International Journal of Research
Available at https://edupediapublications.org/journals
e-ISSN: 2348-6848
p-ISSN: 2348-795X
Volume 04 Issue 13
October 2017

# An Intelligent Universal Remote Control System for Home Appliances Using Internet

[1] D. VENKATARAMI REDDY, [2] T ANJANEYULU [3] MD . MANSOOR ALI
[1] Associate Professor & HOD, ECE, Madhira Institute of Technology & science, Chilkur, Nalgonda, India
[2] Assistant Professor, ECE, Madhira Institute of Technology & science, Chilkur, Nalgonda, India
[3]PG Scholar, ECE, Madhira Institute of Technology & science, Chilkur, Nalgonda, India
[1]dvenkataramireddy@gmail.com, [2]tanjaneyulu@gmail.com, [3] munna429@gmail.com

*Abstract:*
***This paper presents the development of a firmware for a Smart Switch, which can control the on-off of any electrical device at home by using internet. The Smart Switch is connected to internet via Wi-Fi, through a computer, Smartphone, tablet or any device with internet access. In order to perform this connection it is necessary to write the IP pre-programmed into the Smart Switch in a web browser (Internet Explorer, Chrome, Firefox, etc.) with the purpose to load the Smart Switch server, which will open a configuration page to write the data of the user's network. Then, the user will select in automatic mode the network, the security type, and the user must have written a passphrase. Once these information is uploaded and saved, it is necessary to restart the Smart Switch in order to get access to internet, from which the user can control the Smart Switch simply sending a number one or a number zero to switch the electrical device, this process is done in principle via the internet, but it can be done without the use of internet, i.e. by using a local network.***

## INTRODUCTION

With the continuous growth of mobile devices in its popularity and functionality the demand for advanced mobile applications in people's daily lives is continuously increasing. Utilizing web services is the most open and interoperable way of providing remote service access or enabling applications to communicate with each other. An attractive market for home automation and networking is represented by busy families and individuals with physical limitations.

Smart home is a very promising area, which has various benefits such as providing increased comfort, greater safety and security, a more rational use of energy and other resources thus contributing to a significant savings. This research application domain is very important and will increase in future as it also offers powerful means for helping and supporting special needs of the elderly and people with disabilities. The system is designed to be low cost and flexible with the increasing variety of devices to be controlled. In this paper presents the way to provide internet connectivity to ARM Controller based embedded systems. This system uses ARM Controller to store the main application source code, web pages and TCP/IP stack which is a vital element of the system software. GPRS module is used to handle the communications and it is interfaced with the ARM Controller using UART protocol. Configurations like IP address and other details are set using RS232 interface.

The app can be viewed on any system with Internet/LAN connection by configuring the specific IP address and by giving User Login ID, password. There are several I/O pins available at the ARM Controller which are used to interface with sensors, LCD displays and relays for monitoring and controlling AC appliances .

## AIM OF THE PROJECT

The main aim the project is to establish a server for Remote Access Terminal using ESP8266 Enabled Embedded Server as main communication protocol from powerful microcontroller.

## EXISTING SYSTEM

In the existing method, we were controlled the electrical appliances and other DC loads from the GPRS message. If we send the predefined message from our phone to the GPRS modem SIM card, then the data was received by the controller via UART port and controlled the loads accordingly. If there is signal problem, then this method was not operating the loads properly. Every time, we need to clear the inbox messages. To overcome these problems, we are implementing the proposed system.

## PROPOSED SYSTEM

In the proposed system, we are sending the commands from the telnet app to the ESP8266 module. The ESP8266 module will receive that command and send to the controller to operate the corresponding load. By this way the user can control the loads from anywhere in the world.

