A Smart Switch To Connect And Disconnect Electrical Devices At Home By Using Internet

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Abstract

A firmware advanced for Smart Switch that could control the on-off of any electrical tool at domestic by the use of internet. For normal younger men whilst common switching operation is needed. Thus, this traditional guide switching of any domestic equipment is an inconvenient method for bodily disabled or elders or maybe manual switching technique needs to be triumph over with the aid of a less difficult approach of switching. This may be executed using an advanced switching method like a far flung control for electrical domestic appliances. In Industry/domestic we've unique sorts of loads at exclusive locations. We can control all loads at a time from one place (control room) without connecting any physically wire between loads and control room. In this project we're the use of WI-FI module, LPC2148, TRAIC. Smart Smartphone acts as a far flung to operate the loads. Here we are the use of a era called Internet of things (IOT), in which we will wirelessly operate any industrial/domestic appliances with the aid of speaking IOT module with the controlling gadget. The essential machine of the project is ARM7 LPC2148 microcontroller to which all input outputs are interfaced. The input to device is IOT ESP8266 and outputs are LCD and 4 loads. The ARM7 LPC2148 takes input from the IOT and offers output to the loads that are interfaced through TRIAC and motive force circuit. The popularity of the system is being displayed on LCD. This venture makes use of regulated 3.3V, 500mA electricity supply. 7805 three terminal voltage regulator is used for voltage law. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/12V step down transformer.

Keywords: Home automation, internet of things, smart switch, Wi-Fi technology.

1. INTRODUCTION

With the continuous increase of cellular gadgets in its recognition and capability the call for advanced cell programs in humans' day by day lives is continuously increasing. utilizing internet offerings is the maximum open and interoperable way of imparting faraway provider get entry to or enabling applications to talk with each different. An appealing market for domestic automation and networking is represented by way of busy households and people with bodily boundaries Clever domestic is the very promising vicinity, which has numerous advantages such as offering increased comfort, more protection and safety, a more rational use of power and different assets for this reason contributing to a great savings. This research application domain could be very critical and could boom in destiny as it also gives powerful way for helping and helping special wishes of the elderly and people with disabilities. The system is designed to be low fee and flexible with the growing sort of devices to be managed.

In this paper provides the way to offer internet connectivity to ARM controller primarily based embedded systems. This machine makes use of ARM Controller to shop the main utility source code, internet pages and TCP/IP stack that is a critical detail of the device software. This website can be viewed on any device with net/LAN connection by means of configuring the particular IP cope with and by way of giving person Login id, password. There are several I/O pins available on the ARM Controller which might be used to interface with sensors, liquid crystal display shows, motors and relays for tracking and controlling AC home equipment.

OBJECTIVE OF THE PROJECT

The main aim of this project is to protect the home from the outsider's entry and provide the automation is very important now-a-days. Intention of the assignment is to set up server for remote get admission to Terminal the usage of GPRS Enabled Embedded Server as principal verbal exchange from powerful microcontroller.

Existing device

Computerized light manage system is a easy yet effective concept, which uses transistor as a switch. By using the use of this gadget manual works are a hundred% removed. It mechanically switches ON lighting whilst the sunlight goes below the seen place of our eyes. This is carried out through a sensor known as mild based Resistor (LDR) which senses the light clearly like our eyes. It automatically switches OFF lighting on every occasion the daylight comes, seen to our eyes.
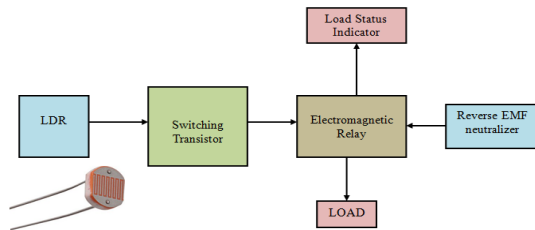
Fig 1 : Block diagram of current machine

Disadvantage: light will be on at night time even if there is no work there.

