Journal of Science and Technology
ISSN: 2456-5660 Volume 06, Issue 02, March-April 2021

www.jst.org.in *DOI: https://doi.org/10.46243/jst.2021.v6.i2.pp114-117*

Remote Monitoring and Controlling the Industrial Parameters by Ethernet

Y. Rojarani[1], M. Shiva kumar[2], Dr M. Sreedhar Reddy[3]
[1, 2, 3](Electronics and Communication Engineering, MallaReddy College of Engineering, India)
[1]Corresponding Author: roja.yarava@gmail.com

To Cite this Article
Y. Rojarani, M. Shiva kumar Dr M. Sreedhar Reddy[3], "Remote Monitoring and Controlling The Industrial Parameters By Ethernet", Journal of Science and Technology, Vol. 06, Issue 02, March-April 2021, pp114-117

Article Info
Received: 25-12-2020 Revised: 10-03-2021 Accepted: 28-03-2021 Published: 31-03-2021

Abstract: *From last few years Ethernet and embedded are two different paths i.e., Ethernet mainly present in laptops and heavy machines. And here embedded systems are mainly related to certain band in absences of regular program protocols. Now days we are using many Networks in embedded systems for monitoring and controlling the home application as well as industrial devices. This paper creates a simple and reasonable way to access Ethernet in various forms in embedded systems. In this ARM7 micro controller is used to store main source codes, wed site, TCP/IP stack pointers and 28 pin ENC28J60 Ethernet chip and micro controller interconnected with SPI pins. In industrial purpose or in-home appliances many times we need to monitor and control dissimilar parameters using microcontroller. Once we are able to build such kind of interface then it is possible to communicate.*

Keywords*: Ethernet, ARM Processor, TCP/IP, Sensors, Wireless networks, 28-pin ENC28J60 Ethernet adapter chip, SPI pins*

I. Introduction

The ARM is defined as an advanced reduced instruction set computing [RISC] machine which is 32bit reduced instruction set computer (RISC) microcontroller. And mainly this model is used to connect two separate machines to exchange data. Ethernet also one of the standards wired local area networks which is defined as IEEE 802.3. Based on the 32-bit/16-bit ARM7TDMI architecture with integrated floating-point arithmetic the LPC2141/42/44/46/48 is mounted [1]. The LPC2148 microcontroller is designed by Philips (NXP Semiconductor) with several in-built features & peripherals, due to this reason, it will make more reliable as well as the efficient option for an application developer [2].

II. Hardware Implementation

This project includes a number of hardware components i.e., an ARM7 controller, Ethernet controller, temperature sensor, an LDR sensor, a bulb, a dc fan, a relay, etc. The main object of this project is to monitor industrial parameters from a remote web page over the Ethernet input thus this refer as Temperature Sensor and Light Intensity and data is transfer to Ethernet module via. Ethernet cable. This chip shifts the date very high speed via an Ethernet cable. Even from remote areas, our clients can monitor the home application which includes LED light, fans etc., utilizing the network.

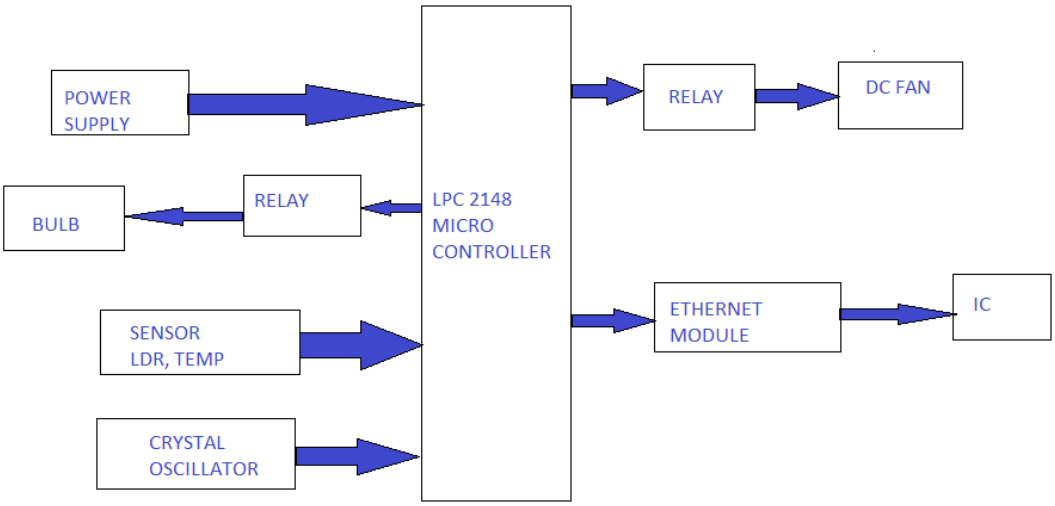

Figure: 1 Overview of Block Diagram

The block diagram of the hardware system is shown in the fig.1. This system consists temperature sensor (LM 35), Ethernet, Relay Control device, LCD and PC. In this, ARM processor is used to control and measure parameters and input port is used to sense the temperature and output port to control the process. Ethernet allows to transfer information in the system. Sensors are used to convert the data one from to another form. A processer LPC2148 is used because of many in-built features and peripherals, this makes it more efficient and reliable choice for a high-end application developer [3].