## BLOCK DIAGRAM

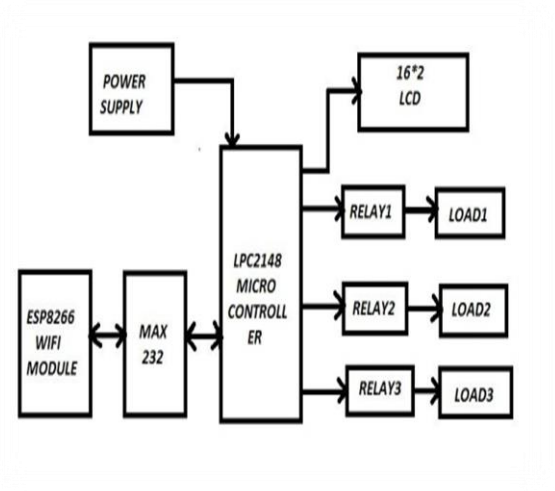



Fig 2.1: Block diagram of proposed system

The LPC2148 microcontrollers are based on a 16-bit/32-bit ARM7TDMI-SCPU with real-time emulation and embedded trace support, that combine the microcontroller with embedded high-speed flash memory ranging from 32 kb to 512 kb. A128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at the maximum clock rate. Serial communications interfaces ranging from a USB 2.0 Full-speed device, multiple UARTs, SPI, SSP to I2C-bus and on-chip SRAM of 8 kb up to 40 kb, make these devices very well suited for communication gateways and protocol converters, soft modems, voice recognition and low end imaging, providing both large buffer size and high processing power. Various 32-bit timers, single or dual 10-bit ADC(s), 10-bit DAC, PWM channels and 45 fast GPIO lines with up to nine edge or level sensitive external interrupt pins make these microcontrollers suitable for industrial control and medical systems

## POWER SUPPLY

The input to the circuit is applied from the regulated power supply. The A.C input i.e., 230V from the mains supply is step down by the transformer to 12V and is fed to a rectifier. The output obtained from the rectifier is a pulsating D.C voltage. So in order to get a pure D.C voltage, the output voltage from the rectifier is fed to a filter to remove any A.C components present even after rectification. Now, this voltage is given to a voltage regulator to obtain a pure constant D.C voltage.

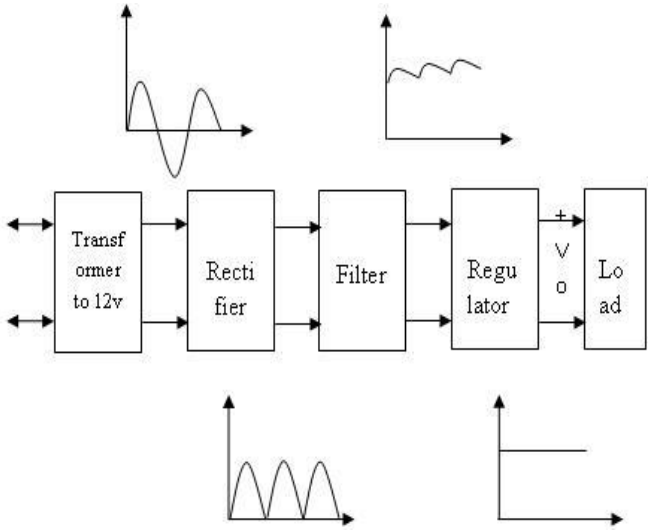



Fig 2.2: Block Diagram of Power Supply

### MAX232

Max232 IC is a specialized circuit which makes standard voltages as required by RS232 standards. This IC provides best noise rejection and very reliable against discharges and short circuits. MAX232 IC chips are commonly referred to as line drivers.


Fig 2.4: MAX232 IC

To ensure data transfer between PC and microcontroller, the baud rate and voltage levels of Microcontroller and PC should be the same. The voltage levels of microcontroller are logic1 and logic 0 i.e., logic 1 is +5V and logic 0 is 0V. But for PC, RS232 voltage levels are considered and they are: logic 1 is taken as -3V to -25V and logic 0 as +3V to +25V. So, in order to equal these voltage levels, MAX232 IC is used. Thus this IC converts RS232 voltage levels to microcontroller voltage levels and vice versa.

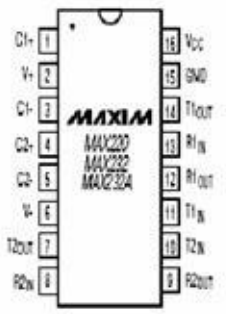



Fig 2.5: MAX232 pin diagram

### 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).

The ARM7TDMI-S is a general purpose 32-bit microcontroller, which offers high performance and very low power consumption. The ARM architecture is based on Reduced Instruction Set Computer (RISC) principles, and the instruction set and related decode mechanism are much simpler than those of micro-programmed Complex Instruction Set Computers. 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.

