AN ADVANCED HOME ENERGY MANAGEMENT SYSTEM FACILITATED BY IoT WITH AUTOMATED POWER SCHEDULING

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***Abstract*—Previous research and development have been carried out in the field of electric meter such as Remote wireless Energy measurement from Meter, Electricity meter based on RFID, GSM based Electric Metering System. But none of them found to be an effective tool to eliminate the problems associated with power demand. The current project work is carried to solve the problems associated with power demand by designing an energy meter that effectively handle the power consumed by the consumer with the power available on that time. The main objective is to avoid power shutdown using IOT based smart energy scheduling technique. Giving the flexibility to the consumer to determine which devices or loads to be operated at a particular time so that power can be utilized efficiently and the power saved can be given to other places or industries for the betterment of the country's growth. Prototype hardware is developed to demonstrate the efficient of the system.**

Keywords—IoT, PIC 16F877A,7805 REGULATOR.

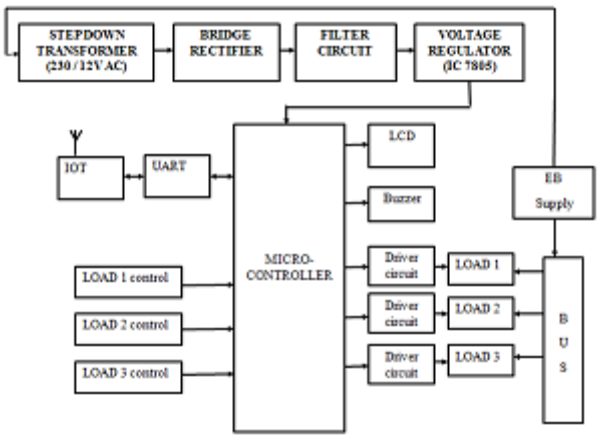
INTRODUCION

. It is not only sufficient to monitor the power plant, substations and power transmission equipment but also to monitor information from electrical equipment for analysis prediction, auxiliary power production decisions, to ensure stable power system operation, safety and reliability. In recent years, electricity production capacity and the electrical load is increased manifold compared to the previous decade. Hence there is a need of hybrid AC-DC power grid. This has increased the size and complexity of the power scheduling system.

EXISTING SYSTEM

Previous research and development has been carried out in the field of electric meter such as Remote wireless Energy measurement, prepaid Electricity meter based on RFID(Radio Frequency Identification) and GSM(Global System for Mobile communications)to determine the energy usage and tariff payment. These aren't effective tools to eliminate the problems associated with power demand and Effective utilization of the energy consideration.

BLOCK DIAGRAM



PROPOSED SYSTEM

In our proposed system, we are using advanced automationof power scheduling methodology to overcome the drawbacks in existing system. Here we are scheduling the power using IoT technology. In this method, we introduce three modes of operation like full power mode, custom mode and limited mode. The full power mode is the default mode to operate all nodes as per consumer wish. Whenever the power utilization is more and production is less, electricity board will change the mode from full power to custom mode. In custom mode, user can use only two loads as per their wish. In limited mode, electricity board will allow only certain loads to operate at a particular time. So at that time user cannot use load as per their wish. LCD is used to display the various statuses. Buzzer is used to intimate the mode changes. This methodology is very much useful for power saving and equal power sharing.

METHODOLOGY

MQTT Protocol

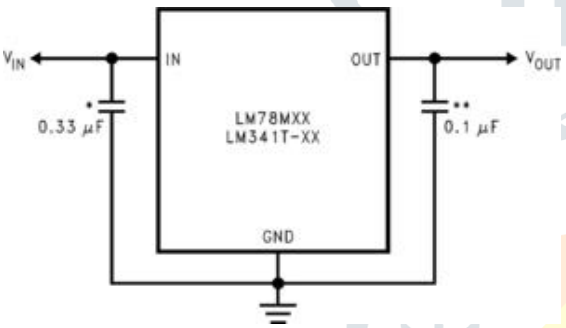
MQTT is one of the most commonly used protocols in IoT projects. It stands for Message Queuing Telemetry Transport. In addition, it is designed as a lightweight messaging protocol that uses publish/subscribe operations to exchange data between clients and the server. Furthermore, its small size, low power usage, minimized data packets and ease of implementation make the protocol ideal of the "machine-to-machine" or "Internet of Things" world.

