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IOT Based Home Energy Management System

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ABSTRACT

One of the fundamental need for the financial advancement of the nation is energy. It ought to be dispersed to its clients as most extreme client's right, as vitality creation is costlier. Energy Management System should assume an essential part in acknowledging private request reaction in keen network environment. Therefore, IOT based framework utilizing Arduino microcontroller is proposed, in which distinctive burdens are utilized and relating need is balanced in view of need of user. The controller board is utilized which settles on a choice to switch ON/OFF activity of the chose end utilize machines in light of mortgage holders stack need and preference setting. The proposed framework is likewise in charge of gathering electrical utilization information from all heaps and gives an interface to property holder to retrieve apparatuses status.

Keywords: Energy management,demand response, microcontroller(Arduino),HEM, demand response.

I. INTRODUCTION

Today the world in which we live is the universe of computerized gadgets. the innovative progression has taken to arrange where we can do nothing without the assistance of complex instruments like PCs, phones, mobiles, wirelesses. The way toward watching, controlling, and rationing power use in an association/building is known as Home Energy Management [1]. It has been accounted for that 40% of the worldwide power utilization happens inside private buildings [2]. An IOT based Home Energy Management System empowers request side administration program. Demand side administration obtains the use example of the purchaser and hence the choice to switch ON/OFF activity of the chose end utilize gadget in view of mortgage holders stack need and inclination setting. To manufacture a predominant IOT based canny home, there are some basic focuses that ought to be taken into consideration. In request to make the framework high qualified and successful, an experienced architect who is exceptionally appropriate for natural conditions, open to improvements and who is extremely well acquainted with the framework is needed. The term "Intelligent Design" incorporates implications, for example, economical design, high tech utilization and easy to understand design [3].

II. LITERATURE SURVEY

The consider shutdown of electric power in a section or parts of a power-circulation framework, by and large to keep the disappointment of the whole framework when the request strains the limit of the system, the demonstration or routine with regards to incidentally decreasing the supply of power to a territory to abstain from over-burdening the generators is stack shedding.

The electrical load arranging is the way towards evaluating the prompt weights working in an establishment. The stack design gives the store to the

particular foundation with respect to clear, respective and dynamic control (KVA, KVAR and KW) and as a general rule did at the sub officer area or at the switchboard.

There are diverse strategies for control stack administration like:

Arduino based Home Energy Management System, in which diverse home apparatuses are utilized by the predefined need set by the house proprietor and furthermore by energy restrict as of now been characterized for a specific purchaser.

