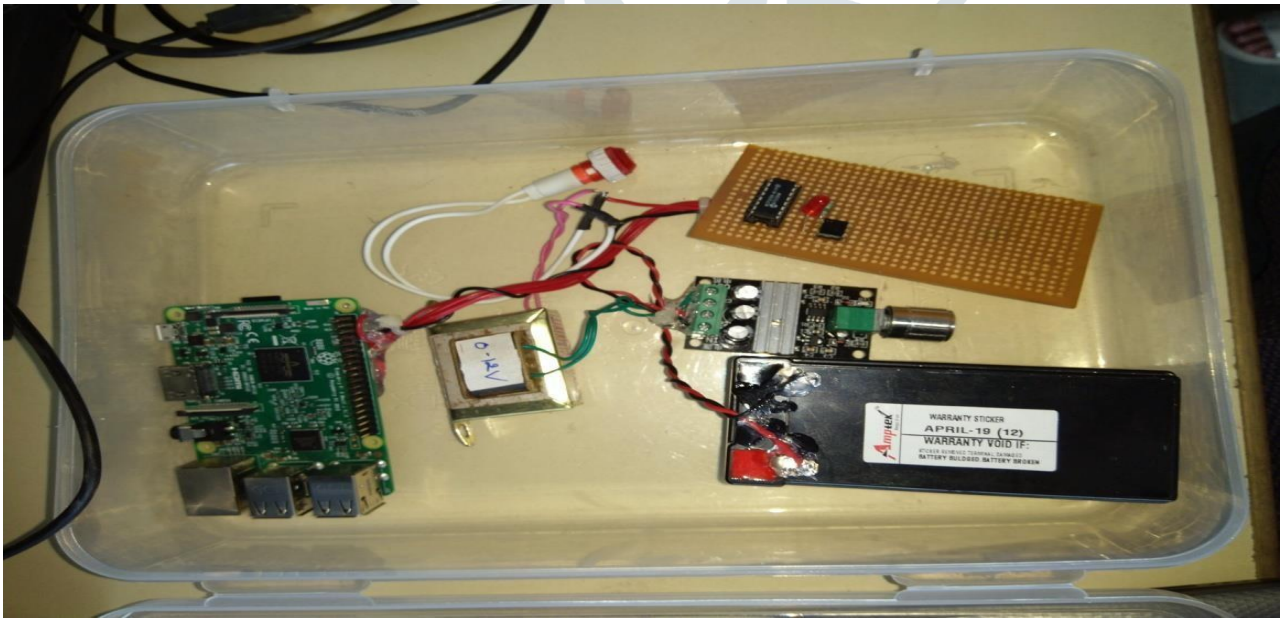


fig. 6: hardware

Result

Remote monitoring system is displaying output parameters on our GUI. Following figure shows the output parameters of the inverter on the website.

To obtain the desired results enter the following commands.

To initiate the data enter on the Raspberry GUI cd Desktop/IoT_based_parameter_monitoring/ sudo python mcp3008.py