### 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.

International Journal of Research
Available at https://edupediapublications.org/journals
e-ISSN: 2348-6848
p-ISSN: 2348-795X
Volume 04 Issue 13
October 2017

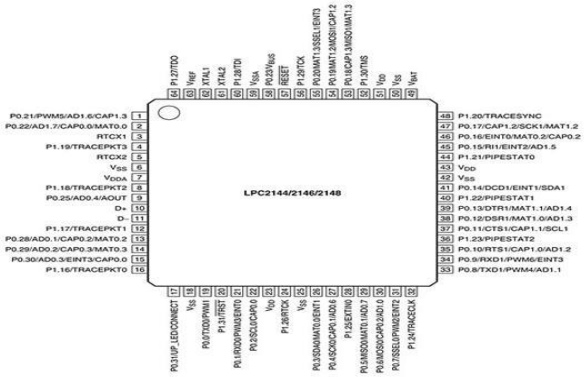



Fig 2.6: Pin Diagram of LPC2148

## Architectural Overview:

The ARM7TDMI-S is a general purpose 32-bit microcontroller, which offers high performance and very low power consumption. The ARM architecture is based on Reduced Instruction Set Computer (RISC) principles, and the instruction set and related decode mechanism are much simpler than those of micro programmed Complex Instruction Set Computers (CISC).

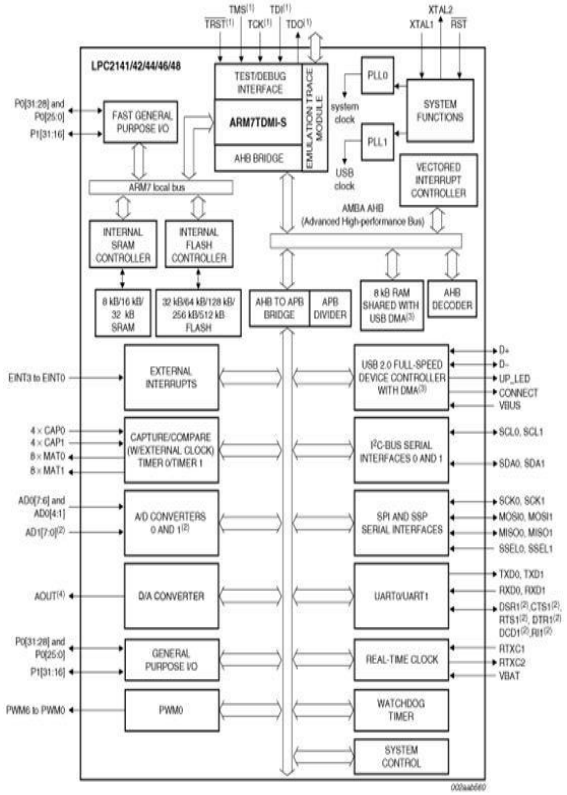



Fig 2.7: Architecture of ARM7 LPC2148

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:

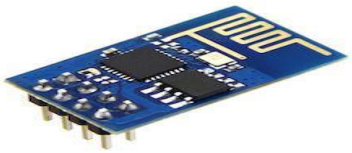
- The standard 32-bit ARM set.
- A 16-bit Thumb set.

The 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.

**ESP8266 WIFI MODULE**



The ESP8266 Wi-Fi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much Wi-Fi-ability as a Wi-Fi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community. This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime. Its high degree of on-chip
integration allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area. The ESP8266 supports APSD for VoIP applications and Bluetooth co-existence interfaces; it contains a self-calibrated RF allowing it to work under all operating conditions, and requires no external RF parts.

## LIQUID CRYSTAL DISPLAY

LCD stands for Liquid Crystal Display. LCD is finding wide spread use replacing LEDs (seven segment LEDs or other multi segment LEDs) because of the following reasons:

1. The declining prices of LCDs.
2. The ability to display numbers, characters and graphics. This is in contrast to LEDs, which are limited to numbers and a few characters.
3. Incorporation of a refreshing controller into the LCD, thereby relieving the CPU of the task of refreshing the LCD. In contrast, the LED must be refreshed by the CPU to keep displaying the data.
4. Ease of programming for characters and graphics.

These components are "specialized" for being used with the microcontrollers, which means that they cannot be activated by standard IC circuits. They are used for writing different messages on a miniature LCD.

A model described here is for its low price and great possibilities most frequently used in practice. It is based on the HD44780 microcontroller (Hitachi) and can display messages in two lines with 16 characters each.

It displays all the alphabets, Greek letters, punctuation marks, mathematical symbols etc. In addition, it is possible to display symbols that user makes up on its own.

Automatic shifting message on display (shift left and right), appearance of the pointer, backlight etc. are considered as useful characteristics.