III. PROPOSED SYSTEM

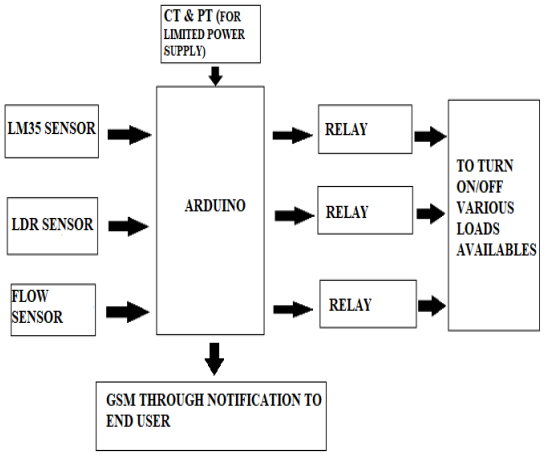

Figure 1. Proposed System

It consist of sensors like LDR ,LM35 and flow sensors which senses the light intensity ,temperature and water level respectively which helps in saving energy in case when light is sufficient or temperature is in between 17-25 degree Celsius so that appliances like fans ,cooler ,AC will not operate and in case if water level is enough the water pump won't operate .If the power consumed by the end user becomes greater than the prescribed limit the appliances would start tripping according to the priority been set by the home owner .The upper limit of the prescribed value is given by the CT and PT to the microcontroller which compares the given value with the predefined limits and then sends the trip signal to the relays if the value is greater .Thus the end user appliances status is changed from ON state to OFF state according to the relay conditions and also according to the priority been set by the end user .In case if the hose appliances like refrigerator ,water pump, TV, fans ,lights ,cooler are operating simultaneously than such heavy usage of energy has to be limited .The consumption becomes greater than the predefined value and the consumer is notified about this condition through SMS. Thus, the consumer can switch OFF the load, which is required the least by the consumer in order to maintain the energy consumption with in a limit. Demand Response is defined as "change in power use by request side assets from their ordinary utilization designs in light of changes in the cost of power or to motivating force instalments intended to instigate bring down power utilize are at high discount showcase costs or when framework dependability is endangered". The Demand Response can either be incentive based or time-based program.

A.Introduction to Microcontroller:

The Arduino Uno is a microcontroller board based on the AT mega 328. It has 14 digital input/output pins(of which 6 can be used as PWM outputs),6 analog inputs, a 16MHz ceramic resonator, a USB connection, reset button. It contains everything with AC to DC adaptor or battery to get started. The Arduino has a number of facilities for communicating with a computer, another Arduino. The ATmega 328 provides UART TTL(5v) serial communication, which is available on digital pins 0(RX) and 1(TX). The Arduino software includes a serial monitor which allows simple textual data to be send to and from the Arduino board. The RX and TX LED's on board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer.

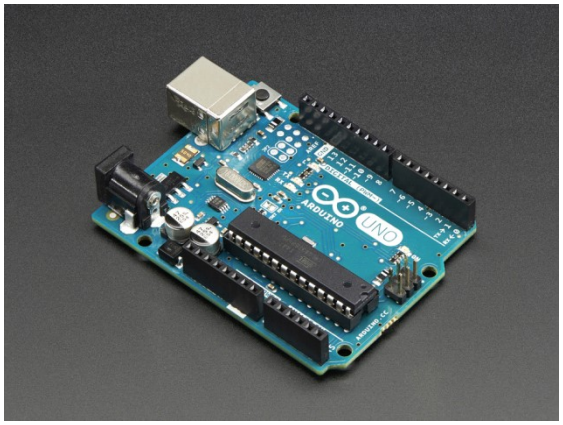

Figure 2. Arduino

1.Relay and relay drivers:

A relay is an electromagnetic switch which is used to switch high current using low power circuits. Relay isolates low power circuits from high power circuits. It is activated by energizing a coil wounded on a soft iron core and relay should not be directly connected to Arduino it needs a driving circuit because Arduino may stop working by negative voltages produced in the relay due to its back emf.

2. CT & PT:

A present transformer (CT) is a kind of transformer that is utilized to quantify rotating current (AC). It creates a current in its auxiliary which is relative to the current in its essential. Voltage transformers (VT), also called potential transformers (PT), are a parallel connected type of instrument transformer. They are designed to present negligible load to the supply being measured and have an accurate voltage ratio and phase relationship to enable accurate secondary connected metering.

Current transformers, alongside voltage or potential transformers, are instrument transformers. Instrument transformers scale the substantial estimations of voltage or current too little, institutionalized esteems that are anything but difficult to deal with for instruments and defensive transfers. The instrument transformers seclude estimation or assurance circuits from the high voltage of the essential framework. A present transformer gives an auxiliary current that is precisely relative to the present streaming in its essential. The present transformer shows a negligible load to the primary circuit.

3. LDR:

Two cadmium sulphide photoconductive cells with otherworldly reactions like that of the human eye. The cell protection falls with expanding light force. Applications incorporate smoke recognition, programmed lighting control, clump tallying and robber caution frameworks.

Like the human eye, the relative affectability of a photoconductive cell is subject to the wavelength (shading) of the episode light. Each photoconductor material compose has its own particular one of a kind unearthly reaction bend or plot of the relative reaction of the photocell versus wavelength of light.