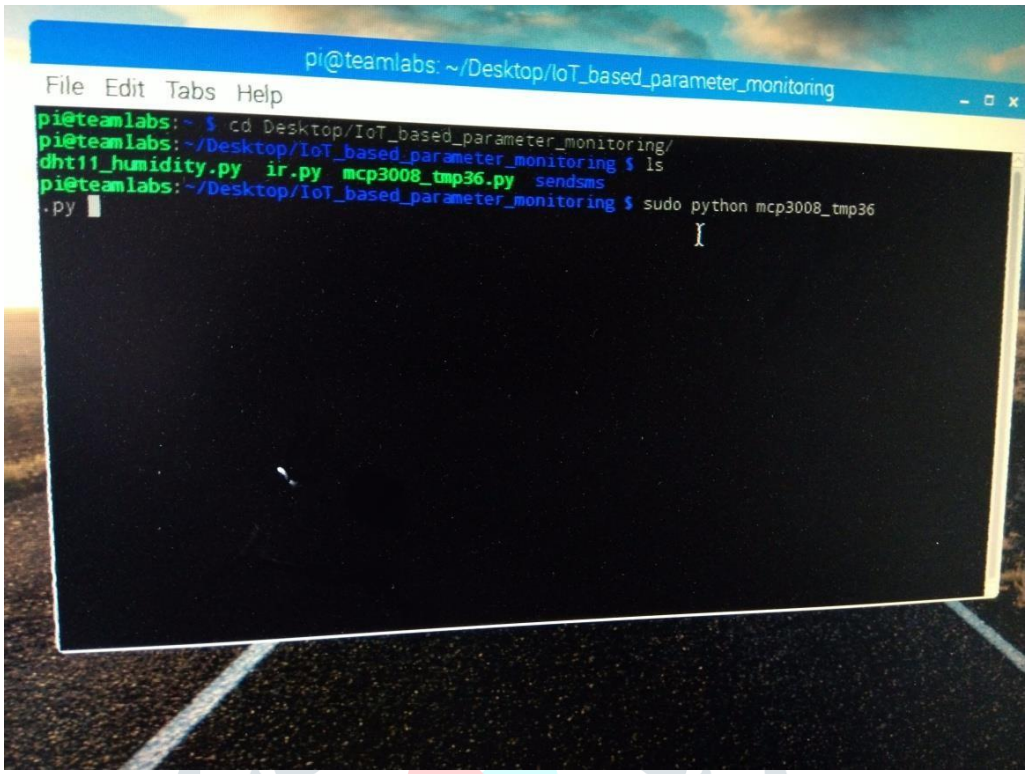
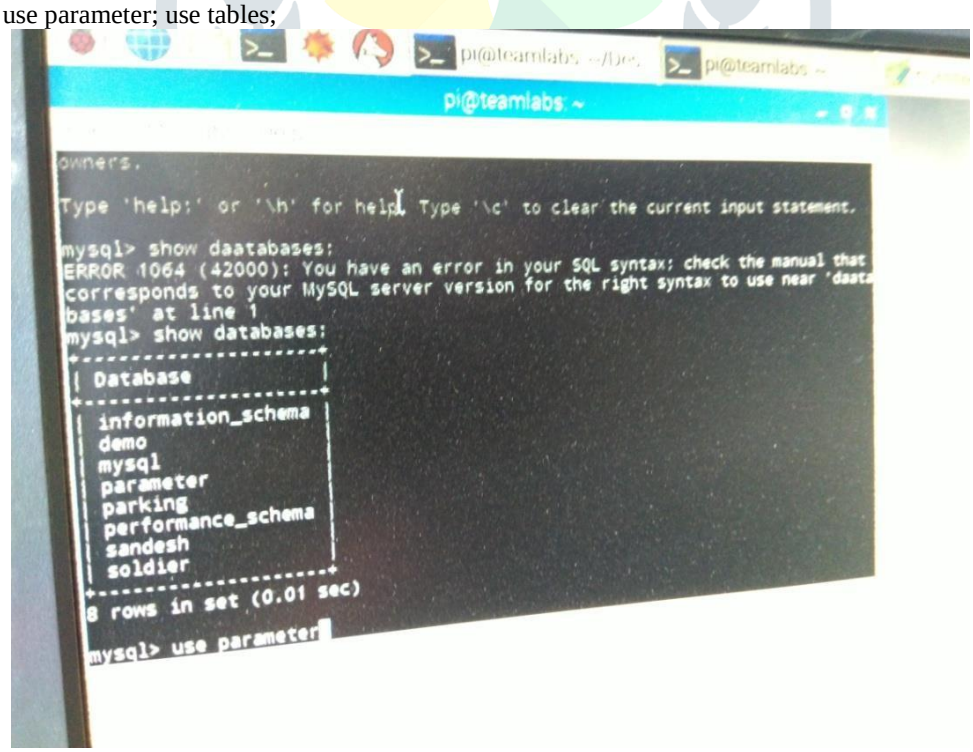


fig. 7: initializing adc program

Setting up MySQL database Type the following commands mysql –u root–p

Enter the password

Show databases; use parameter; use tables;



