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Internet Based Energy Meter

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Abstract: This work presents an internet based energy meter that displays readings over the internet for the continuous consumption of units and its costs .The working of the project is based on Internet of things. Internet of things allows objects to be sensed and controlled remotely across existing network structure.

I. INTRODUCTION

In this work we have taken a digital energy meter whose blinking LED signal is interfaced to a microcontroller of 8051 family through a LDR .The blinking of LED flashes 1000 times for 1unit consumption. The microcontroller takes this reading and sent it to the router.Now all the devices which are connected to the router when type the IP address gets the reading.

The power supply consists of a step down transformer 230/12V, which steps down the voltage tr and it is then regulated to 5Vusing a voltage regulator 7805 o 12V AC into 5VDC. This is converted to DC using a Bridge rectifier and it is then regulated to 5V DC .This is converted to DC using a Bridge Rectifier and it is then regulated to 5V .

5V is the supply which is given for microcontroller operation and also of its other components. That supply starts the microcontroller .Mmicrocontroller sends the data to Ethernet and then to we from where the data can be accessed through IP address .

Block Diagram:

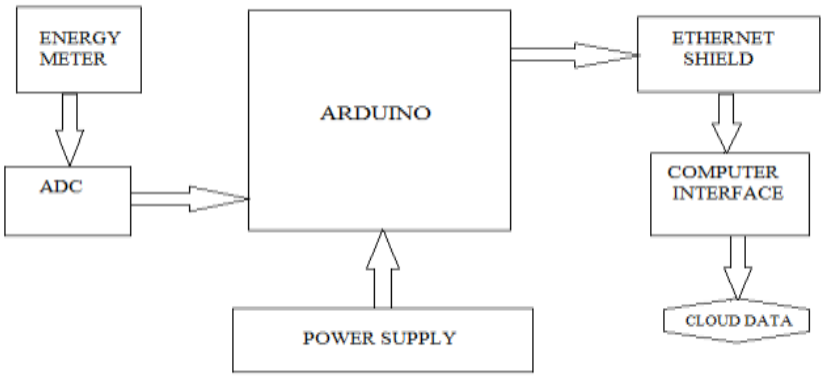

Fig 1 Block diagram of internet based energy meter

a) Electricity Consumption Meter: The electric meter working involves computing the integral part over time of the electrical power in Watts consumed on the power deliverd to a particular connection .This electrical power is measured by performing the line currents in Amps and the line voltage in Volts.

b) Analog to Digital Converter (A/D Converter)
Converter is a device which convert analog signals into digital signals. Analog signals are obtained from the supply are converted into digital signals with the help of analog to digital converter and these signals are applied to the microcontroller.

c) Arduino UNO: Arduino is a software company, project and user community that designs and manufacture open source hardware, open source software and microcontroller based kits for building digital devices and interactive objects that can sense and control physical devices .Components of Arduino UNO are power, pins, Reset button ,Power led indicator ,transmission and receiver leds,main ICS and voltage regulator. The microcontroller block of Arduino Uno can be considered as the main block of the entire Uno circuit, as it is programmed to control all the components to perform the desired operation.

d) Ethernet shield: Ethernet shield can be used to provide the objects with internet connectivity.