Ethernet: An Ethernet frame is a piece of data along with the information that is required to transport and deliver that piece of data and the Ethernet frame is defined in the Data link layer [4]. Ethernet frame contains three parts,

1. Ethernet header (Preamble, SFD, Destination, Source, and Type)
2. Encapsulated data (Data and Pad)
3. Ethernet trailer (FCS)

Preamble have7-Bytesand **Start of frame delimiter (SFD) have** 1-Byte i.e., 10101011.Destination Addresshas 6-Byte which contains the MAC address of machine for which data is destined.Source Addressis a 6-Byte field which contains the MAC address of source machine. Length is a 2-Byte field, which specify the length of entire Ethernet frame. Data is the place where actual data is inserted, also known as Payload both the IP header and data will be inserted here if Internet Protocol is used over Ethernet. Cyclic Redundancy Check (CRC)is 4-

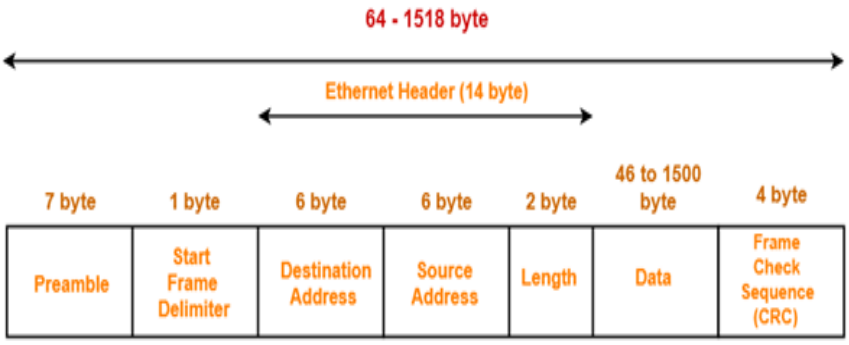

Figure: 2 IEEE 802.3 Ethernet frame format

-Byte Cyclic Redundancy Check (CRC) is 4 Byte field and it contains a 32-bits hash code of data, which is generated over the Destination Address, Source Address, Length, and Data field.

III. Software

In an Ethernet network, the interface to the network is an Ethernet controller chip and its driver. The Ethernet driver contains program code that manages communications between the controller chip and a higher level in the network protocol stack [5]. Here internet communication over the Ethernet, a Transmission Control Protocol/Internet Protocol (TCP/IP) software stack is necessary.

IV. Experimental Results

The main aim of this project is to monitor and control anytime to select ON and OFF the machines by using an Ethernet which is added to the arm7 controller. The temperature sensor is used as the sensor and the LDR-Sensor is used to find the intensity of light in the industry by using the Ethernet. To measure remote areas by using the ON and OFF motors and bulbs and the sensor values, the control behavior of the appliance was displays by IP address in Ethernet pane. Like that, the procedure takes place. This project enables us to remotely obtain data and monitor the Arm7 controller and Ethernet.