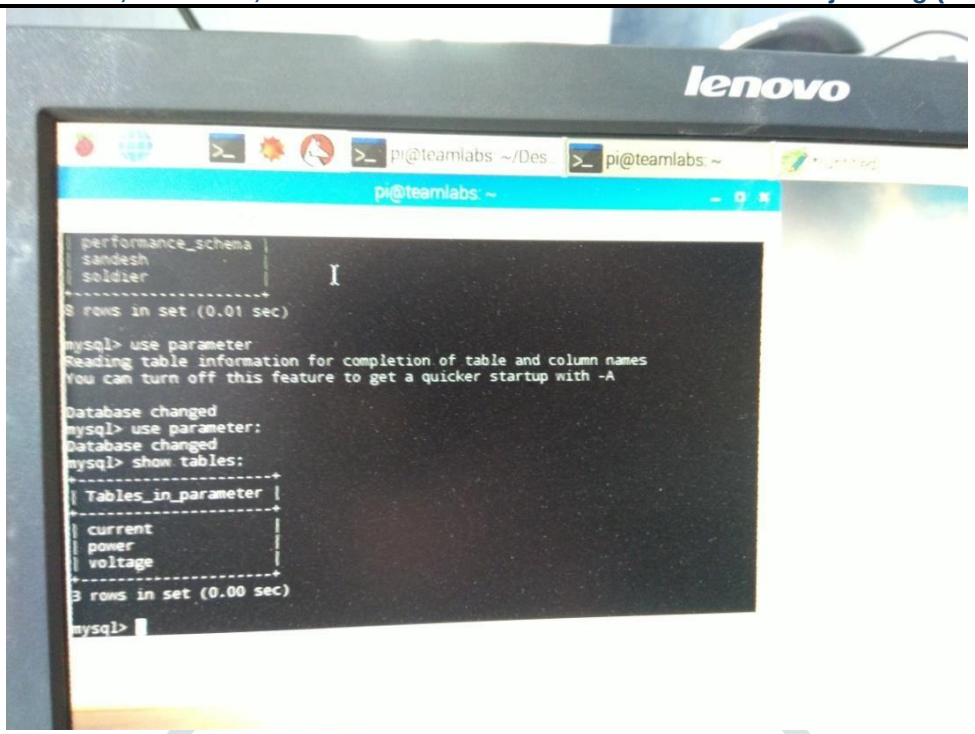


fig. 8: mysql database (2)

Setting up thewebsite
Type the following commands on terminal window. cd Desktop/
cd website/ lspython manage.py runserver 0.0.0.0:8051 Open Browser
URL 192.168.43.48:8051/library/

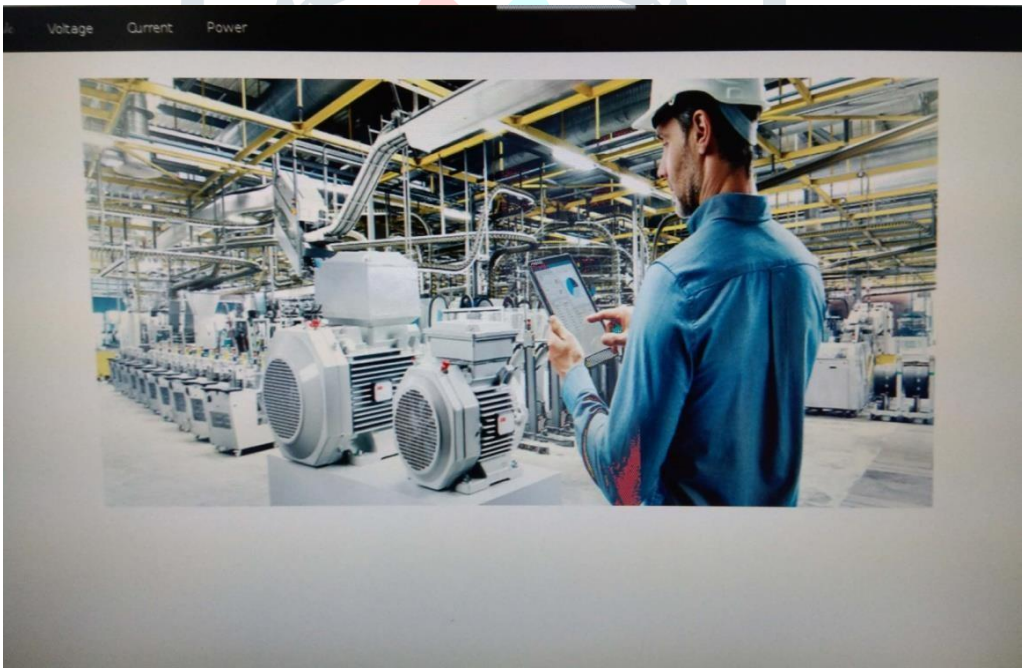
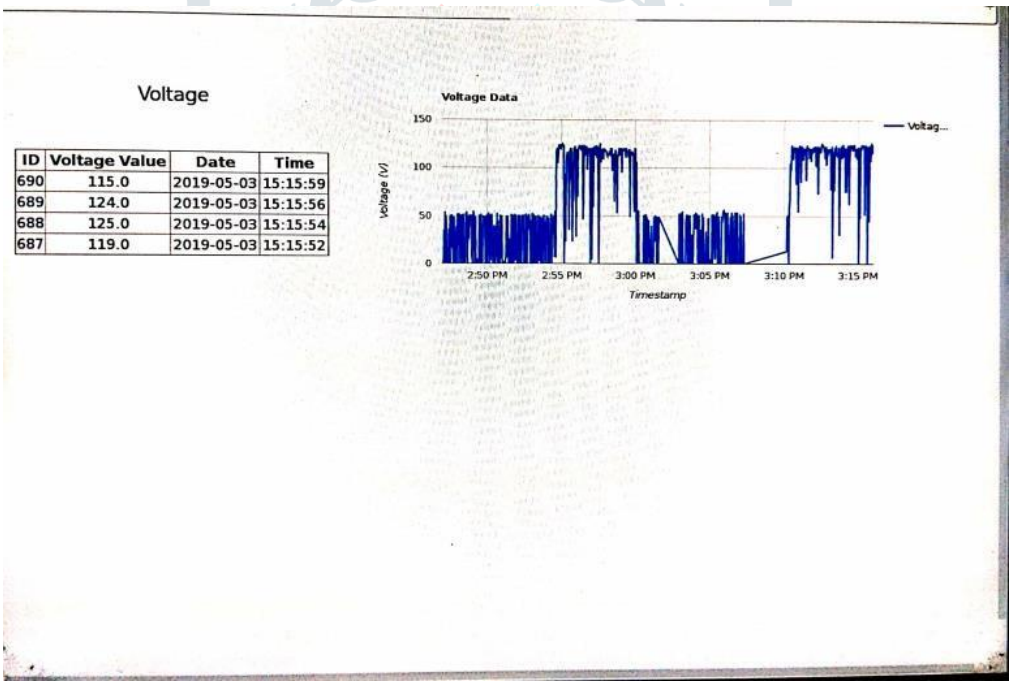


