Development of In-Home Energy Management and Smart Home System

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Abstract: In the proposed system android phone is interfaced to the microcontroller via Bluetooth which can used in monitoring the energy management of the house and it can also be used in turning ON or turning OFF the home appliance and home security features are incorporated in the home. Safety from theft. leaking of raw gas and fire are the most important requirements of home security system for people. Home security system does not alert the user about an intrusion or breaking of a door while the user is away. A traditional home security system gives the signals to the house owner in terms of alarm. The Microcontroller continuously monitors the parameters and in the event of any abnormality. the system is programmed to alert the user. The power control of a wind and solar hybrid generation system for interconnection operation with electric distribution system. Power control strategy is to extract the maximum energy available from varying condition of wind speed and solar irradiance while maintaining power quality at a satisfactory level.

Key words: Five Level Inverter · Fuzzy Logic Controller (FLC) · Total Harmonic Distortion (THD) · Renewable Power Generation System

INTRODUCTION

This project is developed in order to create awareness about the energy management and remote monitoring in home automation to our mobile through an android application. This is also developed for helping elderly and disabled people [1].

Advances in wind turbine and photovoltaic generation technologies have brought opportunities for utilizing wind and solar resources for electric power generation. They have unpredictable random behaviours. However. some of them. like solar radiation and wind speed. have complementary profiles [2].

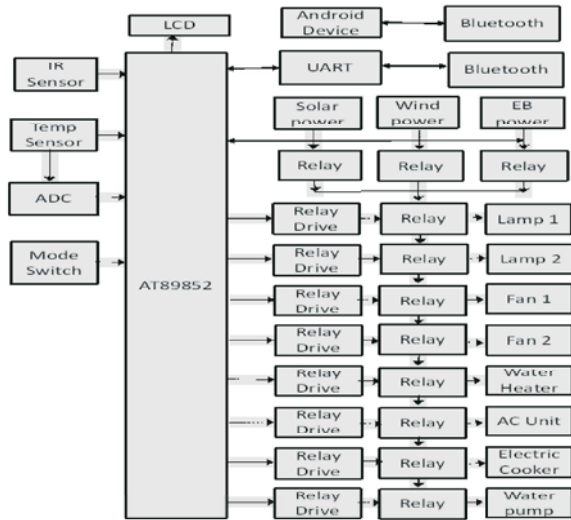**Block Description**
Existing Model
Explanation: The existing model consists of Atmel AT89S52. It is an 8 bit powerful microcontroller with input supply of (0-5V) DC .The devices are operated by making the controller to communicate with that android mobile through Bluetooth. The master Bluetooth device gives commands to the server Bluetooth and that command is

given as input to the microcontroller through UART. The reading in the energy meter is sensed through the IR sensor and the reading is intimated to the controller. The controller calculates the cost based on tariff. The output of the controller is sent to our mobile through the Uart [3].
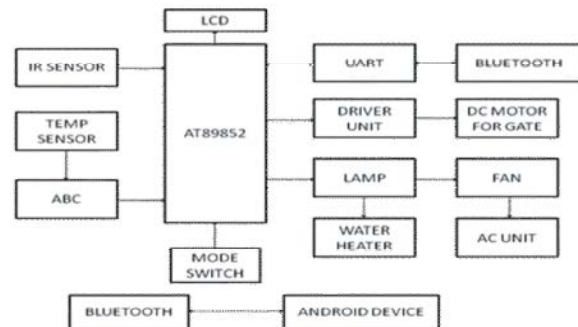
Disadvantages:

- Energy management system is not included.
- Less input available.
- Atmel is used in existing system.
- Minimum output is available
- Processor speed is slow.

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Proposed System

Explanation: A microcontroller based home automation is proposed to monitor and control the home applications. An android based application is developed for interfacing the different home appliance. The Bluetooth is used for interfacing the smart phone with the microcontroller. The microcontroller is used in monitoring and controlling the devices. The devices are operated by making the controller to communicate with that android mobile through Bluetooth. The master Bluetooth device gives commands to the server Bluetooth and that command is given as input to the microcontroller through UART. The reading in the energy meter is sensed through the IR sensor and the reading is intimated to the controller. The controller calculates the cost based on tariff. The output of the controller is sent to our mobile through theUart [4].

When the temperature exceeds the present value. the message is given with the help of controller and the AC is automatically triggered ON through driver unit. According to the command given from the master Bluetooth either lamp or fan is operated. In case of lamp. it is switched ON or OFF and the fan is switched also the speed is regulated through TRIAC circuit [5].

When the automatic water pump motor gets started. the timer is set ON and when the motor stops. the timer is set OFF and the timer value is sent to the mobile. Thecoding of UART. Relay and DC are fed to the controller and made to operate .The compiler used is KEIL C [6].

Atmel Microcontroller: The ATmega328P is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture.

By executing powerful instructions in a single clock cycle. the ATmega328P achieves throughputs approaching 1 MIPS per MHz allowing the system designed to optimize power consumption versus processing speed [7-10].

Advantages:

- Energy management is very useful for smart home system.
- Highly useful for elderly and disabled people.
- Android is used and does not require any server.
- Bluetooth is used which can transmit data faster.
- High Performance. Low Power Atmel®AVR® 8-Bit Microcontroller Family.
- Advanced RISC Architecture
- The131 Powerful Instructions – Most Single Clock Cycle Execution
- In 32 x 8 General Purpose Working Registers
- Fully Static Operation
- Up to 20 MIPS Throughput at 20MHz

KEY BUTTONS	FUNCTIONS
1	Light 1 is ON/OFF
2	Light 2 is ON/OFF
3	Fan 1 is ON/OFF
4	Fan 2 is ON/ OFF
5	Water pump is ON/OFF
6	AC is ON/OFF
7	Water Heater is ON/OFF
8	Electric Cookware is ON/OFF

Test System and Results Commandsand Functions:

Hardware:
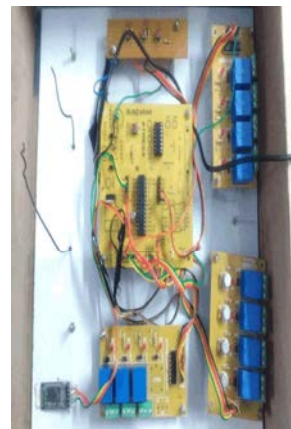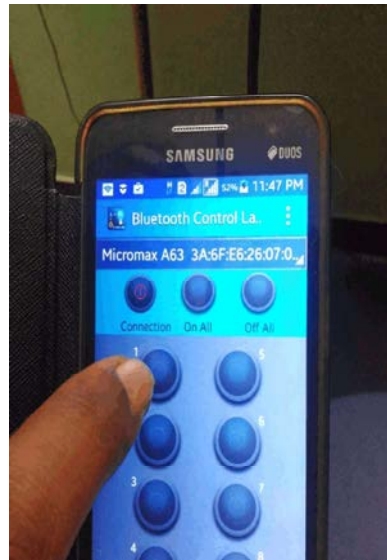
Software

CONCLUSION

This efficient and low cost system is designed to improve the standard living in home. The remote control function by smart phone provides help and assistance especially to disabled and elderly. In order to provide safety protection to the user. a low voltage activating switches is replaced current electrical switches. Moreover. implementation of wireless Bluetooth connection in control board allows the system install in more simple way. The system is designed in user-friendly interface. It designs mobile-based device monitoring and control. which can be applied In both fixed or moving LAN scenarios. such as vehicle electronics. power and energy systems. etc..

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