Figure 3. LDR sensor

The LM35 arrangement are exactness coordinated circuit temperature sensors, whose yield voltage is directly relative to the Celsius (Centigrade) temperature. The LM35 accordingly has favourable position over straight temperature sensors aligned in ˚ Kelvin, as the client isn't required to subtract a vast consistent voltage from its yield to acquire advantageous Centigrade scaling. The LM35 does not require any outer alignment or trimming to give average correctness's of ±1⁄4˚C at room temperature and ±3⁄4˚C over a full –55 to +150˚C temperature extend. The LM35's low yield impedance, direct yield, and exact inalienable alignment make interfacing to readout or control hardware particularly simple. It can be utilized with single power supplies, or with in addition to and less supplies. As it draws just 60 μA from its supply, it has low self-warming, under 0.1˚C in still air. The LM35 is evaluated to work over a –55˚

to +150˚C temperature go, while the LM35C is appraised for a –40˚ to +110˚C territory (–10˚ with enhanced exactness). The LM35 arrangement is accessible pack

Matured in hermetic TO-46 transistor bundles, while the LM35C, LM35CA, and LM35D are additionally accessible in the plastic TO-92 transistor bundle. The LM35D is likewise accessible in a 8-lead surface mount little framework bundle and a plastic TO-220 bundle.

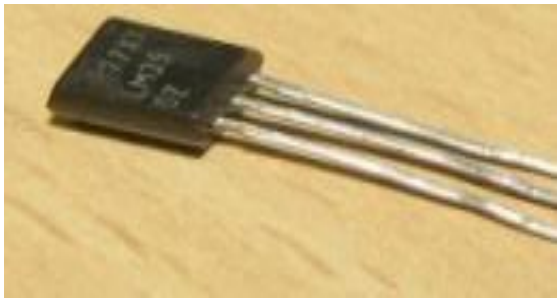

Figure 4. LM35 sensor

5. LCD:

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in colour or monochrome.[1]LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as present words, digits, and 7-segment displays, as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays LCD have larger elements.

LCDs are used in a wide range of applications including LCD televisions, computer monitors, instrument panels, aircraft cockpit displays, and indoor and outdoor signage. Small LCD screens are common in portable consumer devices such as digital cameras, watches, calculators, and mobile telephones, including smartphones. LCD screens are also used on consumer electronics products such as DVD players, video game devices and clocks. LCD screens have replaced heavy, bulky cathode ray tube (CRT) displays in nearly all applications. LCD screens are available in a wider range of screen sizes than CRT and plasma displays, with LCD screens available in sizes ranging from tiny digital watches to huge, big-screen television sets.

IV. CONCLUSION

The Home Energy Management framework with request reaction assumes a most vital part in adequately dealing with the wastage of energy on consumer side. This venture introduces another plan to control utilization of apparatuses at home. The proposed home vitality administration framework for request reaction applications which can proactively and successfully control and deal with the machines activity to keep the aggregate family utilization underneath a predefined request constrain by overseeing chose control concentrated burdens as per their priority. The proposed vitality administration framework considers both load need and client preferences. The changes in status of machines will be advised to client through SMS. Consequently, the undertaking gives a minimal effort, flexible, user friendly, and exceptionally secure design for actualizing a Home Energy Management System. In HEM framework with Demand Response activity the power utilization is diminished by 20%to 30%.

V. REFERENCES

[1] Kailas, V. Cecchi, and A. Mukherjee, Kailas, Aravind, Valentina Cecchi, and Arindam Mukherjee. “A survey of communications and networking technologies for energy management in buildings and home automation.” Journal of Computer Networks and Communications 2012 (2012).

[2] Ullah, M. N., et al. “A Survey of Different Residential Energy Consumption Controlling Techniques for Autonomous DSM in Future Smart Grid Communications.” arXiv preprint arXiv:1306.1134 (2013).
[3] E. N. Yılmaz, Education Set Design for Smart Home Applications, Computer Applications in Engineering Education, Vol. 19, Issue 4, December 2006, pp. 631-638
[4] A. K. Gupta, S. K. Arora, Industrial Automation and Robotics, Dec 1 2007, 348 pages, Laxmi Publications, ISBN-10: 8131801810