Smart Home Energy Saving System using IOT

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Abstract

Automation plays a significant role in today’s human life and people’s life is gradually changing with smart living due to current technology developed. The sensible home energy network has gained general attentions thanks to its versatile addition into standard of living. This next generation inexperienced home system transparently unifies varied home appliances, sensible sensors and wireless communication technologies. Wattage parameters of a load conjointly establish the operation standing of a tool that is joined to the sensible plug. We tend to decision it as a “ZigBee device network”. The planned sensible home energy management system divides and assigns varied home network tasks to applicable parts. Energy recording, standby power use management, electrical asking, and power info assortment. It will integrate heterogeneous physical sensing info and management varied shopper home devices, with the support of active device networks having each device and mechanism parts. The system example is put in at a private residence, and therefore the concert is valid by the check results.

Keywords- Smart Home, Energy Management, ZigBee, Sensor Net, Internet

I. INTRODUCTION

The continuous growth of Smart homes aim to provide enhanced convenience and comfort, energy efficiency, security and surveillance. It is claimed by market researchers that majority of homes will be outfitted with home automation systems in the very near future. ZigBee network model services have been proposed in different domains of our everyday life such as in homes. the standby power is the minimum power consumption of a device when it works in a standby mode or even when it is switched off. Some appliances such as television or air conditioner always wait for trigger signal to terminate standby mode, the survey results show that standby power may account for 3% to 11% of all household electricity. a home energy saving network framework composed of a smart plug, a smart meter and a Internet-based data center, and the test results of standby power management . The use of Web Services is an open and interoperable method for providing remote access service or applications can communicate with each other. An attractive market for home. Various smart home systems have been proposed where the control is via Relay, ZigBee [2], microcontroller-atmega8 [6], internet [3], and energy meter [5], LCD display.
II. BLOCK DIAGRAM

A. EB Meter Side

![Block Diagram for EB Meter Side]

Fig. 1: EB Meter Side

B. Junction Box Side

![Block Diagram for Junction Box Side]

Fig. 2: Junction Side
III. WORKING SYSTEM

A. Zigbee

ZigBee may be a specification for a set of high level communication protocols victimization tiny, low-power. Applications embody wireless light-weight switches, electrical meters with in-home-displays, and alternative shopper and industrial instrumentation that need short-range wireless transfer of knowledge at comparatively low rates. The technology outlined by the ZigBee specification is meant to be less complicated and fewer dearly-won than alternative WPANs, like Bluetooth. ZigBee is targeted at radio-frequency (RF) applications that need a coffee rate, long battery life, and secure networking. ZigBee incorporates an outlined rate of 250 kbps best fitted to periodic or intermittent information or one signal transmission from a device or data input device.

ZigBee may be an inexpensive, low-power, wireless mesh network customary. The low value permits the technology to be wide deployed in wireless management and watching applications. Low power-usage permits longer life with smaller batteries. Mesh networking provides high dependableness and additional in depth vary. The technology is meant to be easier and fewer high-ticket than alternative WPANs like Bluetooth. ZigBee chip vendors generally sell integrated radios and microcontrollers with between sixty kilobyte and 256 kilobyte nonvolatile storage. ZigBee operates within the industrial, scientific and medical (ISM) radio bands; 868 megacycle in Europe, 915 megacycle within the USA and Australia, and 2.4 GHz in most jurisdictions worldwide. Data transmission rates vary from twenty to 250 kilobits/second. The ZigBee network layer natively supports each star and tree typical networks, and generic mesh networks. Each network should have one arranger device, tasked with its creation, the management of its parameters and basic maintenance. Among star networks, the arranger should be the central node. Each trees and meshes enable the utilization of ZigBee routers to increase communication at the network level.

B. Smart Plug

Plugged into the smart plugs. In that case, the user is not required to specify the device type when connecting a new device. To this purpose, we propose to use a database, storing behavior patterns (e.g., load) of various devices. A new device, plugged into the smart plug, can be checked to match one of the appliance models (e.g., Fridge, TV set, Lamp, etc.) already stored in the database. Only when the appliance cannot be identified or the accuracy doesn’t satisfy some specific criteria, the user will prompted to specify manually the device type.

C. RS232

Due to its relative simplicity and low hardware overhead (as compared to parallel interfacing), serial communications is used extensively inside the physics business. Today, the most widespread serial communications commonplace in use is actually the EIA/TIA–232–E specification. This commonplace that has been developed by the Electronic business Association and also the Telecommunications business Association (EIA/TIA) is a lot of popularly noted merely as “RS–232” wherever “RS” stands for “recommended standard”. In recent years, this suffix has been replaced with “EIA/TIA” to facilitate determine the supply of the quality. We have a tendency to use the common notation “RS–232”.

Fig. 3: Zigbee Hard Ware Kit
D. Microcontroller– Atmega8

![Fig. 3: Pin Diagram for Atmega8](image)

Pin Descriptions

- **VCC**: Digital supply voltage.
- **GND**: Ground.
- **Port B (PB7..PB0)**: Port B is an 8-bit bi-directional I/O port with internal pull-up resistors (selected for every bit). The Port B output buffers have symmetrical drive characteristics with each high sink and supply capability. As inputs, Port B pins that square measure outwardly force low can supply current if the pull-up resistors square measure activated. The Port B pins square measure tri-stated once a reset condition becomes active, even though the clock isn't running. Reckoning on the clock choice fuse settings, PB6 are often used as input to the inverting generator electronic equipment and input to the interior clock operative circuit. Reckoning on the clock choice fuse settings, PB7 are often used as output from the inverting generator electronic equipment. If the interior graduated RC generator is employed as chip clock supply, PB7..6 is employed as TOSC2..1 input for the Asynchronous Timer/Counter2 if the AS2 bit in ASSR is about.

