

Design And Analysis of Capacitor & Battery Performance with Operative Protecting System

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DOI: 10.5281/zenodo.20607856

ABSTRACT

Capacitor & batteries widely used in industries. It is very precious work to maintain the industrial parameter constant. This paper proposes & focuses on work of capacitor & battery performance by advanced system via credit card sized computer known as Raspberry Pi. The parameters which are monitored & analyzed are current, voltage, temperature & humidity. The board used is Raspberry Pi, DHT-11, ACS712, Wi-Fi. The data can be monitored through a monitor or LCD & simultaneously we will get notification alerts when parameters go beyond the limits through cloud.

Keyword: - Raspberry Pi, Sensor network, WIFI, Cloud

1. INTRODUCTION

In the present scenario of technology it has been observed that there is an increase in IoT based electronics devices. In industries Real time monitoring of power systems is essential for its continuous and reliable operation. This progressed framework presents a moo fetched, moo control devouring framework that can be utilized for speedy and exact control framework parameter observing. The designed system will continuously measure the processes and display the power system parameters like voltage, current, temperature & humidity. Now-a-days the mishaps within the businesses have expanded. Indeed, on the off chance that any blast happens, it can't be effortlessly known to the laborers, and it may cause mischances. So, in order to avoid this & to save the time a system has been designed and this is allowed to monitor the ambient situations inside the industry. Some of the parameters such as humidity, temperature, current, voltage is detected by utilizing sensors and the obtained information from sensors transmitted to the raspberry PI and then transmitted to the personal computer through Wi-Fi module. By this the human intervention can be avoided inside the industry and the accidents can be prevented as we can access this system from any remote place. Wireless communication plays an important role in various fields. Today the use of wireless communication in automation is increasing rapidly. A one person can monitor and control the ongoing work from a single base station. The IoT based monitoring in industrial processes are crucial in order to improve process efficiencies, and accuracy of systems. Wireless is predicted to be one of the fastest growing technologies. Cloud creates an easy way for monitoring & controlling any device which is at a remote place. We implement a system which is portable, low cost & having less maintenance by using Wi-Fi technology. Use of wired advances are not commendable as the links will get harmed after a specific timeframe or because of the impact of natural parameters. So, the wireless transmission technology is efficient than other methods. The industrial monitoring protocol should be designed such that the system must have a good end to end data delivery. The data which is collected from sensors should be transmitted without any delay and loss of data. Some of the techniques like Bluetooth, and Wi-Fi.

2. METHODOLOGY

2.1 Data Monitoring through IoT

The data from DHT11 sensor which provides us with temperature and humidity values is monitored. If the value obtained is greater than threshold value than the control is made ON. Here control would mean increasing or decreasing temperature and humidity as required and the data would be sent to IoT. Even if the value is less than Threshold then too the data would be sent to IoT.

2.2 Load Operation Through IoT

The data would be read through IoT. The ON and OFF control would be done through IoT over Wi-Fi.

2.3 Battery Monitoring

The voltage and current sensing of Battery is done here. ACS712 is the current sensor used here to sense the current. And using voltage divider circuit voltage has been calculated.

3. HARDWARE DESCRIPTION

3.1 Raspberry PI B+

The Raspberry Pi 3 Demonstrate B+ is the modern item within Raspberry Pi 3. The run, bragging a 64-bit. Quad center processor running at 1.4GHz, dual-band 2.4GHz. Remote LAN is 5GHz. The Bluetooth is 4.2/BLE & speedier Ethernet. This are the specifications of the Raspberry Pi 3 B+ module

The raspberry pie is a credit card size computer. The input power given to the RPI is 3.3 volts. It has an operating system of free BSD, Linux, RISC OS, Windows to IOT. RPI having memory of 1,2,4 GB. The RPI 3 Show B+ keeps up the same mechanical impression as both the Raspberry pi 2 and 3.

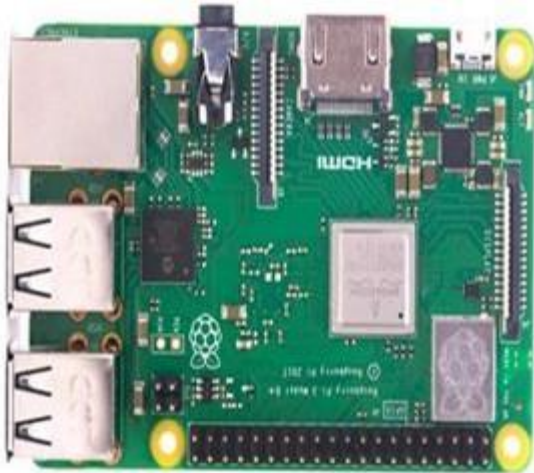


Fig -1 Raspberry Pi 3

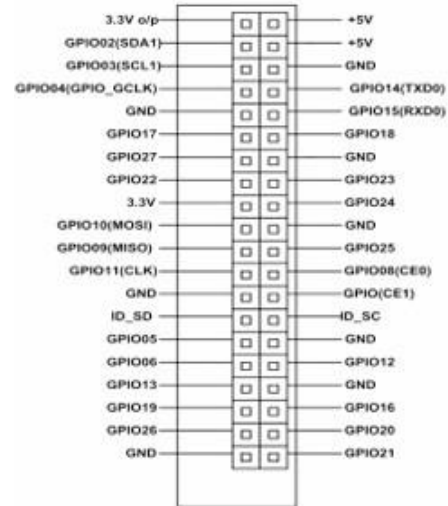


Fig -2 Pin Diagram

3.2 Temperature & Humidity Sensor

The DHT11 Temperature & Humidity Sensor is a 4-pin cost efficient highly reliable sensor. Pin-1 is Vcc, Pin-2 is information pin which gathers information from outside and offers information to the Raspberry Pi. Pin arrangement for the DHT11 sensor appears in the above figure.