### LCD screen

International Journal of Research
Available at https://edupediapublications.org/journals
e-ISSN: 2348-6848
p-ISSN: 2348-795X
Volume 04 Issue 13
October 2017

LCD screen shown in figure 3.13 consists of two lines with 16 characters each. Each character consists of 5x7 dot matrix. Contrast on display depends on the power supply voltage and whether messages are displayed in one or two lines. For that reason, variable voltage 0-Vdd is applied on pin marked as Vee. Trimmer potentiometer is usually used for that purpose. Some versions of displays have built in backlight (blue or green diodes).

When used during operating, a resistor for current limitation should be used (like with any LE diode).

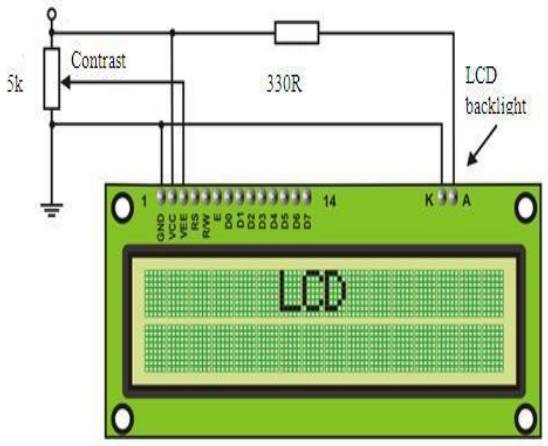
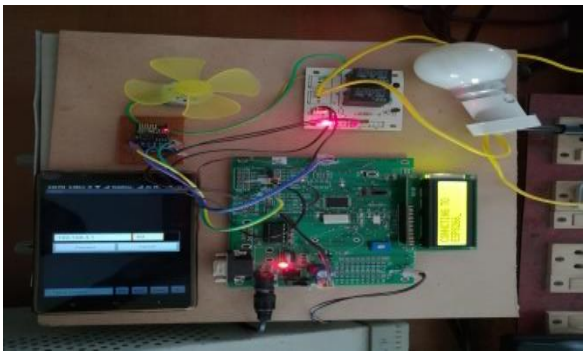
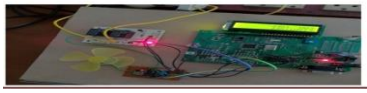



Fig 3.7: LCD connection

In this project we are using ESP8266 WI-FI module ,it I the signal provider to the kit.MAX232 IC is placed between WI-FI module and micro controller ,it is used to make an interaction between WI-FI module and micro controller which are having different voltage levels. Relay is connected to the micro controller which is nothing but an electronic switch ,it switches the loads according to the inputs .Power supply is given to activate the circuit We operate the devices by using telnet app in mobile .Initially ,we have to connect to the WI-FI ,then we should enter the IP address and host name in the mobile and enter the load representation according to the coding and check the loads status whether it is ON or OFF. First these kits are connected to the main supply (230V A.C).then it is step down to 5V d.c supply. 230V A.C supply is given as input to the step down transformer then it is step down that voltage to some 18V A.C supply. Then it is given to the Bridge wave Rectifier. This converts A.C to Pulsating D.C. then this is given to the filter circuit. Here capacitive filter is used. So it converts that pulsating D.C to pure D.C. next this is connected to 7805 regulator. It produces our required 5V D.C supply.

**RESULTS**



## PROPOSED SYSTEM RESULTS

The main aim of this project is to control the electrical appliances from anywhere in the world by using the web server and using the ESP8266 module. Here in this project we are controlling both the AC and DC loads

This method is by using the Wi-Fi module. This ESP8266 module will work with the AT commands. The ESP8266 module is connected to the microcontroller via UART port. After initializing the ESP8266 module then open the predefined links of the web server and send the commands through the links to control the appliances. Then the commands will received by the ESP8266 module and send to the LPC 2148 microcontroller, and that in turn control the loads.

In this project, we are controlling both the AC and the DC loads. For the AC loads, we need TRIAC and the opto-coupler to isolate both the AC and DC section of the controller.

The code was written in the embedded C language and the code was compiled using the KEIL compiler, which will generate the executable hex file. The hex file was dumped into the LPC2148 microcontroller by using the FLASH MAGIC software.

## ADVANTAGES AND APPLICATIONS ADVANTAGES

- Simplicity of the system.
- Accuracy of the system
- Real time monitoring
- From anywhere we can monitor the system
- Reduction in Manual power & Time saving.
- Low cost easy to implement and low power consumption and controlling is done by using web technology.