2. Literature Review

Many Wireless Technologies like RF, Wi-Fi, Bluetooth and Zigbee have been developed and remote monitoring systems using these technologies are popular due to flexibility, low operating charges, etc. Today Wireless Sensor Network are used into an increasing number of commercial solutions, aimed at implementing distributed monitoring and control system in a great number of different application areas.

(Wijetunge et al., 2008) designed a general purpose controlling module designed with the capability of controlling and sensing up to five devices simultaneously. The communication between the controlling module and the remote server is done using Bluetooth technology. The server can communicate with many such modules simultaneously. The controller is based on ATMega64 microcontroller and Bluetooth communication TDK Blu2i (Class 1) module which provides a serial interface for data communication. The designed controller was deployed in a home automation application for a selected set of electrical appliances.

(Kumari and Malleswaran, 2010) developed real time based equipment condition monitoring and controlling system using embedded web based technology which directly connects the equipment to network as a node. The embedded system consists of ARM7 based LPC 2148 microcontroller board, A/D, signal conditioning, sensors, and communications interface. The function of web based system is to collect the real time data information of the on-site equipment and remotely send the data in the form of user defined data transmission style. The remote Computer collects the data and running status through the network and provides the comparison on the historical data. If the parameter value is different from the original set value, the corrected signal is sent to the control unit. The embedded remote monitoring system completes the data Collection in the embedded platform and provides the data to remote host through the TCP/IP protocol from Web server. It creates condition to realize unattended management through providing Web-based graphical management interface for the Internet or LAN users.

3. Design of Proposed Hardware System

In industry/domestic we've got unique varieties of hundreds at extraordinary places. we are able to manipulate all hundreds at a time from one place (control room) without connecting any physical twine among masses and control room. On this project we are using Wi-Fi module, LPC2148, TRAIC. Clever telephone acts as a remote to function the loads. Here we're the use of a generation referred to as net of things (IOT), in which we can wirelessly operate any commercial/home home equipment with the aid of communicating IOT module with the controlling machine. The main gadget of the task is ARM7 LPC2148 microcontrollers to which all enter outputs are interfaced. The centre to device is IOT ESP8266 and outputs are liquid crystal display and four masses. The ARM7 LPC2148 takes input from the IOT and offers output to the loads which can be interfaced via TRIAC and motive force circuit. The repute of the system is being displayed on LCD.

BLOCK DIAGRAM
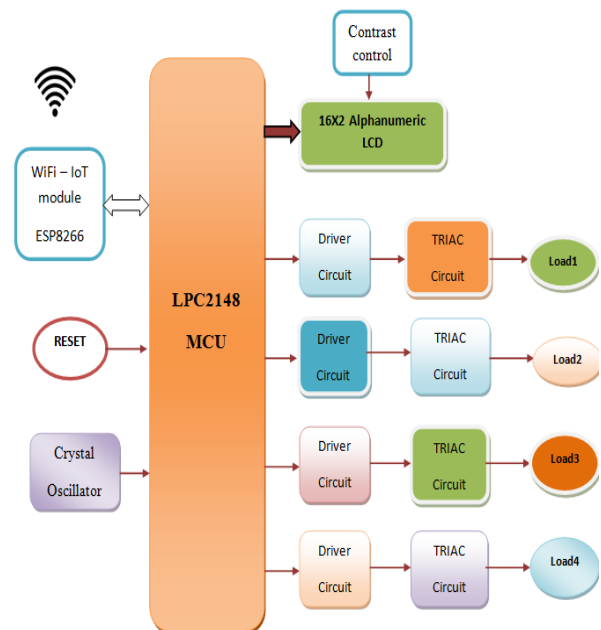
Power supply
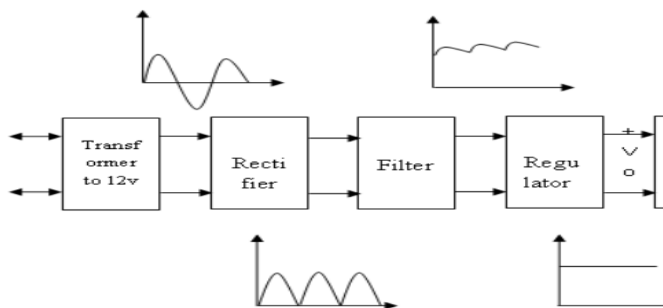
Monitoring and controlling Section

