

Web Based Automatic Irrigation System Using Ethernet Protocol and Cortex M3 Board

Shalini S¹, Dr. S G Hiremath²

M. Tech in LDE, EWIT, Bengaluru, Karnataka¹

Professor and Head of the Dept., ECE, EWIT, Bengaluru, Karnataka²

Abstract: “The irrigation system based on web using Ethernet and LPC1768 cortex M3 panel” has developed to monitoring the parameter like temperature by considering the crop as the main item. Based on the temperature range the water must be provided to the particular crop by controlling the motor to determine that the crop must be maintained properly throughout the period. As when the temperature is high the motor will turn on and the data must be transferred through the Ethernet protocol and the result will be displayed on the web page using the internet. As when the motor is turned on it defines that the temperature or water level is high and it displayed green color on the web page and if it is red in color it means that the motor is turned off. For a particular crop the specific temperature and water level must be given. And the other goal of this project is to reduce the human invocation in the field of agriculture. All this process is done by using the LPC1768 cortex M3 board as a microcontroller.

I. INTRODUCTION

In our project, we briefly discussed about an automation of irrigation system using an Ethernet protocol and cortex M3 embedded board. Here we are using two sensors that are temperature sensor and water level sensors as input and cortex M3 embedded board as a microcontroller and the motor as output. From the earlier days, an agriculture is the all-inclusive leading occupation of all the human being in the world, about 60% of complete presented land is engaged by the agriculture, and it ingests 82 % of

Available renewed water. Thus amount of water intake increases every day by day towards globalization and due to progress of population. Hence it is having a challenge in front of each and every single nation to withstand the replacement food condition and falling the farm aquatic depletion. Farming means it is the practice of dampening the mud. The necessity of rainwater to the dust be contingent on the soil belongings plus the amount of water requirement is likewise hang on upon the yield which breeds in the soil. In the earlier days some of the prevailing organization functioning for sinking the water drinking in the agronomic fields, but these existing systems have some of the limitations. In those existing systems, the irrigating is ready deprived of questioning the belongings of the soil and in line for to which schemes relate non uniform liquid to this particular soil, in which it outcomes in minus harvests. Furthermore earlier organism’s mandatory added social involvement and supplementary ingesting of interval. And hence here we necessitate recent technologies to determination this difficult and to maintenance superior irrigation system. Intended for that we have of the technology called “Web centred automatic irrigation scheme by means of Ethernet protocol and cortex M3 embedded board”. In this electronic programmed watering system framework utilizing Ethernet convention and cortex M3 inserted board venture we will create Ethernet gadget drivers for Cortex-M3 to transmit the checked sensor information to

the web through TCP/IP. The most well-known LAN innovation on the planet is Ethernet. The Ethernet gives an elite systems administration in PC gadgets in each distinctive sorts. In any of the type of Ethernet the CSMA/CD methodology is utilized which are working as a part of half-duplex mode, in this half duplex mode in which transmit and get signs can be sent on the same wire or information way. Transmit and get signs are isolated onto devoted, one-route diverts in a full duplex mode. This kills the requirement for CSMA/CD, since every one of the information is transmitted on a solitary information way which will originate from a solitary gadget. Ethernet parcel is additionally called as edge systems in a wide range of time. Every bit of data is either transmitted or got on an Ethernet system is sent as parcel

II. AUTOMATED IRRIGATION SYSTEM

1) Proposed architecture used for automated irrigation
The main block diagram of the web grounded automatic irrigation system using Ethernet protocol and cortex M3 embedded panel is as shown in the Fig 1.