Figure3: Display on webpage

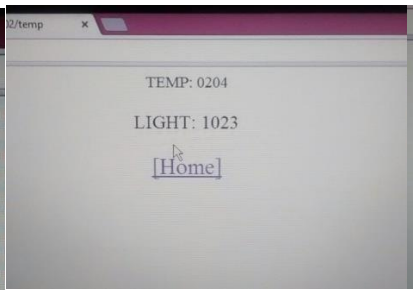

Figure 4: Sensor display

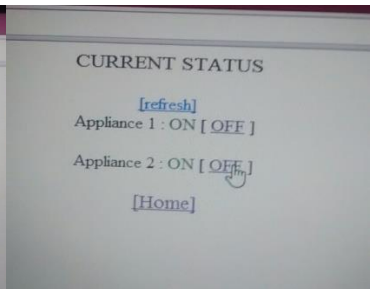

Figure 5: Device is on

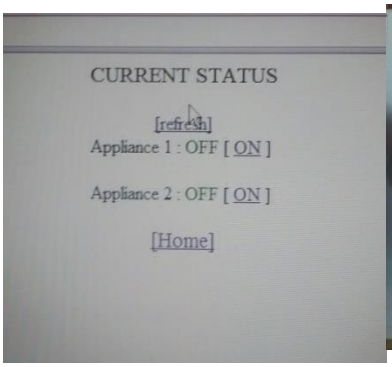

Figure 4: Device is off

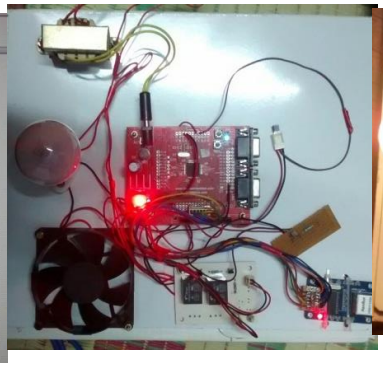

Figure 5: Ethernet Interfacing

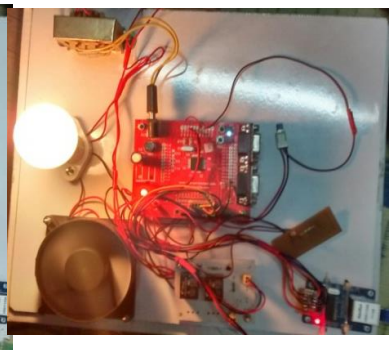

Figure 6: Control Feedback Circuit

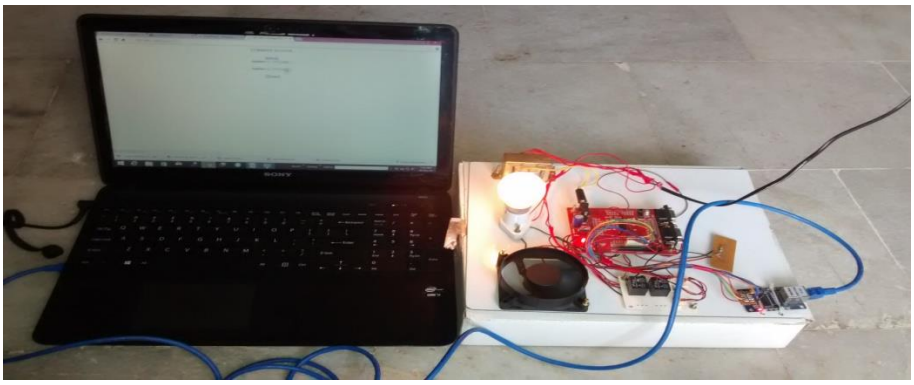

Figure 7: Complete setup with ethernet

V. Conclusion

This project is implemented to monitor industrial parameters with the help of sensors. This paper creates a simple and reasonable way to access Ethernet in various forms in embedded systems. In industrial purpose or in-home appliances many times we need to monitor and control dissimilar parameters using microcontroller. Ethernet provides low cost with high-speed network to access the single users and it provides high performance. If we compare Ethernet with other technologies like Bluetooth, Zigbee, IR, RF-ID and GSM, it has low response time when compare Ethernet but ethernet having very high speed, secure and reliable.

VI. Future Scope

Ethernet-enabled monitoring and control is designed for multitask input and output for industrial purpose as well as non-industrial parameters using ARM. This project may enlarge by using GPRS technology, which helps in sending the data throughout the world. In future, we can focus on industrial automation through internet i.e., it ispossible to access the web page through internet and even able to monitor and control the temperature with a PCs or Laptops.

References

[1]. Jan Axelson, "Embedded Ethernet and Internet Complete", 2003. Microchip Technology Inc. "ENC 28J60 Data Sheet", 2008. Richard H. Barnett, Larry O'CuII, Sarah Cox, "Embedded C
[2]. www.microchip.com
[3]. www.embeddedmarket.com
[4]. http://www.alldatasheet.com
[5]. www.microbuilder.edu/tutorials/LPC 2148.
[6]. Philips semiconductor, "LPC 2142/2146/2138", preliminary datasheet,rev.0.1,JUNE2005.
[7]. Microchip Technology Inc. "ENC 28J60 Data Sheet"'2008.
[8]. Dhananjay patil ,"Industrial Parameter control and monitoring using LAN ",IRNET explore ,7th Oct.2012
[9]. S.A.N. Sandeep, P. Malyadri, **"**ARM-based Embedded
[10]. Ethernet Interface Design Using DAC System,International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 – 8958, Volume-1, Issue-6, August 2012 **.**
[11]. Florin Ravigan, Niculae Boteanu, Adrian Mircea
[12]. Drighiciu, "Ethernet interface for a system of Automation with microcontroller",Annals of the university of Craiova Electrical
[13]. Kumbhar trupti sambhaji, Prof S.B. Patil, " Design of PIC based Ethernet interface to control the industrial parameter", International journa of engineering reasurch and application (IJERA), ISSN: 2248-9622 Vol. 2 Issue 4, July-n Aug 2012 PP 977-979