ARM7 MICROCONTROLLER

ARM is an acronym for advanced RISC machine and is manufactured by Phillips. ARM7 is based on reduced instruction set computing architecture. ARM7 is most successful and widely used controller family in embedded system applications. The advantage of low power consumption and low cost increases the range of applications from portable devices to almost all embedded electronic market.

It is preloaded with many in-built features and peripherals making it more efficient and reliable choice for an high end application developer. It also supports both 32-bit and 16-bit instructions via ARM and THUMB instruction set. LPC 21XX series of microcontroller are based on ARM 7 TDMI – S architecture.LPC stands for Low Power Consumption, because for the reason it have different voltages for operation and not like other controllers where the entire controller (CPU + peripherals of controller operate at +5V Vcc).

Pin Diagram

ARM7 LPC2148 microcontroller is a 64 pin dual-in package. There are basically 2 ports in LPC2148, Port0 and Port1. Port0 has 32 pins reserved for it. And Port1 has 16 pins. So total it comes to 32+16 = 48 pins. If it were really 2 ports then the number of port pins should have been 32 + 32 = 64.
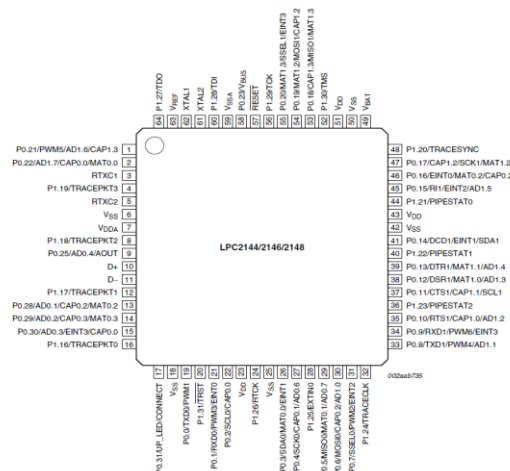

Fig 2 : Pin Diagram of LPC2148

Architectural Review:

The ARM7TDMI-S is a fashionable motive 32-bit microcontroller which gives excessive overall performance and very low strength intake. The ARM architecture is based on decreased education set laptop(RISC) concepts, and the instruction set and related decode mechanism are plenty less difficult than those of micro programmed complex training set computers(CISC).

This simplicity results in a excessive training throughput and extraordinary real time interrupt response from a small and cost-effective controller core. Pipeline techniques are employed so that everyone elements of the processing and reminiscence systems can function constantly. Generally, even as one education is being finished, its successor is being decoded, and a 3rd preparation is being fetched from reminiscence. The ARM7TDMI-S controller also employs a unique architectural method called Thumb, which makes it perfectly suited to excessive volume packages with memory restrictions, or programs wherein code density is an problem. The important thing idea at the back of thumb is that of a tremendous reduced education set.
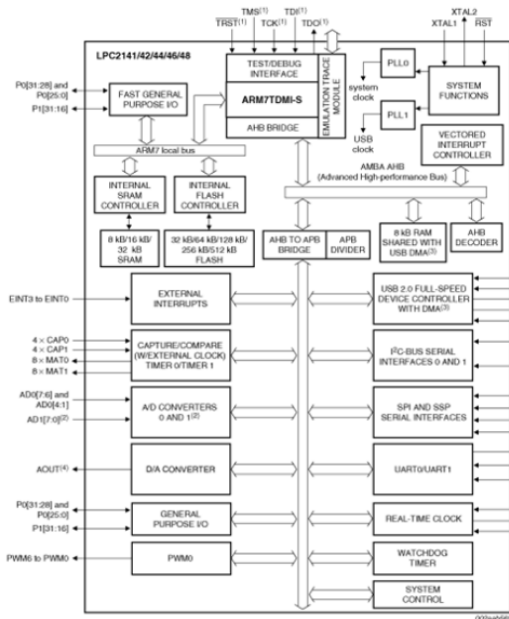
Fig 3: Block Diagram of ARM7 LPC2148 microcontroller