- **Port C (PC5..PC0)**: Port C is a 7-bit bi-directional I/O port with internal pull-up resistors (selected for every bit). The Port C output buffers have symmetrical drive characteristics with each high sink and supply capability. As inputs, Port C pins that square measure outwardly force low can supply current if the pull-up resistors square measure activated. The Port C pins square measure tri-stated once a reset condition becomes active, even though the clock isn't running.

- **PC6/Reset**: If the RSTDISBL Fuse is programmed, PC6 is used as an I/O pin. Note that the electrical characteristics of PC6 differ from those of the other pins of Port C. If the RSTDISBL Fuse is unprogrammed, PC6 is used as Reset input. A low level on this pin for longer than the minimum pulse length will generate a Reset, even if the clock is not running. Shorter pulses are not guaranteed to generate a Reset.

- **Port D (PD7..PD0)**: Port D is an 8-bit bi-directional I/O port with internal pull-up resistors (selected for every bit). The Port D output buffers have symmetrical drive characteristics with each high sink and supply capability. As inputs, Port D pins that are outwardly force low can supply current if the pull-up resistors are activated. The Port D pins are tri-stated once a reset condition becomes active, even though the clock isn't running.
H. Reset
Reset input. A low level on this pin for longer than the minimum pulse length will generate a reset, even if the clock is not running. Shorter pulses are not guaranteed to generate a reset.

I. AVCC
AVCC is the supply voltage pin for the A/D Converter, Port C (3..0), and ADC. It should be externally connected to VCC, even if the ADC is not used. If the ADC is used, it should be connected to VCC through a low-pass filter. Note that Port C (5..4) use digital supply voltage, VCC.

J. AREF
AREF is the analog reference pin for the A/D Converter.

K. ADC7..6 (TQFP and QFN/MLF Package Only)
In the TQFP and QFN/MLF package, ADC7..6 serve as analog inputs to the A/D converter. These pins are powered from the analog supply and serve as 10-bit ADC channels.

L. LCD
A liquid crystal display (LCD) is a thin, flat display device.

![Fig. 4: Pin Diagram of LCD](image)

It created up of any range of color or monochrome pixels clad in front of a light-weight supply or reflector. Every component consists of a column of liquid crystal molecules suspended between 2 clear electrodes, and 2 polarizing filters, the axes of polarity of that area unit perpendicular to every alternative. While not the liquid crystals between them, light-weight passing through one would be blocked by the opposite. The liquid twists the polarization of light-weight getting into one filter to permit it to pass through the opposite.

M. Arduino UNO
Arduino UNO is the microcontroller that is used in this project. It is built based on ATmega328 in AVR 8 bit RISC architecture. It has 6 analog inputs, 14 digital input output port, a USB connection, 16MHz ceramic resonator, power jack and an ICSP connector. It consists of 1 KB of EEPROM memory which can be read and written. Communication in Arduino UNO is using UART TTL serial communication.

![Fig. 5: Arduino UNO](image)
N. Ethernet
Ethernet Shield connects your Arduino to the internet in mere minutes. Just plug this module onto your Arduino Board, connect it to your network with an RJ45 cable (not included) and follow a few simple steps to start controlling your world through the internet.

Fig. 6: Ethernet

Ethernet protect connects your Adriano to the web in only minutes. Simply plug this module onto your Arduino Board, connect it to your network with an RJ45 cable (not included) and follow a number of straightforward steps to begin. Dominant your world through the web. As invariably with Arduino, each part of the platform – hardware, software package and documentation – is freely offered and ASCII text file. This implies you'll be able to learn precisely however it's created and use its style because the start line for your own circuits. Many thousands of Arduino Boards are already refueling people’s creativeness everywhere the planet, every day. Be a part of U.S.A. currently, Arduino.

O. Relay
A relay is an electrically operated switch. Several relays use a magnet to work a change mechanism automatically, however different in operation principles are used. Relays are used wherever it's necessary management to regulate to manage a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or wherever many circuits should be controlled by one signal. The primary relays were employed in long distance telegraph circuits, continuation the signal returning in from one circuit and re-transmitting it to a different.

Fig. 7: Relay Circuits Operation

A relay will switch one or more poles, each of whose contacts can be thrown by energizing the coil in one of three ways. Normally-open (NO) contacts connect the circuit when the relay is activated; the circuit is disconnected when the relay is inactive. It is also called a Form A contact or "make" contact. NO contacts can also be distinguished as "early-make" or NOEM, which means that the contacts will close before the button or switch is fully engaged.

Normally-closed (NC) contacts disconnect the circuit when the relay is activated; the circuit is connected when the relay is inactive. It is also called a Form B contact or "break" contact. NC contacts can also be distinguished as "late-break" or NCLB, which means that the contacts will stay closed until the button or switch is fully disengaged.
Change-over (CO), or double-throw (DT), contacts control two circuits: one normally-open contact and one normally-closed contact with a common terminal. It is also called a Form C contact or "transfer" contact ("break before make"). If this type of contact utilizes "make before break" functionality, then it is called a Form D contact.

SPDT – Single Pole Double Throw. A common terminal connects to either of two others. Including two for the coil, such a relay has five terminals in total.

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REFERENCES


