

RASPBERRY PI BASED INDUSTRIAL POWER CONTROL AND MONITORING THROUGH ZIG-BEE TECHNOLOGY

Banda Pranaya¹, S.Ravi Kumar²

¹M-Tech Student, Dept. of ECE, St. MARTIN'S Engineering College, Medchal, India

²Associate Professor, Dept. of ECE, St. MARTIN'S Engineering College, Medchal, India

ABSTRACT:- *This paper proposes a driven structure for process enterprise through strategies for a rate card assessed unmarried board PC called raspberry pi based multi parameter checking tools system organized the use of RS232 and microcontroller that measures and controls extraordinary typical parameters. The structure contains novel professional and specific slaves with far flung method for correspondence and a raspberry pi gadget which could both chip away at windows or linux working machine. The parameters that can be taken after are energy, voltage, temperature, light power and water stage. The hardware association is accomplished with the floor mount instruments (SMD) on a twofold layer revealed circuit board (PCB) to decreased the dimensions and upgrade the power functionality. The numerous exciting features are discipline tool correspondence by way of strategies for USB-OTG enabled Android devices, on area company item revive without a particular hardware and faraway checking and manage.*

Keywords: *Raspberry pi, Zig-bee, SENSORS--- Temperature sensor, LDR.*

1. INTRODUCTION

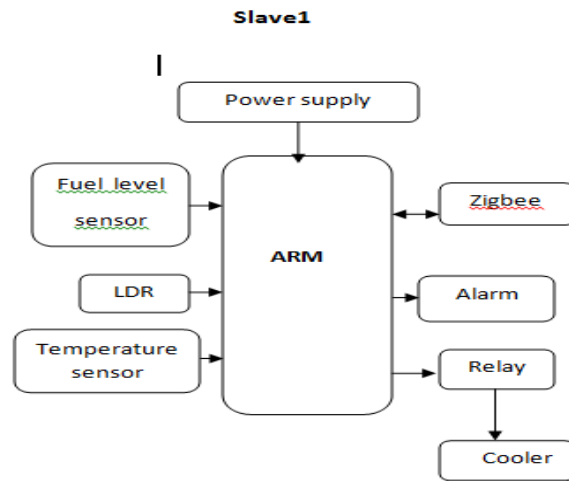
The entire technique is made with the twofold layer SMD constructed up embedded board with fantastic sensors and a raspberry pi which could accumulate and continue to be in contact the information procured from the sensors. The raspberry-pi whilst chipped away at the Linux jogging method can participate in multi – entrusting. The not on time outcomes of the insert board consists of the interfacing of precise sensors to two slave accumulates and partner that slave to an ace board by strategies for far flung transmission. The get and slave sheets utilize ARM Microcontroller, Zig-bumble bee modules, LM35 and LDR Sensors, fuel degree sensor(IC lm324).

Handle approach this is organized with each Wi-Fi slaves and Wi-Fi seasoned where the speak is a half of-duplex verbal exchange. The grasp module acts a diffusion device amongst slaves and the raspberry pi pc. The capture may additionally in like way recognize to the with any android devices and compactable with all X86, X64 and ARM outlines that runs any jogging manner with RS232 helpfulness. The verbal exchange between the hold close what is extra, raspberry pi is stressed out and it will likely be labored by structures for remote enrolling both stressed out or Wi-Fi. The correspondence between the grip and raspberry pi is wired and the it will be worked by using methodologies for some distance flung enlisting either wired or Wi-Fi. The on – discipline firmware up degree of get and slave is achievable without a taking out or keeping apart any contraptions from the module with the help of USB boot loader paintings in ARM microcontroller.

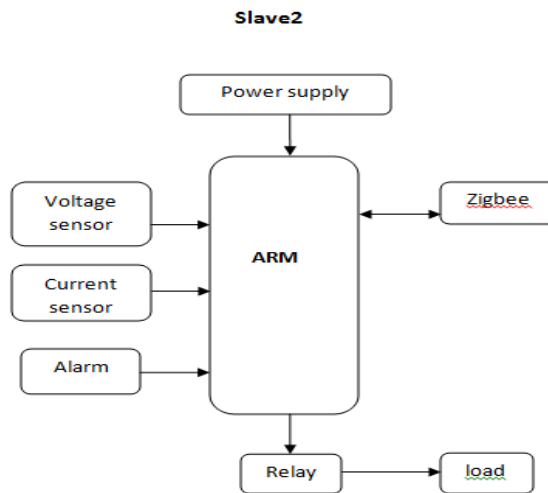
Slave1: interfacing of proper parameters like Temperature, fragile significance and Water measure identifier in Slave-1 module. Abilities got from every parameter is accrued in Slave - 1 and dispatched to get module via RF transmission. The alert, hand-off is additionally concerning the MC for controlling cause. The changing over coders (EN, DE) are in fee for converting parallel facts into saved an eye on serial capacities and the a exclusive way. This serial competency is transmitted or elevated over faraway modules. Slave2: interfacing of big parameters like voltage and reward in Slave-2 module. Authority procured from each parameter is collected in Slave - 2 and dispatched to get a take care of on by method for RF transmission. The alert, hand-off is likewise related to the microcontroller for controlling sport plan. The in-made easy to ADC is applied to test the voltage and present. The encoder and decoder serve the similar point as in the Slave-1. This framework is used to govern the strength and seeing thru the zig-bumble bee advancement utilized in adventures.

