RTC Based Farm Automation

Mr. Vaibhav A. Pawar[1] Miss. Vishranti B. Shingan[2] Miss Smita A. Shinde[3] Miss. Poonam K. Jadhav[4]

[1]Assistant Professor [2,3,4]U.G Student

[1,2,3,4]Department of Electronics & Telecommunication Engineering

[1,2,3,4]Dr. Daulatrao Aher college of Engineering, Karad Dist- Satara; Maharashtra, India

Abstract— The motivation for this project came from countries where economy is depend on agriculture and climatic conditions lead to lack of rains. The key objective of this project is to report on a developed indigenous low cost time based microcontroller based irrigation scheduler who performs user defined functions and output commands to derive appropriate actuators (relay, solenoids valves, motor). In the present work microcontroller based controlled irrigation system is developed for the agriculture. Irrigation system controls valves by using automated solenoids valves to turn ON and OFF, the main gate valves for specified time. The system is based on microcontroller RTC DS1307, Solenoids valve.

Key words: Microcontroller, Irrigation, Timer, Fertilizer, Solenoids Valve, Fountain Pump

I. INTRODUCTION

In today's life, everyone gives importance to time. Time does not wait for anybody. Everything should be performed in time. In world, the agriculture plays very important role in the economy and development of the country. We are experiencing a growing interest in the field of agriculture using the latest technologies. The continuous increase in population of India the food requires the rapid improvement in food production technology. In a country like India, Where the economy is mainly based on agricultural. For agriculture, the main reason is the lack of rains. Another very important reason of this is due to unplanned use of water, due to which a some amount of water goes waste. In the modern irrigation systems, the most significant advantage is that water is supply near the root zone of the plants drip by drip due to which a large quantity of water is saved. At the present area, the farmers have been using irrigation technique in India through the manual control in which the farmers irrigates the land at regular intervals. This process sometimes consumes more water or sometimes the water reaches late due to which the crops get dried. Water deficiency can be detrimental to plants before visible wilting occurs. Slowed growth rate, lighter weight fruit follows slight water deficiency. This problem can be perfectly rectified if we use RTC Based Farm Automation System in which the irrigation will take place when there will be intense requirement of water. Irrigation system use valves to turn irrigation ON and OFF. This valve may be easily automated by using controllers and solenoids. Automatic farm or nursery irrigation allows farms to apply the right amount of water at right time, regardless of the availability of labour to turn valves ON and OFF. In addition, farmer using automation equipment are able to reduce runoff from over watering saturated soils, avoid irrigating at the wrong time of day, which will improve crop performance by ensuring adequate water and fertilizer when needed. RTC Based Farm Automation is a valuable tool for irrigation. Now a day's fertilization in farm is manual. Hence there is big question of accuracy. Also there is necessity of man power and money. Hence here we should use automatic control system, which saves our man power and money and also highest accuracy. [1].

II. EXPERIMENTAL WORK

In last few decades, electronics and telecommunication have become an integral part of our lives, always expanding into realms, to provide ways to do things in precise manner. In this paper, we present a automatic irrigation system along with water usage monitoring. This paper describes the design and implementation control for an irrigation system .An automated irrigation system was developed to optimize water use for agricultural crops. Actually, automated irrigations have been around since the mid of the 20th century. The early controllers were basically simple timers and switches used to turn ON the irrigation for a predetermined period of time. [2], [3]. In this system we use switches for incrementing and decrementing min, sec and hours in BCD that is decimal, and reset switch is used to reset the system. Microcontroller AT89C51 it is a high CMOS 8-bit microcontroller 4K bytes of flash programmable Erasable Read Only Memory (PEROM). AT89C51 is a powerful microcontroller, which provides a highly flexible and cost effective solution .So many embedded control application. Full system and program codes were implemented to verify system operation.

III. IMPLEMENTATION DETAILS

– Hardware Description:

To understand the circuit operation we will divide the hardware into 3 sections.