## APPLICATIONS

- Security applications & Used For lab monitoring system.
- Home applications
- Industrial applications

## CONCLUSION AND FUTURE SCOPE CONCLUSION

. Mobile phone is rapidly involving from a device only communications to a truly portable personal terminal for data communication and networking .Mobile handsets today are essentially handled with integrated mobile radio communication capabilities. With the help of smart phones or computer the devices can be operated according to the wish with complete accuracy .This smart home technology is more efficient and we can operate home appliances at any corner of home. This controlling of devices by android applications reduces the wastage of current flow which is the major problem in now –a-days .It saves time and energy .We can see the status of the devices on the LCD screen.

## FUTURE SCOPE

In future, we can use the Raspberry Pi 3 microprocessor, instead of the LPC2148 microcontroller. The Raspberry Pi 3 microprocessor has in-built Wi-Fi module and there is no need of any other module. Besides that we can also detect the fault loads and inform the user through the web page alert message.

.

**REFERENCE**

[1].JoaqunGutirrez, Juan Francisco Villa-Medina, Alejandra o- Garibay, And Miguel ngelPorta-Gndara, "Automated Irrigation System Using A Wireless Sensor Network And Gprs Module", Ieee Transactions On Instrumentation And Measurement, Vol. 63, No. 1, January 2014.

[2].Vimal.P, Priyanka.V, Rajyasree.M, SanthiyaDevi.P.T, Jagadeeshraja.M, SuthanthiraVanitha.N,"A Novel Approach for Automatic Irrigation and Fertigation Using Embedded System," International Journal of VLSI and Embedded Systems-IjvesVol 05, Article 03257; March 2014

[3].Sathiyabama P, Lakshmi Priya C, Ramesh Sm, Preethi B, Mohanaarasi+ M, "Embedded System Design For Irrigating Field With Different Crops Using Soil Moisture Sensor," International Journal Of Innovative Research In Computer And Communication Engineering Vol. 2, Issue 8, August 2014.

[4].LiaiGao, Meng Zhang, GengChen,"An Intelligent Irrigation System Based On Wireless Sensor Network and Fuzzy Control, "Journal of Networks, Vol. 8, No. 5, May 2013.

[5].K.Prathyusha, M. ChaitanyaSuman,"Design of Embedded Systems for the Automation of Drip Irrigation," International Journal of Application or Innovation in Engineering Management (Ijaiem) Volume 1, Issue 2, October 2012

[6].Orazio Mirabella, Senior Member, IEEE, and M i c he l e Brischetto,"A Wired/Wireless Networking Infrastructure For Greenhouse Management," IEEE Transactions on Instrumentation and Measurement, Vol. 60, No. 2, February 2011

[7].B.Sivakumar, P.Gunasekaran, T.Selvaprabhu, P.Kumaran, D.Anandan, "The Application of Wireless Sensor Network in the Irrigation Area Automatic System", IjctaJan-Feb 2012

[8]. S.MuhammadUmair, R. Usman,"Automation Of Irrigation System Using Ann Based Controller," International Journal Of Electrical Computer Sciences Ijecs-Ijens Vol: 10 No: 02.May2010.

**AUTHORS**

**Mr.Devireddy Venkatarami Reddy**, received the Master of Technology degree in EMBEDDED SYSTEMS from the DR.PAULRAJ ENGINEERING COLLEGE-JNTUH, he received the Bachelor of Engineering degree from S.A. ENGINEERING COLLEGE-ANNA UNIVERSITY. He is currently working as Associate Professor and a Head of the Department of ECE with Madhira Institute of Technology And Sciences, kodad. His interest subjects are Embedded Systems, Microprocessors, Communication Systems, Digital Electronics and etc.

**Mr. T ANJANEYULU**, received the Master of Technology degree in ECE from the MADHIRA INSTITUTE OF TECHNOLOGY AND SCIENCES-JNTUH, he received the Bachelor of Technology degree from MOTHER THERESA INSTITUTE OF SCIENCE AND TECHNOLOGY, JNTUH. He is currently working as assistant professor in the Department of ECE with Madhira Institute of Technology And Sciences, kodad. His interest subjects are EDC, digital communication, Wireless communication and networks and etc.

MD MANSOOR ALI he is pursuing M.Tech in Madhira institute of technology and sciences, Kodad, Nalgonda, Telangana. His interests in embedded systems.