This simplicity results in a high instruction throughput and impressive real-time interrupt response from a small and cost-effective controller core. Pipeline techniques are employed so that all parts of the processing and memory systems can operate continuously. Typically, while one instruction is being executed, its successor is being decoded, and a third instruction is being fetched from memory. The ARM7TDMI-S controller also employs a unique architectural strategy known as Thumb, which makes it ideally suited to high-volume applications with memory restrictions, or applications where code density is an issue. The key idea behind Thumb is that of a super-reduced instruction set. Essentially, the

ARM7TDMI-S controller has two instruction sets:

- The standard 32-bit ARM set.
- A 16-bit Thumb set. T

he Thumb set's 16-bit instruction length allows it to approach twice the density of standard ARM code while retaining most of the ARM's performance advantage over a traditional 16-bit controller using 16-bit registers. This is possible because Thumb code operates on the same 32-bit register set as ARM code. Thumb code is able to provide up to 65 % of the code size of ARM, and 160 % of the performance of an equivalent ARM controller connected to a 16-bit memory system. The particular flash implementation in the LPC2148 allows for full speed execution also in ARM mode. It is recommended to program performance critical and short code sections (such as interrupt service routines and DSP algorithms) in ARM mode. The impact on the overall code size will be minimal but the speed can be increased by 30% over Thumb mode.

IMPLEMENTATION TRIAC - BT136

General Description Glass passivated, sensitive gate triacs in a plastic envelope, intended for use in general purpose bidirectional switching and phase control applications, where high voltages sensitivity is required in all four quadrants.
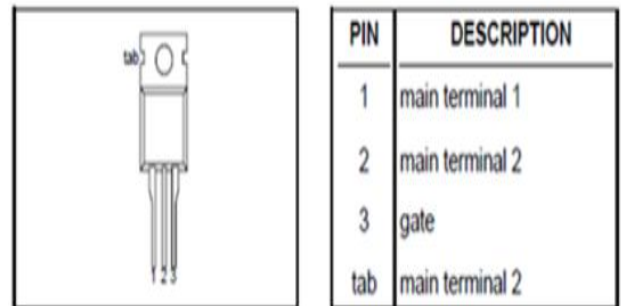

Fig 4: TRIAC pin configuration

MOC3021:

There are many situations in which signals and records want to be transferred from one subsystem to another inside apiece of electronics equipment, or from one piece of device to some other, without making a right away ohmic electrical connection. Regularly this is because the supply and destination are (or may be at instances) at very extraordinary voltage tiers, like a microprocessor that is running from 5V DC however being used to govern a triac which is switching 240V AC. In such conditions the link between the 2 should be an isolated one, to shield the microprocessor from overvoltage damage. Relays can of course offer this sort of isolation, however even small relays tend to be fairly bulky compared with ICs and a lot of today's different miniature circuit components.

Fig.5: MOC3021 pin configuration

Features:

- Low input current required (typically 5mA).
- High isolation voltage-minimum 7500 VAC peak

Applications:

- TRIAC driver
- Industrial controls
- Traffic lights
- Vending machines
- Motor control
- Solid state relay
- Solenoid/valve controls
- Static AC power switch
- Incandescent lamp dimmers
- Lamp ballasts

GPRS MODEM

GPRS Modem can accept any GPRS network operator SIM card and act just like a mobile phone with its own unique phone number. Advantage of using this modem will be that you can use its RS232 port to communicate and develop embedded applications. Applications like SMS Control, data transfer, remote control and logging can be developed easily. The modem can either be connected to PC serial port directly or to any microcontroller. It can be used to send and receive SMS or make/receive voice calls. It can also be used in GPRS mode to connect to internet and do many applications for data logging and control. In GPRS mode you can also connect to any remote FTP server and upload files for data logging. This GPRS modem is a highly flexible plug and play quad band GPRS modem for direct and easy integration to RS232 applications. Supports features like Voice, SMS, Data/Fax, GPRS and integrated TCP/IP stack.