3. Proposed Method

In existing method they used RF Transceiver and Receiver to transmit and receive the data from node 1, node 2 to master. Instead of RF transceiver in this project we are using Zig-Bee To receive and transmit the data and also we are using fuel sensor to measure the fuel level.



In slave 1 we have fuel level sensor to measure the fuel levels, IDR sensor to measure the light intensity and temperature sensor to measure the temperature. When the temperature is high by using Relay we can on/off the cooler. By using zig-bee transmit the information to Raspberry Pi.



In slave-2 we have voltage sensor and current sensor if the load current is high we get the alarm to switch off the load.

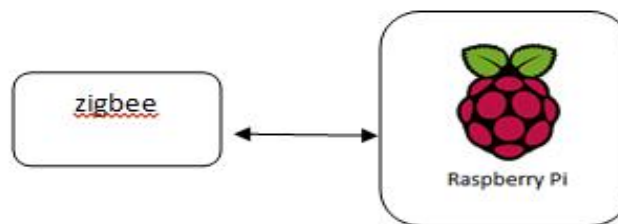
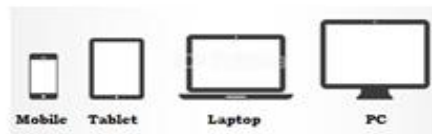


Fig3.1 Block diagram of Raspberry Pi
Raspberry Pi:

The Raspberry Pi passes on 6 times the dealing with farthest point of past models. This second period Raspberry Pi has a refreshed Broadcom BCM2836 processor, which is a viable ARM Cortex-A7 based quad-focus processor that continues running at 900MHz. The board in like manner incorporates a development with the capacity of 1 GB.

Temperature sensor:

It is a sort of resistor whose protection is reliant on temperature. Thermistors are generally utilized as current limiter, temperature sensors (NTC compose regularly), self-resetting over current protectors, and programmed warming segments. The TMP103 is fit for examining temperatures to an assurance of 1°C.



Fig 3.2 Temperature sensor

LDR:

The LDR shows when the light is turned on, the assurance of the LDR falls, empowering current to experience it. This is an occurrence of a light sensor circuit: When light is giving low confirmation of the LDR is high.



Fig 3.3 LDR

Fuel Sensor:

Through utilizing this sensor we're measuring the stages in a gas tank, so as to perform this operation we're utilizing op-amp sensor (lm324) which is a quad op-amp. We're giving a RV to the non inverting terminal of this IC and if any conduction at inverting terminal then the ensuing output is zero means that measure is full else empty method the output from that sensor is one.

Current Sensor:

A CT is used for measurement of rotating electrical streams. Show transformers, alongside VT (abilities transformers (PT)), are followed as instrument transformers. At the point when circuit current is excessively intemperate, making it impossible to apply instantly to estimating instruments, a present transformer creates a brought show completely relative down to the present inside the circuit, which can likewise be effortlessly connected to estimating and recording contraptions. A blessing transformer separates the estimating gadgets from extremely over the top voltage inside the observed circuit. Inducted transformers are used in metering and ensuring transfers in the electrical vitality undertaking.

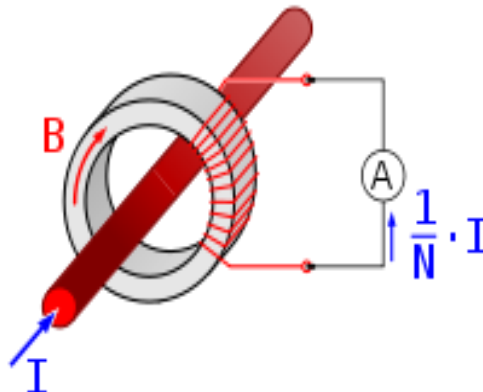


Fig 3.4 Current Sensor

Voltage Sensor:

Potentiometer is a passive device that supplies an adjustable electrical resistance. it is a effortless way of allowing person input to a strolling Micro controller software.

The left side of figure 1 is a photo the VS included within the Spark fun Inventor's Kit1. Of a traditional the schematic representation of a VS called a trim-pot.