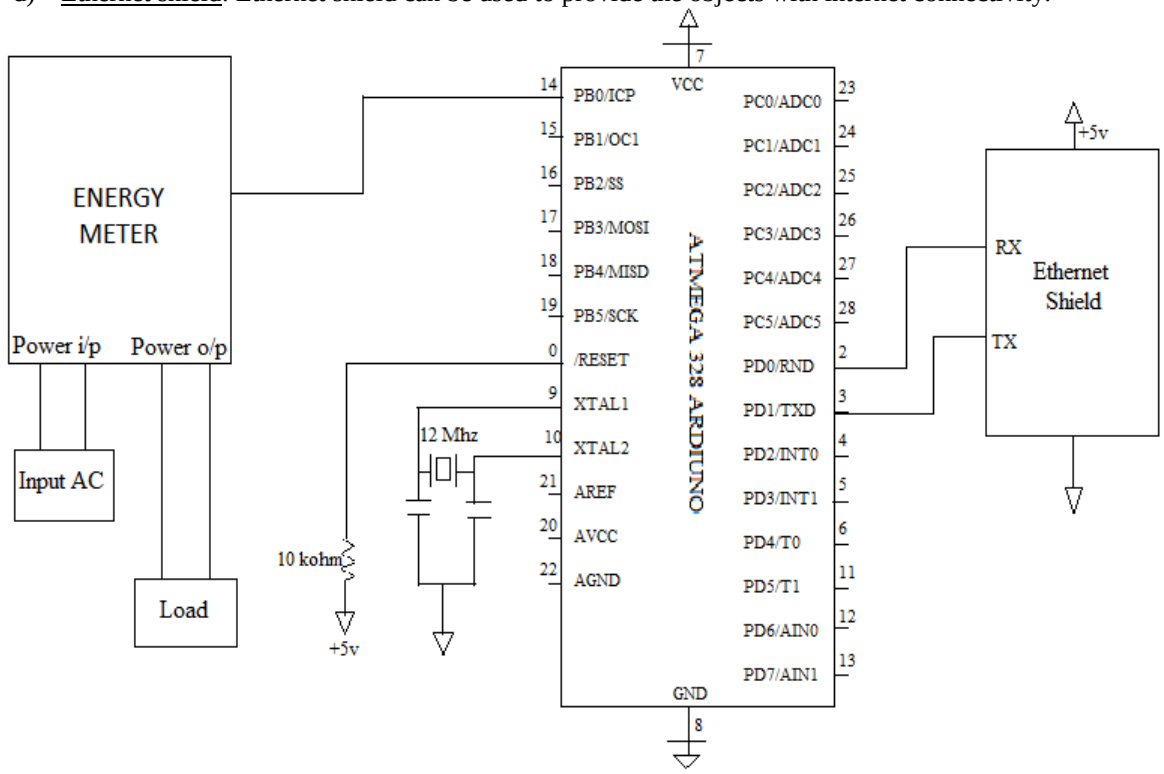

Fig 2 Circuit diagram of internet based energy meter

2.1 Power (USB / Barrel Jack)

Every Arduino board needs a way to be connected to a power source. The Arduino Uno can be powered from a USB cable coming from your computer or a wall power supply (like this) that is terminated in a barrel jack. In the picture above the USB connection is labeled (1) and the barrel jack is labeled (2).

The USB connection is also how you will load code onto your Arduino board. More on how to program with Arduino can be found in our Installing and Programming Arduino tutorial.

Do not use a power supply greater than 20 Volts as it will overpower (and thereby destroy) the Arduino. The recommended voltage for most Arduino models is between 6 and 12 Volts.

2.2 Pins (5V, 3.3V, GND, Analog, Digital, PWM, AREF)

The pins on your Arduino are the places where you connect wires to construct a circuit (probably in conjunction with a breadboard and some wire. They usually have black plastic 'headers' that allow you to just plug a wire right into the board. The Arduino has several different kinds of pins, each of which is labeled on the board and used for different functions.

- GND (3): Short for 'Ground'. There are several GND pins on the Arduino, any of which can be used to ground your circuit.
- 5V (4) & 3.3V (5**)**: As you might guess, the 5V pin supplies 5 volts of power, and the 3.3V pin supplies 3.3 volts of power. Most of the simple components used with the Arduino run happily off of 5 or 3.3 volts.
- Analog (6): The area of pins under the 'Analog In' label (A0 through A5 on the UNO) is Analog In pins. These pins can read the signal from an analog sensor (like a temperature sensor) and convert it into a digital value that we can read.
- Digital (7): Across from the analog pins are the digital pins (0 through 13 on the UNO). These pins can be used for both digital input (like telling if a button is pushed) and digital output (like powering an LED).
- PWM (8): You may have noticed the tilde (~) next to some of the digital pins (3, 5, 6, 9, 10, and 11 on the UNO). These pins act as normal digital pins, but can also be used for something called Pulse-Width Modulation (PWM). We have a tutorial on PWM, but for now, think of these pins as being able to simulate analog output (like fading an LED in and out).
- AREF (9): Stands for Analog Reference. Most of the time you can leave this pin alone. It is sometimes used to set an external reference voltage (between 0 and 5 Volts) as the upper limit for the analog input pins.

2.3 Reset Button

Just like the original Nintendo, the Arduino has a reset button (10). Pushing it will temporarily connect the reset pin to ground and restart any code that is loaded on the Arduino. This can be very useful if your code doesn't repeat, but you want to test it multiple times. Unlike the original Nintendo however, blowing on the Arduino doesn't usually fix any problems.

3.2.4 Power LED Indicator

Just beneath and to the right of the word "UNO" on the circuit board, there's a tiny LED next to the word 'ON' (11). This LED should light up whenever the plug of Arduino into a power source. If this light doesn't turn on, there's a good chance something is wrong. Time to re-check your circuit!

2.5 TX RX LEDs

TX is short for transmit, RX is short for receive. These markings appear quite a bit in electronics to indicate Arduino is receiving or transmitting data (like when we're loading a new program onto the board).

2.6 Main IC

The black thing with all the metal legs is an IC, or Integrated Circuit **(**13). Think of it as the brains of our Arduino. The main IC on the Arduino is slightly different from board type to board type, but is usually from the AT mega line of IC's from the ATMEL Company. This can be important, as you may need to know the IC type (along with your board type) before loading up a new program from the Arduino software. This information can usually be found in writing on the top side of the IC. If you want to know more about the difference between various IC's, reading the datasheets is often a good idea.

2.7 Voltage Regulator

The voltage regulator (14) is not actually something you can (or should) interact with on the Arduino. But it is potentially useful to know that it is there and what it's for. The voltage regulator does exactly what it says – it controls the amount of voltage that is let into the Arduino board. Think of it as a kind of gatekeeper; it will turn away an extra voltage that might harm the circuit. Of course, it has its limits, so don't hook up the Arduino to anything greater than 20 volts.

In our case, there are two places on the Arduino Uno where TX and RX appear – once by digital pins 0 and 1, and a second time next to the TX and RX indicator LEDs (12). These LEDs will give us some nice visual indications whenever our There are many varieties of Arduino boards (explained on the next page) that can be used for different purposes.

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