1) CPU Board
2) Input Board
3) Output Board

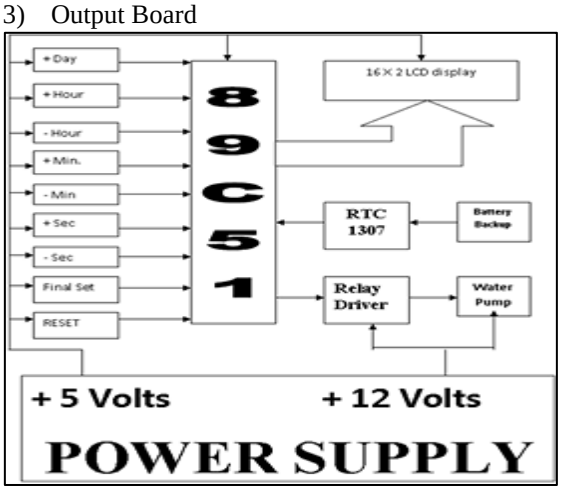

Fig. 1: Block Diagram

A. CPU Board Designing:

In our project we are using 89C51 microcontroller as CPU. 89C51 microcontroller requires some extra supporting hardware like +5 volts power supply, POR as well as manual RESET,Clock generator, pull up resisters and LCD display.

1) Power Supply:

For getting +5 volts supply,first 230 Vac suppy is converted into 12 Vac by using step down transformer. This 12 Vac supply is given to bridge WO4. The output of the bridge is pulsating dc voltage therefore we are using 1000 Uf/25V filter. The output of the filter is +12 Vdc. But microcontroller requires +5 Vdc. For this purpose we have to use IC 7805. The minimum input to 7805 is +7 Vdc and Maximum input is + 35 Vdc. And we are giving +12 Vdc as input to the 7805. Therefore the output of the 7805 is constant regulated +5 Vdc.

2) POR and Manual RESET:

When we switch ON the power supply of the CPU board then microcontroller must be RESET to start the program execution from 0000H memory location. Therefore POR is must. POR means Power ON Reset. For this purpose we have to use RC differentiator circuit. RC differentiator circuit will provide logic High pulse to RESET pin of 89C51, when you switch ON the power supply.Some times we requires manual RESET. For this purpose one push to ON tact switch is used. When you press this tact switch then logic high signal is given to the RESET pin of the Microcontroller 89C51.

Fig. 2: Circuit Board

3) Clock Generator:

The maximum clock frequency of the Microcontroller 89C51 is 24 MHz. Therefore we can use any frequency less than 24MHz. In our project we had used 12 MHz, crystal. Now just connecting the crystal is not sufficient to generate the clock, it requires two additional capacitors to generate the starting spike pulse.

4) External Pull up Resister:

In micro-controller port 0 does not have internal pull up resister therefore we have to use the external pull up resister at port 0. At other ports external pull up resistor is optional.

5) LCD Display:

In our project to monitor the clock status, and some project parameter we require LCD display. The disadvantage of LCD is it will not emit the light. Therefore to remove this disadvantage we have to select the LCD, which has backlight LED. Two lines are sufficient for our project. Therefore we can select 2 line 16 character LCD displays.

6) RTC 1307 and Battery Backup:

The DS1307 Serial Real Time Clock is a low power, full BCD clock/calendar plus 56 bytes of non-volatile SRAM. Address and data are transferred serially via a 2–wire bi–directional bus. The clock/calendar provides seconds, minutes, hours, day, date, month, and year information. The end of the month date is automatically adjusted for months with less than 31 days, including corrections for leap year. The clock operates in either the 24–hour or 12–hour format with AM/PM indicator. The DS1307 has a built–in power sense circuit which detects power failures and automatically switches to the battery supply.

B. Input Board:

Input board means the time setting switches. These switches are used to enter the clock settings, ON time and OFF time set points for particular zone. These are normally pushed to ON switches. When these buttons are not pressed then they are open and give logic 1 to 89C51 and when these buttons are pressed then these buttons are closed, and give logic 0 to 89C51.