Fig 3.5 voltage sensor

4. Hardware requirement

Raspberry-Pi ARM1176JZF-SZig-bee modules, Temperature Sensor (LM35), LDR (5V), Current sensor (5V), Voltage sensor (3.3V), Relays (12V), Buzzer (5V), LCD display (16×2), Arm controller (LPC2103), Fuel Level sensor (LM324), Power Supply Unit (12V/5V), Miscellaneous Components.

5. Software requirement

For Raspberry Pi:

- ❖ A Wheezy Raspbian Installed System Required Python
- ❖ The Qt Creator is complete GUI Application development framework for Raspberry-Pi.

For Arm7:

- ❖ The KEIL MDK-ARM is finished programming advancement condition for ARM7.
- ❖ Flash the gadget utilizing FLASH MAGIC, a free programming utility supported by NXP.

Language:

- ❖ All editions provide a complete Embedded C/ C++/Python development environment includes
- ❖ For Web development Projects we use HTML and PHP.
- ❖ Raspbian (Linux Oriented Recommended).

4. Implementation

In this project we have node 1,node 2 and a master.In node 1 we have Temperature sensor,LDR sensor and Fuel sensor.node 2 we have current sensor and voltage sensor.

Node 1:

In this temperature sensor is used in measures the temperature if the temperature is high we get alert message to on the cooler .LDR sensor is used when the light intensity is high we get alert message to switch of the lights .Fuel sensor is used to measure the fuel levels and the levels information is passed to the webpage.

Node 2:

In node 2 we are having current sensor and voltage sensor .If the load current is high we get alert message that high current consuming please switch off load .If the load current is low we get alert message that low current consuming please switch on load.

The information from node 1, node 2 is transferred to master using zig-bee and also we have buzzer to get alert when the temperature is high to on the cooler. Lcd is used to display the temperature, LDR, Fuel level, Current and Voltage values displays.

5. RESULTS

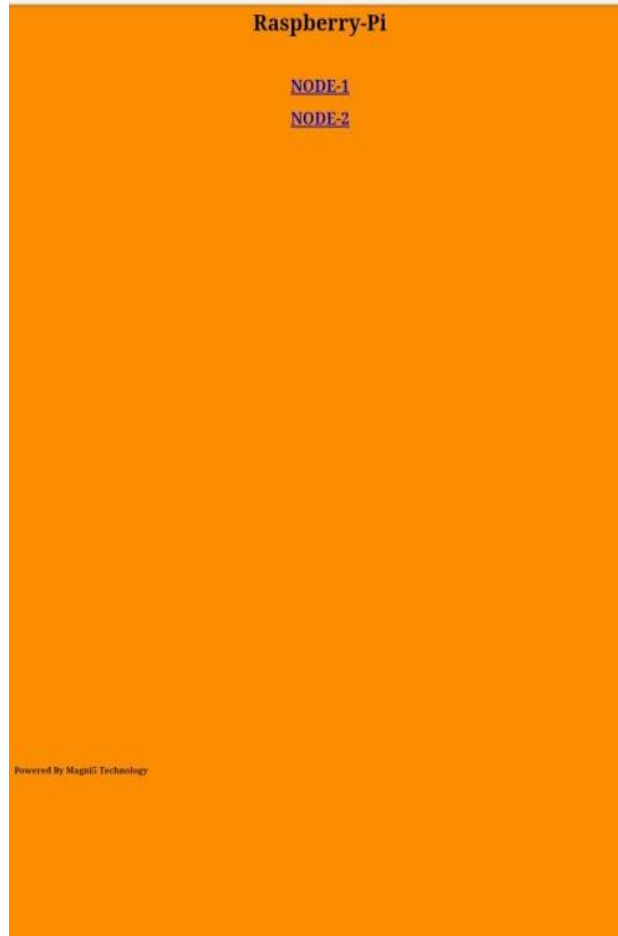


Fig 5.1 Raspberry Pi

Here we are having two nodes i.e node 1 and node 2. If we click on node 1 details related to node 1 will be shown on web page. If we click on node 2 details related to node 2 will be shown on web page.

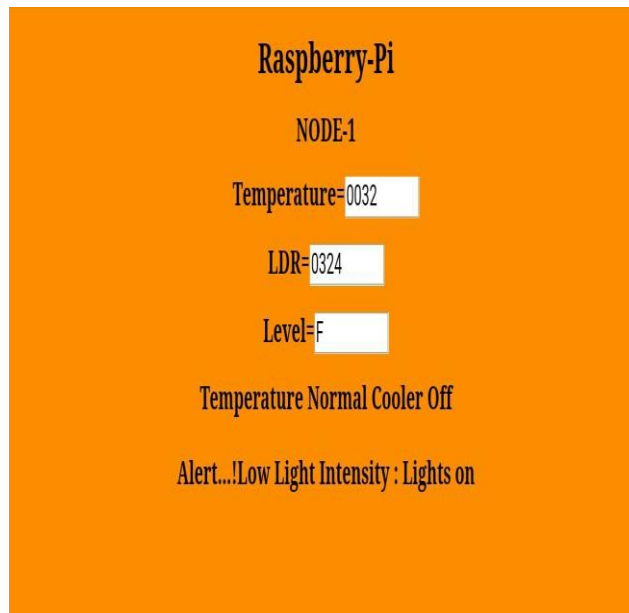


Fig 5.2 Node -1

In node 1 we are having temperature sensor, LDR sensor and fuel level sensor. If temperature is normal we will get temperature normal cooler off message on the webpage if it is high we get temperature is high cooler on message displays on the webpage. If the light intensity is low we get alert message "low light intensity: lights on" if light intensity is high we get

