

IOT based Energy Efficient Management System using Raspberry Pi

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Abstract - Nowadays, despite the fact that there are numerous new IT benefits, these reason another kinds of issues. There are increments in the assorted variety of administrations and administration quality however there is additionally considerably higher energy utilization. Related arrangements are being created and marketed by numerous organizations yet these items have a uninvolved property. That is, these sorts of arrangements need to incorporate intelligent management due to inactive activity as indicated by hourly variety or battery status. For instance, despite the fact that there are different factors, for example, future power requests, age status relying upon climate conditions, and current battery status, current arrangements don't think about these factors, so it is difficult to expect high effectiveness. Therefore, for considerably higher proficiency of sustainable power source, an intelligent system is expected to screen these statuses and give legitimate management administrations. In this paper, we propose an intelligent energy management system (IEDM). The idea of dynamic task of needs for all the buyer is set up in this venture. Cutting of interfere with timings is additionally talked about which can be utilized to enhance the execution. According to the created control sum, control close down will be declared and it will achieve the purchaser in the uniform level in light of needs.

Keywords - Raspberry pi, current and voltage sensor, WSN, relay switches etc.

I. INTRODUCTION

In accordance with the standard mechanical developments the rising IOT innovation goes for enhancing the personal satisfaction of general masses and the proficiency of the community civilities in asustain capable design while improving monetary speculations by private and open segment. The IOT applications can be found in different indispensable fields, for example, energy, wellbeing, transportation, condition, and so on. A huge number of uses in every one of these fields can work ideally if there is a solid interconnection among IOT empowered gadgets [1]. Interconnection among IOT empowered gadgets by means of correspondence channels and conventions aren't just a basic mechanical topic yet it intrigues likewise different qualities, for example, protection, institutionalization, lawful issues, and so forth [2]. This obviously instigates more up to date creative difficulties in IOT condition, which moves mechanical and scholastics specialists to go encourage in IOT supportability examine [3].

Unquestionably, the innovative interfacing and communications among the IOT empowered gadgets (things) is basic to engage the IOT condition [4]. This is there as on why couple of imperative capacities will be performed by few key mechanical parts and procedures, which have advanced to ensure interconnection among heterogeneous gadgets adjusting to the utilization of less supplies as far as both computational time, memory, functionalities and energy assets. This paper offers an investigation report of a little venture done by the creators at CDAC, Pune to design the electrical game plan of a working in a keen way utilizing the ideas of DALI and IOT. In like manner, whatever is left of the paper is composed as takes after: Section II distinguishes the essential mechanical assembly required for the task and a concise portrayal about the different conventions and modules that have been depleted in the undertaking. Segment III gives an outline of the strategy through which the task was completed and the working standards of the venture. Area IV displays a brief of the outcomes accomplished from the undertaking and an examination of how brilliant lattices are proficient speculations for individuals in an opportunity to come. Area V comprises of the end and viewpoint. Following the determination is a short note of affirmation by the creators to the general population who have helped throughout this venture.

II. BLOCK DIAGRAM

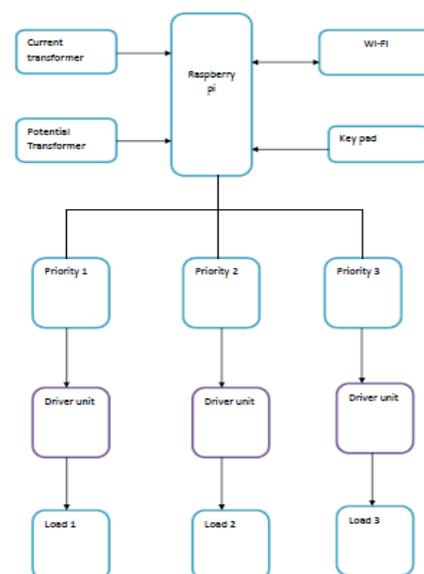


Figure 1: System Block Diagram

A. System overview:

i) Raspberry pi - The processor at the heart of the Raspberry Pi system is a Broadcom BCM2837 system-on-chip (SOC) multimedia processor. This means that the vast majority of the system’s components, including its central and graphics processing units along with the audio and communications hardware, are built onto that single component hidden beneath the 256 MB memory chip at the center.