C. Output Board:

In our project we are using ON-OFF control mode. A relay for each line acts as a switch. For driving the relay we are using following circuit. If input is zero volts then transistor is OFF and NO terminal remains NO therefore the device connected at NO terminals is also OFF. If input is +5 Volts then transistor is ON and NO terminal becomes NC therefore the device connected at NO terminals turns ON. The electric supply is given to output terminals of the relay.

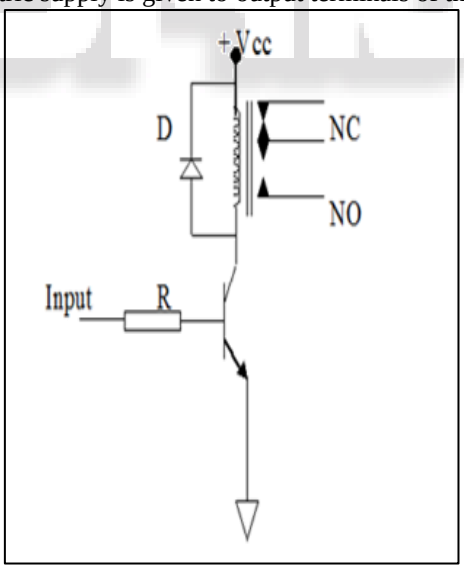

Fig. 3: Relay

IV. RESULT

Following table represents full operation of the project. In that we assume one hour equal to one minute and total operation is for six minutes. Here we used pumps P1 and P2 for water and liquid fertilizer respectively. From each valve V1,V2,V3 water supply is provided for 2 minute. In that after 1:30 minute, for 15 seconds liquid fertilizer is provided and for remaining 15 seconds the water supply will continued.

Sr. No.	Demo time	Real time	P1	P2	V1	V2	V3
1	XX:00	6:00	ON	OFF	ON	OFF	OFF
2	XX+1:30	7:30	ON	ON	ON	OFF	OFF
3	XX+1:45	7:45	ON	OFF	ON	OFF	OFF
4	XX+2:00	8:00	ON	OFF	OFF	ON	OFF
5	XX+3:30	9:30	ON	ON	OFF	ON	OFF
6	XX+3:45	9:45	ON	OFF	OFF	ON	OFF
7	XX+4:00	10:00	ON	OFF	OFF	OFF	ON
8	XX+5:30	11:30	ON	ON	OFF	OFF	ON
9	XX+5:45	11:45	ON	OFF	OFF	OFF	ON
10	XX+6:00	12:00	OFF	OFF	OFF	OFF	OFF
11	XX+12:00	18:00	ON	OFF	ON	OFF	OFF
12	XX+13:30	19:30	ON	ON	ON	OFF	OFF
13	XX+13:45	19:45	ON	OFF	ON	OFF	OFF
14	XX+14:00	20:00	ON	OFF	OFF	ON	OFF
15	XX+15:30	21:30	ON	ON	OFF	ON	OFF
16	XX+15:45	21:45	ON	OFF	OFF	ON	OFF
17	XX+16:00	22:00	ON	OFF	OFF	OFF	ON
18	XX+17:30	23:30	ON	ON	OFF	OFF	ON
19	XX+17:45	23:45	ON	OFF	OFF	OFF	ON
20	XX+18:00	0:00	OFF	OFF	OFF	OFF	OFF

Table 1: Operation of Project

V. Conclusion

The RTC Based Farm Automation system proves to be a real time feedback control system which monitors and controls all the activities of irrigation system efficiently. Microcontroller based Public Garden Automation system is simple and easy. In this system various applications like gate, water pump, light etc are turned ON and OFF for the predefined time. The present proposal is a model to modernize the agriculture industries at a mass scale with optimum expenditure. Using this system, one can save manpower, water to improve production and ultimately high profit.