fig. 9:website

Open current table, voltage table and power table in new tabs, for accessing the current, voltage and power values in Figure , Figure and Figure respectively.

ID	Current Value	Date	Time
672	24.6	2019-05-03	15:15:20
671	24.8	2019-05-03	15:15:18
670	24.8	2019-05-03	15:15:16
669	24.8	2019-05-03	15:15:13

fig. 10: current table



ID	Voltage Value	Date	Time
690	115.0	2019-05-03	15:15:59
689	124.0	2019-05-03	15:15:56
688	125.0	2019-05-03	15:15:54
687	119.0	2019-05-03	15:15:52

fig. 11: voltage table

fig. 12: power table

Conclusion:

With the knowledge of new techniques in 'Electronics' we are able to make our life more comfortable. One such application of electronics is used in "Remote Monitoring System" The approach we followed and which is explained in this project report is novel and has achieved the target of "Remote Monitoring System" satisfying user needs and requirements.

The development of this project has shown how much hard work goes into the creation of a system. "Remote Monitoring System" was a project based on Raspberry Pi 3, due to which hardware requirement is reduced. Embarking of this project has helped us in developing a team spirit, patience and time management necessary for today's technical professionals.

Hence we can conclude that the required goals and objectives of our project have been achieved.

This project has built in us confidence that any problem can be solved with sheer determination, hard work and optimism. We feel that our product serves something good to this world and we like to present it before this prosperous world. By doing this project, we were better able to understand the various facets of doing an embedded system project which is emerging as one of the most 'in demand' technologies right now.

References

1. Mr.Khelu Londhe, Prof.Asokan S.- Design and implementation of embedded web server for monitoring and controlling solar power plant remotely- ISSN:2454-7875VOLUME3, ISSUE 4,Apr.-2017IJRPET
2. Prof. Dr. Sangeeta Kurundkar, Sheetal Kamthe, Sadanand More Prajakta Marathe, Yogesh Gadade - Remote Monitoring of Solar Inverter (An application of IOT) - American Journal of Engineering Research (AJER) e-ISSN: 2320-0847 p-ISSN : 2320-0936 Volume-6, Issue-7,pp-70-74
3. R. F. Gusa, I. Dinata, W.Sunanda, T. P. Handayani- MonitoringSystem forSolarPanelUsingSmartphoneBasedonMicrocontroller-20182nd International Conference on Green Energy andApplications
4. SupritaA. Patil, M.Vijaylaxmi, Rakesh Tapaskar- Solar Energy Monitoring System Using IoT - Indian J.Sci.Res. 15 (2): 149-155,2017 ISSN:2250-0138