It includes a DHT11 complex with an aligned computerized signal yield. It braces high unwavering quality and amazing stability. The DHT11 sensor includes a resistive-type humidity measurement component, and offering better quality, speedy response, anti-interference ability and cost-efficient. Its temperature range is 00-55C and Humidity range is 20-90%

3.3 Current & Voltage Sensor

For AC or DC current sensing in industrial, commercial & communication systems the ACS712 provides economical and accurate comprises of solutions. The an accurate, gadget low counterbalance, straight Hall sensor circuit with a copper conduction way got close to the outside of the surface of the die. A magnetic field is generated by applied current flowing through copper conduction path. Magnetic field is detected by the integrated Hall IC and moved into a relative voltage. Device accuracy is advanced through the close proximity of the magnetic signal to the Hall transducer. The voltage divider circuit is used to limit the voltage. The 12-v voltage is converted into 3.3 v & then given to the Raspberry Pie through signal conditioning circuit.

3.4 Features of Raspberry Pi

1. CPU having rating of 1.5 GHz, 64/32 bit Quad-center 64-bit ARM Cortex A53 timed at 1.2 GHz
2. GPU having rating of 400 MHz Video Core IV sight and sound
3. Memory having ratings of 1GB LPDDR2-900 SDRAM (for example 900MHz) or 2, 4 GB
4. It has 4 USB ports.
5. Video yields are HDMI, composite video (PAL and NTSC) by means of 3.5 mm jack
6. System: 10/100Mbps Ethernet and 802.11n Wireless LAN
7. Peripherals: 17 GPIO in addition to explicit capacities, and HAT ID bus (Hardware Attached on Top)
8. Bluetooth: 4.1
9. Power source: 5 V by means of Micro USB or GPIO header
10. Size: 85.60mm × 56.5mm
11. Weight: 45g.

4. DESIGN & IMPLEMENTATION

Raspberry Pi B+ is the main controller used which is powered by 3.3V. By using charger cable power supply is directly given to the RPI & then this 5V supply is converted into 3.3V in RPI. It requires an SD card of 16 GB class 10 loaded with Raspbian OS. DHT11 is the sensor used to monitor temperature & humidity. DHT11 has 3 pins that are Vdd, data & ground which are connected to the raspberry pie. ACS712 is a sensor which is used to monitor current value. ACS712 sensor having 8 pins 4 at input & 4 at outputs.

Output pins are connected to the signal conditioning circuit & then connected to RPI. For voltage control there is a voltage divider circuit that uses resistors of 1K & 10K. At the output side there are 4 relay & relay driver circuits. This relay circuit is at NO condition at normal operation. When the fault occurs or industrial parameters go beyond their limits then this relay circuit is operated & operative protective scheme comes in picture. Here Cloud is connected to Raspberry pi through Wi-Fi & by using this we can monitor the system from a remote place.

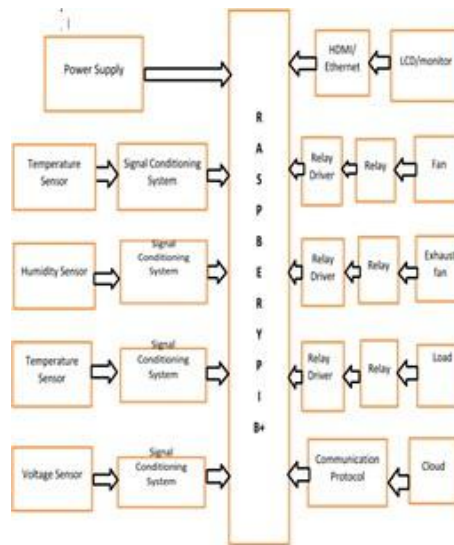


Fig -3 Block Diagram

5. CONCLUSIONS

There is a chamber (room) for capacitor manufacturing. The battery system is an important part of any type of industry. It is a very precise work to maintain industrial parameters within range manually. Temperatures and Humidity are to be maintained in these chambers and also voltage & current in battery room to keep them maintained continuous monitoring is required. This is done through humans where one needs to monitor the mentioned parameters in the server room.

Here we want to conclude that, this proposed project would make industrial parameters easy to monitor the

mentioned parameters as temperature and humidity monitoring would be done using Raspberry Pi in which the person monitoring it can use mobile phones to monitor the parameters. One can also control the features using Raspberry Pi from a remote place. Also, the type of production of capacitor will be displayed to the supervisor as the person or worker working in the chamber would enter the details about type of capacitor into the system.

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