alert message as “high light intensity: lights off”. Fuel sensor in this level of the fuel displays based on the fuel level Empty, low, medium and high

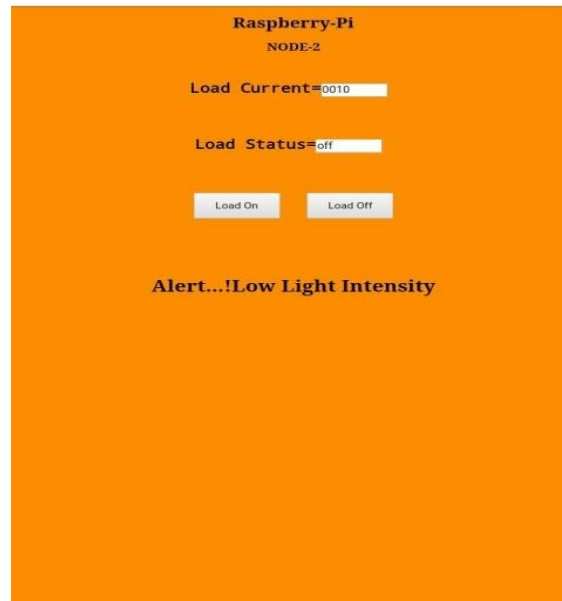


Fig5.3 Node-2

In node 2 we are having current sensor and voltage sensor .If the load current is high we get alert message that high current consuming please switch off load .If the load current is low we get alert message that low current consuming please switch on load.

6. CONCLUSION

The test "Wi-Fi Sensor people group strategy utilizing Raspberry-Pi and Zig-Bee for Ecological Checking applications" has been strongly composed and affirmed. This paper outlines a Wi-Fi sensor arrange strategy making utilization of sensor hub, Raspberry-Pi base station, Zig-Bee as a systems administration convention, and various open-supply application programs. Assessing with grouping and sending data or learning of regular base station (portal), this technique has low valued, low power utilization, smaller, versatile, helpful to establishment, and advantageous to hold. One principal favorable position of the strategy lies in the joining of the passage hub of remote sensor organize, database server, and web server become one minimal, low-control, charge card measured PC Raspberry Pi, that is effortlessly arranged to keep running without show, console, and mouse. Likewise, this methodology makes it workable for using it with did sensor systems using unique equipment structures. The kind of framework could be extremely valuable in heaps of natural observing and data gathering.

Coordinating purposes of all the equipment additional items utilized have created it. Nearness of each module has been contemplated out and situated precisely with the lines adding to the palatable working with unit. Furthermore, using massively developed IC's and with the assistance of developing innovation the endeavor has been strongly connected.

7. FUTURE SCOPE

On this challenge we are utilizing two nodes these are slave 1 and slave 2. Within the slave one we are going to have LDR, TS and gas sensor. In slave 2 we've present sensor and voltage sensor. By way of using this we will assess the gas stages, present, V and T. One day with the aid of utilizing the GSM modem we will get messages with alert together with this we are able to maintain the database.

Bibliography

1. ARM-systemonchip-structure by using Steve furber.
2. ARM-consumer guide UM10114.
3. ARM method developers advisor by Andrew N.SLOSS four. "vigor Electronics" through Singh M.D. and ok B Khanchandan
5. "Linear built-in Circuits" by using D Roy Choudary, Shail Jain
6. "Machine electronics" with S K Bhattacharya
7. "Electrical Machines II" by means of Thereja B.L.
8. www.8051freeprojectsinfo.Com.

Author's Profile



BANDA PRANAYA her B.Tech degree in 2016 from PRRM Engineering college, TS, India. She is currently working towards Post Graduation degree in the department of Electronics and Communication Engineering in S. Martins Engineering College, TS, India. Her research interest is in embedded systems.



Mr. S. Ravi Kumar received his M.Tech degree in Electronics & Communication Engineering from Andhra University and pursuing Ph.D in JNTU Hyderabad. Currently working as Associate Professor in St.Martins Engineering College Hyderabad with the teaching experience of 14 years. Interested domains are wireless Communications, Microwave and Radar Engineering.