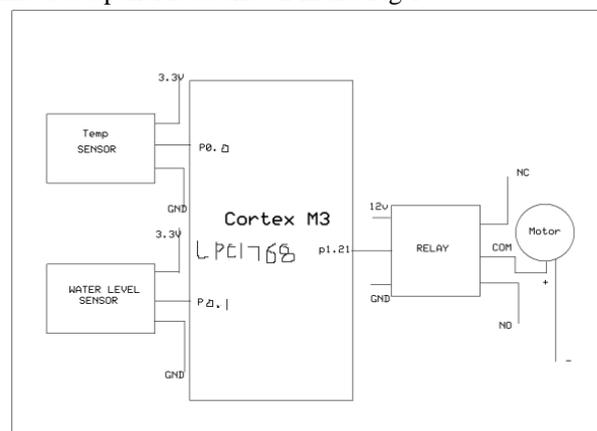


Fig 1: A block diagram of web based automatic irrigation system

From the Fig 1 we can say that the two sensors which are used in our project that are temperature sensor and water level sensor are given as input to the cortex M3 embedded board and the motor is used as output in this project. Here the LM35 IC is used as a temperature sensor and a power supply of 3 volts is applied to it. The relay is used to ON or OFF the DC motor and hence the relay acts as an operating switch. Here we are using a 32 bit cortex M3 controller in which it has an operating speed of 100MHz.

2) Cortex M3

In this project the cortex M3 embedded board used here is LPC1768. The LPC1768 are ARM Cortex-M3 based microcontrollers which are used for embedded applications featuring a high level of integration and the consumption of power is low. The LPC1768 operate at CPU frequencies of up to 100 MHz



Fig 2: LPC1768 cortex M3 embedded board

By utilizing a web program the car watering System can hold the remote observing and support their gear operations through the system. To arrange and execute a Data accomplishment and the framework is controlled utilizing arm cortex M3 implanted board and TCP/IP Ethernet association for some mechanical controlling applications is the fundamental theory of our undertaking. The ongoing simple voltages are changed over into their relating computerized values utilizing the Analog to Digital Conversion pins, and these ADC pins are those which are inbuilt in LPC 1768 Cortex M3 inserted board and through Ethernet convention they are exchange them to the web.

3) The LM35 Temperature Sensor

The LM35 series are precision integrated-circuit temperature sensors, whose voltage which acts as an output is proportional linearly to the Celsius (Centigrade) temperature. The LM35 therefore has an advantage than temperature sensors which are linear calibrated in ° Kelvin, as the user is not required to subtract a constant voltage which is in large amount from its output to obtain appropriate Centigrade scaling. Stumpy rate is guaranteed

in way of garnish in addition to regulation at the near of wafer. Its speed is 100MHz. It has three pins.

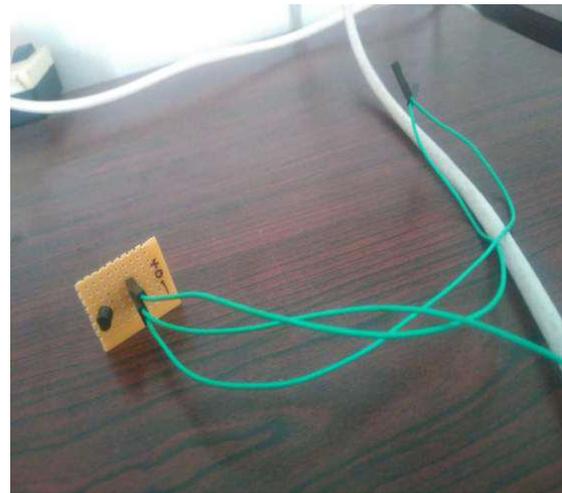


Fig 3: Temperature LM35 sensor

4) Water level sensor

Submersible weight transducer worldwide water's WL400 Sensor of Water level comprises of a weight sensor as strong state epitomized in a submersible stainless steel having a distance across lodging of 13/16". Every single Global Water's weight transducers has a yield of abnormal state yield up to two-wire 4-20 mA, full scales scopes of five in number, and is completely barometric weight repaid and temperature adjusted. To associate the water weight sensor to any of the checking gadget the water level gage utilizes a link called marine evaluation. The considerable reach for measuring a 0-3' territory is streams storm channels in sewers, weirs, tanks or any water body, flumes, lakes that is not as much as most extreme of 3' profound. The marker called water profundity pointer is accessible in full scale scope of least of 0 to greatest of 3' which is perfect for measuring an adjustments in little water levels