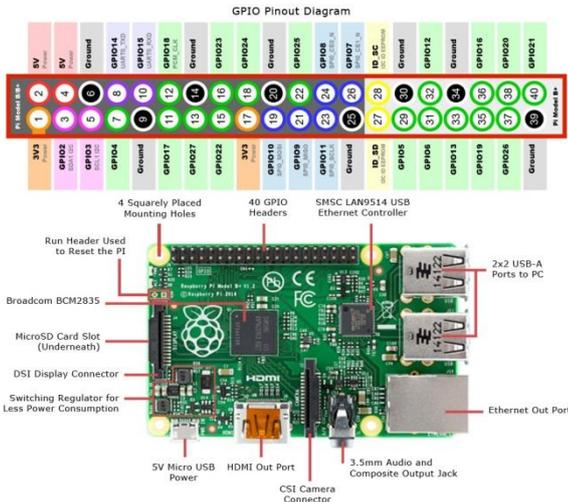


Figure 1.1: Raspberry pi board

ii) Connecting Power - The Raspberry Pi is powered by the small micro-USB connector found on the lower left side of the circuit board. This connector is the same as found on the majority of smartphones and some tablet devices. Many chargers designed for smartphones will work with the Raspberry Pi, but not all. The Pi is more power-hungry than most micro-USB devices, and requires up to 700mA in order to operate. Some chargers can only supply up to 500mA, causing intermittent problems in the Pi’s operation. Connecting the Pi to the USB port on a desktop or laptop computer is possible, but not recommended. As with smaller chargers, the USB ports on a computer can’t provide the power required for the Pi to work properly. Only connect the micro-USB power supply when you are ready to start using the Pi. With no power button on the device, it will start working the instant power is connected and can only be turned off again by physically removing the power cable.

iii) Voltage sensor -Voltage sensor measures AC and/or DC voltage levels. They receive voltage inputs and provide outputs as analog voltage signals, analog current levels, switches or audible signals. They can also provide frequency modulated frequency outputs. For example, some electrical voltage sensor produces sine waves or pulse trains.

iv) Current sensor - Measuring a voltage in any system is a passive activity as it be done easily at any point n the system without effecting the system performance. Current

measure is intrusive as it demands insertion of some type of sensors which introduces risk of effecting system performance current measure is of vital important in many power and instrument systems. Traditionally, current sensing with primary for circuit protection and control how ever with the advanced in technology current sensor has emerged as a method to monitor and enhance performance.

v) Relay - A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and they are double throw (changeover) switches. Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits, the link is magnetic and mechanical.

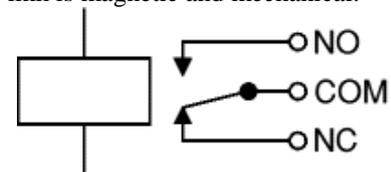


Figure 1.2: Circuit symbol of relay

III. IMPLEMENTATION

The proposed engineering utilizes an ARM processor as a center. To the processor the power management need settings will be customized. Current transformer and the potential transformer will ascertain the power factor and it will be given to the processor ceaselessly. These data will be prepared by the processor and it will compute the sum for that devoured control. For simple understanding this data will be shown on the gadget itself.This unit will likewise have a need based load partaking keeping in mind the end goal to deal with the power use. This need levels will be turned on or killed by the hinders produced by the home server area. So that an automatical control utilization technique will be executed in the home area. The DHL system is associated with the remote correspondence area. Here, Wi-Fi is utilized as a system innovation. Wi-Fi is a handset it tends to be appended to the processor area and to the home server segment.

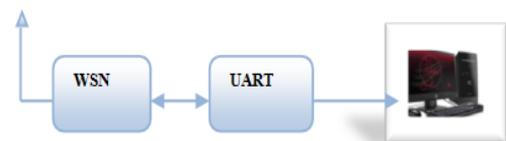


Figure 2: Home server section with WSN

The home server area is appeared on Figure2. In this part, the Wi-Fi module is interfaced on a server which will gather the ceaseless information from the DHLs.The sum level will likewise be shown on the server part. With the goal that a client can give control signals as indicated by those utilization. At the point when a control flag is created, this

data will be send to the processor. At that point the processor will check the hinder and afterward as per the program the specific need setup will be actuated in the home segment. This will maintain a strategic distance from undesirable power use in home segment.