VI. Acknowledgement

We are using this opportunity to express our gratitude to everyone who supported me for writing this review paper. We are thankful for their guidance and invaluably advice during this work. We are sincerely grateful to them for sharing their truthful and illuminating views on a number of issues related to this paper.

We express our warm thanks to Prof. Vaibhav P. Pawar, Prof. Krushnat U. Jadhav and Prof. Prakash J. Chorage for his support and guidance at Department of Electronics and telecommunication Engineering; Dr. Daulatrao Aher College of Engineering, Karad 415114; Maharashtra, India.

References

[1] Design of Embedded System for Drip Irrigation Automation. Jyothipriya. A. N.*, Dr. T. P. Sarvanabava**. International Journal of Engineering Science Invention. ISSN (Online):2319-6734, ISSN(Print):2319-6726. www.ijesi.org. Volume 2. Issue 4. April 2013. PP. 34-37.

[2] Microcontroller Based Closed Loop Automatic Irrigation System. Neelam R. Prakash, Dilip Kumar, Tejender Sheoran. International Journal of Innovative Technology and Exploring Engineering(IJTEE). ISSN: 2278-3075, Volume I, Issue-I, June 2012.

[3] PC Based Automation of a Multimode Control for an Irrigation System. Azzouz Benzekri. University of Bournerdes, Algeria. Kamal Meghriche. University of Vesailles S-Q, France. Larbi Refoufi. University of Bournerdes, Algeria.

[4] Automatic Irrigation System Using Microcontroller. Prathap Krishnamoorthy, Harshit Verma, Mohit Jain, Meeta Rathore. Electronics and communication engineering, SRM university. NCR Campus, Modinagar.

[5] Automated Irrigation System Using a Wireless Sensor Network and GPRS Module. Joaquin Gutierrez, Juan Francisco, and Miguel Angel Porta-Gandara. IEEE TRANSACTIONS ON INSTRUMENTION AND MEASUREMENT.

[6] Embedded Controlled Drip Irrigation System. Mr. S.G. Galande, Dr. G.H. Agrawal. International Journal of Emerging Trends & Technology in Computer Science (IJETTCS). Volume 2, Issue 5, September-October 2013. ISSN 2278-6856.

[7] Embedded based Remote Control Application using Mobile Phone in Irrigation. S. Sumeetha, D. Sharmila. International Journal of Power Control Signal and Computation (IJPCSC). Vol.3. No.1. Jan-Mar 2012. ISSN: 0976-268X.

[8] Microcontroller based Controlled Irrigation System for Plantation. S.R. Kumbhar, Arjun P. Ghatule. Proceedings of the International MultiConference of Engineers and Computer Scientists 2013. Vol. II, IMECS 2013, March 13-15, 2013, Hong Kong.

[9] Automatic Control of Drip Irrigation System & Monitoring Of Soil by Wireless. Aniket H. Hade, Dr. M.K. Sengupta. IOSR Journal of Agriculture

and Veterinary Science (IOSR-JAVS). E-ISSN: 2319, 23-80, p-ISSN:2319-2372. Volume 7, Issue 4. Ver. III(aor. 2014), PP 57-61.

[10] An Automated System for Irrigation and Frost Protection. Mohammad Alzorgan, Abdel Rahman Alzorgan, Ahmad Aljaafreh. Journals of Ubiquitous Systems & Pervasive Networks. Volume 3, No.1 (2011) pp. 13-17.

[11] Design and Implementation of Real Time Irrigation System Network. Chaitali R. Fule, Pranjali K. Awachat. International Journal of Advance Research in Computer Science and Management studies. Volume 2, Issue 1, January 2014. ISSN:2321-7782(Online).

[12] Water Saving-Irrigation Automatic Agriculture Controller. Pranita A. Bhosale, Prof. V.V.Dixit. INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH VOLUME 1, ISSUE 11, DECEMBER 2012. ISSN: 2277-8616.