Fig 4: Water level sensor

5) Ethernet protocol

In this electronic programmed watering system framework utilizing Ethernet convention and cortex M3 installed board venture we will create Ethernet gadget drivers for

Cortex-M3 to transmit the checked sensor information to the web through TCP/IP. The most prominent LAN innovation on the planet is Ethernet. The Ethernet gives a superior systems administration in PC gadgets in each diverse sorts. In our undertaking this Ethernet convention is utilized to transmit and get the information by utilizing single way or by exchanging and getting the information in the same way. The yield information transmitted through Ethernet into the web program by utilizing the web. In the concept of Ethernet, packet data transmission is one of the key element in which the images, data and even the sound signals are also portioned into small-small units and they are transmitted through network and they must recombine the small data unit into one before the data is received by the computer.



Fig 5: Ethernet transmission packet

III. IMPLEMENTATION TO THE WORK

The below Fig 6 shows the final setup of the hardware devices and the Fig 6 shows the data flow path of the automatic irrigation system. From the Fig 3.18 we can analyse that how the hardware devices are connected each other for the proper working. There are many temperature sensors but here the LM 35 is used as a temperature sensor because its cost is less and this sensor is very much suitable in applications like remote application. This temperature sensor has three pins in which those are connected to Vcc, ground and to an output pin. This sensors display the result in analog form but they can be converted into digital form by using an analog to digital converter. It has default pins like P0.0 from this pin we can select any one to convert the analog output into the digital form. We can give a supply voltage of 3.3 volts to the temperature sensor. This sensor is connected to the cortex M3 embedded board for its operation.



Fig 6: Final setup of the hardware devices

1) Flow Chart

From the flow chart as shown in the Fig 7 we can explain briefly how the data are transferred through the Ethernet protocol to the web page. At first it start the process and the given data must be read and each red data must be transferred through the Ethernet protocol since we are using this Ethernet in our project. As soon as we send the data based on the working of the DC motor that is either it is turned on or turned off, the data must be displayed on the web page. As the main of the project is to reduce the human invocation with the agricultural field here we designing an automatic irrigation system in which the documents are displayed on the web page. The data must be refreshed every second to recover the changed values in the motor. As a data is refreshing for each second the updated value must read again and again it sends through the Ethernet protocol and displayed on the web page and again the data must be refreshed and likewise the process continues

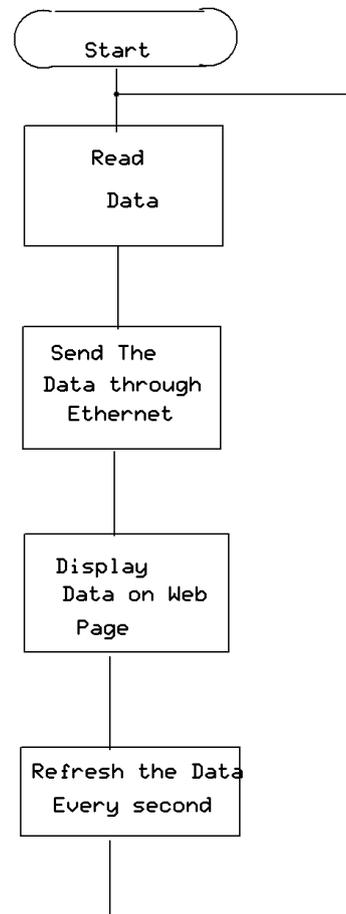


Fig 7: Data flow of the automatic irrigation system

VI. RESULTS AND CONVERSATION

This sector delivers the experimental results of the web based automatic irrigation system. Here the screenshots shows the variation in the temperature level and the water level as there is a change in data values. The page count describes the change of the data foe every second. This proposed automatic irrigation system is programmed using Keil software and outputs are obtained by using a flash magic software