ADVANTAGES OF PROPOSED SYSTEM

Problem associated with power demand can be reduced.
Saved power can be utilized for other purpose.
Flexibility to user to decide want load to be used at the peak load time when the power availability is low.

COMPONENTS

7805 REGULATOR



We have a 5V power supply circuit using LM 7805 IC. LM7805 is a famous positive voltage regulator IC, comes in three terminal provides fixed 5V DC output. This IC has many built in features like internal current limiting, thermal shut down, operating area protection etc. The IC will become hot during the operation so it is essential to use a good heat sink.

PIC16F877A

The term PIC, or Peripheral Interface Controller, is the name given by Microchip Technologies to its single – chip microcontrollers. PIC micros have grown to become the most widely used microcontrollers in the 8- bit microcontroller segment. The PIC16F877A CMOS FLASH-based 8-bit microcontroller is upward compatible with the PIC16C5x, PIC12Cxxx and PIC16C7x devices. It features 200 ns instruction execution, 256 bytes of EEPROM data memory, self programming, an ICD, 2 Comparators, 8 channels of 10-bit Analog-to-Digital (A/D) converter, 2 capture/compare/PWM functions, a synchronous serial port that can be configured as either 3-wire SPI or 2-wire I2C bus, a USART, and a Parallel Slave Port.

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DRIVER CIRCUIT

The ULN2003 is a monolithic high voltage and high current Darlington transistor arrays. It consists of seven NPN Darlington pairs that feature high-voltage outputs with common-cathode clamp diode for switching inductive loads. The collector-current rating of a single Darlington pair is 500mA. The Darlington pairs may be paralleled for higher current capability. Applications include relay drivers, hammer drivers, lamp drivers, display drivers (LED gas discharge), line drivers, and logic buffers.The ULN2003 has a 2.7kW series base resistor for each Darlington pair for operation directly with TTL or 5V CMOS devices.

SOFTWARE USED

EMBEDDED C

Embedded C is designed to bridge the performance mismatch between Standard C and the embedded hardware and application architecture. It extends the C language with the primitives that are needed by signal-processing applications and that are commonly provided by DSP processors. The design of the support for fixed-point data types and named address spaces in Embedded C is based on DSP-C. DSP-C [1] is an industry-designed extension of C with which experience was gained since 1998 by various DSP manufacturers in their compilers. For the development of DSP-C by ACE (the company three of us work for), cooperation was sought with embedded-application designers and DSP manufacturers. The Embedded C specification extends the C language to support freestanding embedded processors in exploiting the multiple address space functionality, user-defined named address spaces, and direct access to processor and I/O registers. These features are common for the small, embedded processors used in most consumer products. The features introduced by Embedded C are fixed-point and saturated arithmetic, segmented memory spaces, and hardware I/O addressing. The description we present here addresses the extensions from a language-design perspective, as opposed to the programmer or processor architecture perspective.

MPLAB IDE

Free integrated development environment (IDE) from Microchip to implement code for PICs. Latest version 8.60(recommended), In Lab 7.6. IDE and documentation (user guide) can be downloaded from the Microchip website. To open MPLAB IDE **Start→All Programs→Microchip→MPLAB IDE v8.60→MPLAB IDE**

PROGRAMMING THE PIC

- Directly Downloading Hex files to the PIC Memory
- Used to transfer HEX file to the PIC and begin program execution
- Two methods (HEX file must be generated)
  - MPLAB IDE
    - Programmer → Select Programmer→PICKit3
  - PICkit3
    - Separate program
    - Start → ALL Programs → Microchip → PICkit 3

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