IV. RESULT

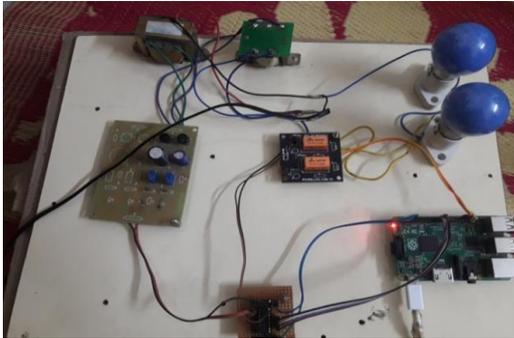


Figure 3: Hardware arrangement



Figure 3.1: WSN Energy monitoring system

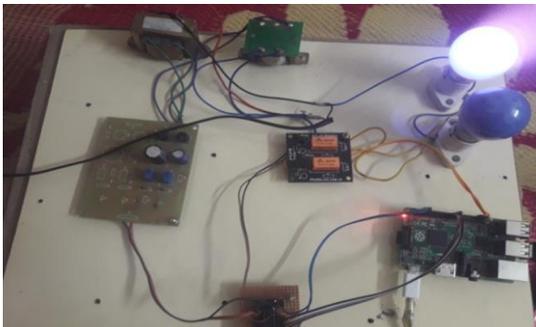


Figure 3.2: WSN sending data to load 1 shown

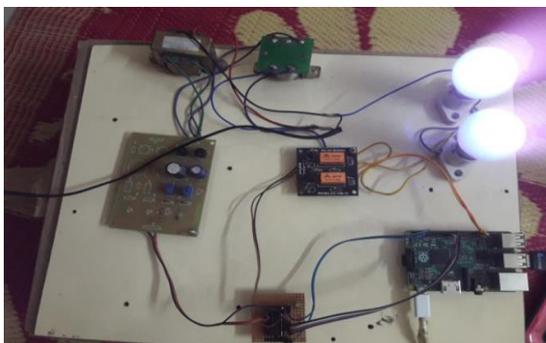


Figure 3.3 WSN sending data to both load shown

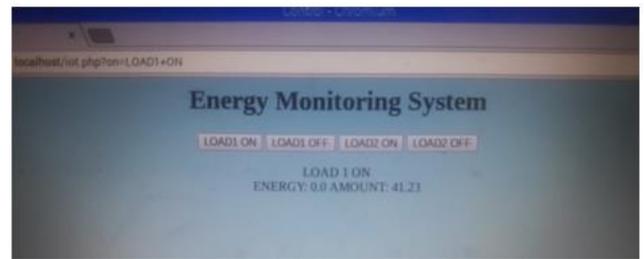


Figure 3.4: Parameters (LOAD1 ON condition) amount displayed on web server

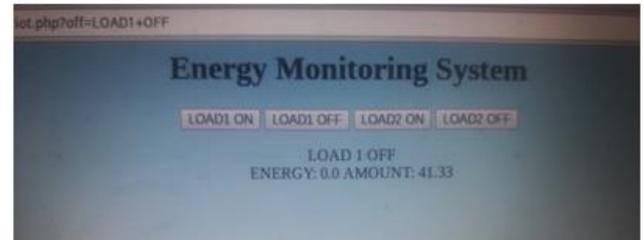


Figure 3.5: Parameters (LOAD1 OFF condition) amount displayed on web server

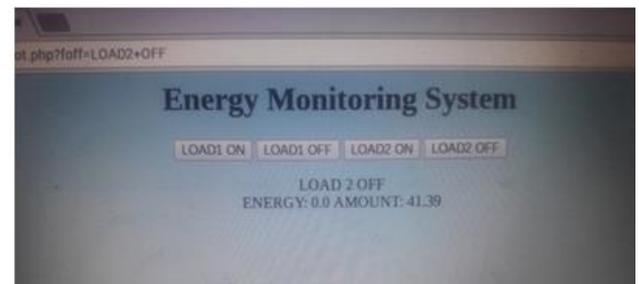


Figure 3.6: Parameters (LOAD 1 AND 2 OFF condition) amount displayed on web server

V. CONCLUSION

An IOT based Energy Management System by Using Raspberry pi ARM cortex has been composed and created toward the execution of an intelligent building. The created system adequately screens and controls the electrical machine us ages at an elderly home. Accordingly, the continuous observing of the electrical machines can be seen through a site. The system can be reached out for checking the entire intelligent building. We expect to decide the zones of day by day crest long stretches of power use levels and accompany an answer by which we can bring down the utilization and improve better usage of effectively restricted assets amid crest hours. This investigation likewise expects to evaluate buyer's reaction toward view of keen matrix advancements, their points of interest and disservices, conceivable concerns, and generally saw utility. The created system is powerful and adaptable in activity.. In future, the system will be incorporated with co-systems like brilliant home occupant conduct acknowledgments systems to decide the wellbeing of the tenant as far as energy utilization. Subsequently savvy management of energy and observing of information continuously from anyplace is conceivable

VI. FUTURE SCOPE

The system so created isn't completely total as we have built up a model just to control two apparatuses i.e. fan and light. In future, we propose to broaden the system for controlling apparatuses like Refrigerator, Air cooler, and Television and so on. The nearness of human just will switch on the apparatuses. More measure of intensity can be spared in light of the lesser use of the apparatuses. There can be additionally a manual authority over the apparatuses.

VII. REFERENCES

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Author Profile



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