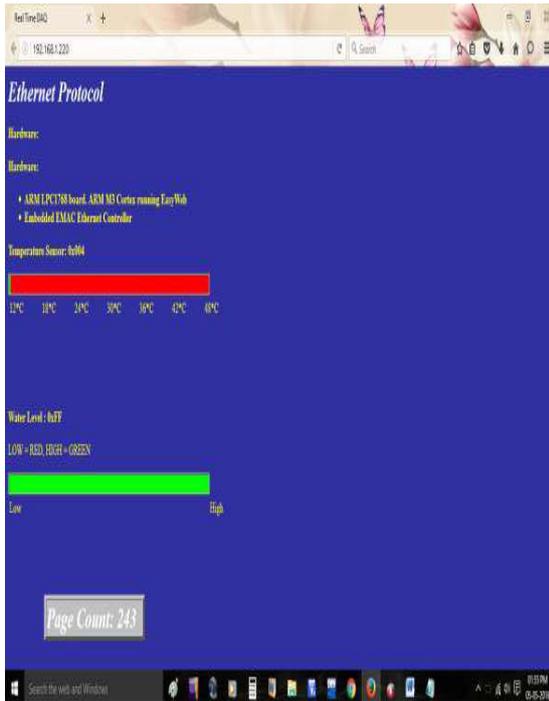


Fig 8: Shows the low temperature and high water level



Fig 10: Shows the medium temperature and low water level

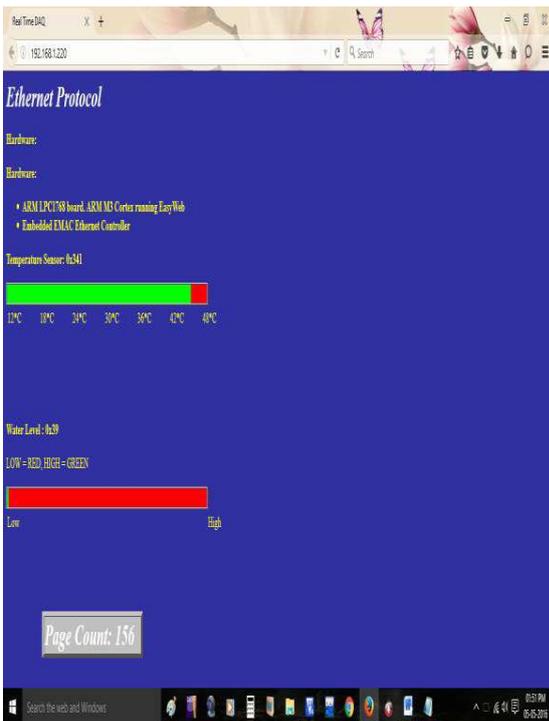


Fig 9: Shows the high temperature and low water level

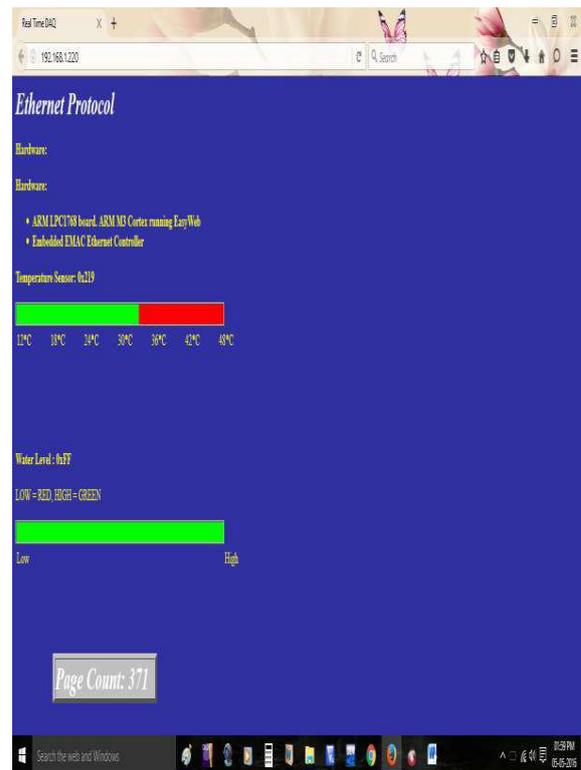


Fig 11: Shows the medium temperature and high water level

Fig 8 shows the low temperature and the high water level it means that when the temperature is low the motor will turn off and hence it is showing red in color. The red color is the indication for low and green is the indication of high. Since the water level is in this fig the output is in green color and here the motor is on condition.