Package Includes

- GPRS Modem - Assembled & Tested (1 Year Warranty)
- Serial Cable
- GPRS Antenna

Software program tool

KEIL compiler is software used in which the device language code is written and compiled. After compilation, the system supply code is transformed into hex code that's to be dumped into the microcontroller for similarly processing. KEAL compiler additionally supports c language code.
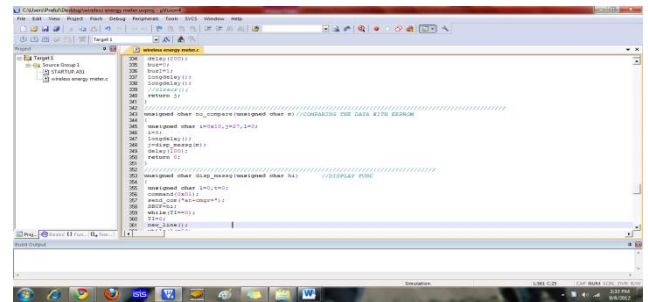
Flash Magic

Flash Magic is a tool that is used to software hex code in EEPROM of micro-controller. It's far a freeware tool. It best supports the micro-controller of Philips and NXP. It may burn a hex code into that controller which helps ISP (in system programming) function. Flash magic helps several chips like ARM Cortex M0, M3, M4, ARM7 and 8051

Consequences

The implementation of consciousness of " A clever switch to attach AND DISCONNECT electric gadgets AT domestic by way of using internet "is accomplished effectively. The communiqué is properly finished with none interface between one-of-a-kind modules inside the layout. Design is performed to satisfy all of the specs and requirements.

Proposed System Outcomes

The primary purpose of this project is to manipulate the electric appliances from anywhere in the global via the usage of the net server. Right here in this mission we're controlling each the AC and DC masses. in this mission we are controlling each the AC and the DC hundreds. For the AC masses, we want TRIAC and the Opto-coupler to isolate both the AC and DC section of the controller.

The code becomes written in the embedded c language and the code changed into compiled using the KEIL compiler, with a purpose to generate the executable hex record. The hex report was dumped in to the LPC2148 microcontroller through the use of the FLASH MAGIC software program.

ADVANTAGES AND APPLICATIONS

Benefits:

➢ Simplicity of the device.
➢ Accuracy of the gadget.
➢ Actual Time monitoring.
➢ From everywhere we will display the gadget.
➢ Discount in manual energy and Time saving.
➢ Low cost easy to implement and occasional strength.
➢ Consumption and controlling is completed by using new technology.
➢ In shape and overlook machine.

Programs:

➢ Safety programs and used for lab monitoring gadget.
➢ Houses preserve programs.
➢ Industrial packages.
➢ Places of work and buying malls.

Conclusion

This undertaking offers a high sensitive IOT based device control. This task is designed and carried out with LPC2148 within the movement of embedded systems. Experimental work has been executed carefully. The proposed method is confirmed to be fairly useful in all places. One of the key necessities inside the IOT is to offer an environment in which possible accumulates reputation statistics from devices and/or manipulate the gadgets even in a useful resource-restrained environment. in this assignment, we investigated the fine of enjoy for controlling a tool remotely that is linked to the internet through the consumer's phone and analyzed the overall performance in phrases of response time and data usage.

Future Scope

In destiny, we will use the Raspberry pi3 microprocessor, rather than the LPC2148 microcontroller. The Raspberry pi3 microprocessor has in constructed Wi-Fi module and there's no need of GPRS module. Except that we also can discover the fault hundreds and inform the user thru the net page alert message.

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