Fig 9 shows the high temperature and the low water level condition. Here for the temperature sensor the DC motor is on since it is high and hence it shows green color and the water level is red in color because of its low level and hence here the motor is in off situation.

Likewise the Fig 10 and Fig 11 shows the medium temperature level and the low water level and medium temperature and the high water level respectively. As explained in the above steps the green is the indication for high and red is the indication for low. The page count counts how many times the values are changing according to the data's.

IV. CONCLUSION

In this project, can conclude that by keeping the crop as a main thing we can varies the value of the temperature and water level by sending the data through the Ethernet and display the result in the web page and hence it reduce the human invocation by controlling the motor in order to define the temperature and water level that is that motor must be turn on when the temperature is high and it turned off when it is low by using the switching operators like relays. By monitoring the temperature and the water level we can maintain the crop properly throughout the period.

REFERENCES

- [1] "Web based Automatic Irrigation System using Wireless sensor network and Embedded Linux board" by Pandurang H. Tarange, Electronics Department, Walchand College of Engineering, Sangli, India. Rajan G. Mevekari, Electronics Department, Walchand College of Engineering, Sangli, India. Prashant A. Shinde, Electronics Department, Walchand College of Engineering, Sangli, India which is submitted to International Conference on Circuit, Power and Computing Technologies [ICCPCT] in the year 2015.
- [2] Joaquín Gutiérrez, Juan Francisco Villa-Medina, Alejandra Nieto-Garibay, and Miguel Ángel Porta-Gándara in the paper "Automated Irrigation System Using a Wireless Sensor Network and GPRS Module" in 2013.
- [3] "Automated Irrigation System in Agriculture Using Wireless Sensor Technology", International Jthisnal of Advanced Research in Electrical, Electronics and Instrumentation Engineering (An ISO 3297: 2007 Certified Organization) Vol. 3, Issue 12, December 2014.
- [4] International Jthisnal of Soft Computing and Engineering (IJSCE) ISSN: 2231-2307, Volume-3, Issue-1, March 2013 324, "Control of Irrigation Automatically By Using Wireless Sensor Network" by Rashid Hussain, JL Sahgal, Anshulgangwar, Md.Riyaj.
- [5] Zhang Feng, "Research on water-saving irrigation automatic control system based on internet of things," Electric Information and Control Engineering (ICEICE), 2011 International Conference on , vol., no., pp.2541,2544, 15-17 April 2011.
- [6] Yunseop Kim; Evans, R.G.; Iversen, W.M., "Remote Sensing and Control of an Irrigation System Using a Distributed Wireless Sensor Network," Instrumentation and Measurement, IEEE Transactions on, vol.57, no.7, pp.1379, 1387, July 2008.
- [7] S. L. Davis and M. D. Dukes, "Irrigation scheduling performance by evapotranspiration-based controllers," *Agricult. Water Manag.*, vol. 98, no. 1, pp. 19–28, Dec. 2010.
- [8] C. Gomez and J. Paradells, "Wireless home automation networks: A survey of architectures and technologies," *IEEE Commun. Mag.*, vol. 48, no. 6, pp. 92–101, Jun. 2010.
- [9] Yan Xijun; Lu Limei; Xu Lizhong, "The Application of Wireless Sensor Network in the Irrigation Area Automatic System," *Networks Security, Wireless Communications and Trusted Computing*, 2009. NSWCTC '09. International Conference on, vol.1, no., pp.21, 24, 25-26 April 2009.
- [10] Rani, M.U.; Kamalesh, S., "Web based service to monitor automatic irrigation system for the agriculture field using sensors," *Advances in Electrical Engineering (ICAEE)*, 2014 International Conference on , vol., no., pp.1, 5, 9-11 Jan. 2014.
- [11] LM35 Datasheet, <http://www.ti.com>.