Smart Irrigation System in Green Houses using 8051

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***Abstract* - Today we live in such a fast world that even single minute is important for us. We had seen our ancestors working in fields for hours to get their basic needs .Today the word modernization has replaced almost all the ancestral practices like ploughing with bulls with mighty tractors which could do ploughing work several times easier and even quicker. We had reached such a point in century where the old saying "slow and steady wins the race" has now turned into "fast and reliable brings the change". Today we introduce a new technology in the field of irrigation "Smart irrigation practices in green houses" which mainly depends on the glass house temperature. We intend here to use 8051 micro controller for making cost effective product.**

Keywords: 8051, automation in irrigation system, green house, smart irrigation system.

I.INTRODUCTION

8051 Microcontroller is a cost effective system which can be easily coded in embedded C. Microcontroller is a 8-bit processor which contains 40 pin DIP (Dual Inline Package)[1]. This project uses fully automated system which has been coded to work in accordance with temperature. Some plants need specific temperature and environment condition to get maximum yield from it. So farmers prefer growing some plants in temperature controlled area like green houses. This prototype will automatically cools the temperature by running the exhaust fan and also water cooling method. This method can help the farmers who stay away from the field. It reduces lot of labor work and time. It also reduces over irrigation and saves water. Agriculture system needs accurate monitoring system. The temperature sensors continuously sense the temperature of environment when temperature is higher than the required temperature. It drives the exhaust fan. If temperature is still higher it drives the suction pump and cools the temperature. When temperature is cooled it automatically stops the exhaust fan and pump.

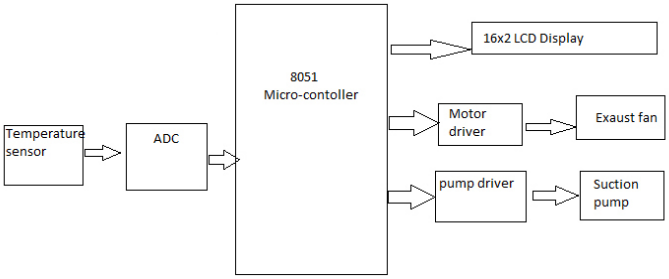
II. PREVOIUS WORK

The previous work[5] was done to check temperature and humidity and displayed in LCD screen and GSM module interfacing to convey atmospheric conditions in the field through SMS system. Much work regarding automations in irrigation system are not done using microcontroller.

III.WORKING PRINCIPLE

Continuously monitors temperature : Different crops requires different temperature to get maximum yield so inside the green house our system continuously checks the temperature and monitors for the required conditions by driving the pump and exhaust fans. The temperature sensed will be continuously displayed on the LCD screen from the microcontroller.

IV BLOCK DIAGRAM:



Fig(1)

The fig(1) shows the interfacing of microcontroller with other IC's. ADC converts analog signals into digital signals as 8051 does not support analog inputs. Microcontroller gives digital outputs for respective drivers and LCD display.

V.SOFTWARES REQUIRED:

Kiel micro vision 3[2] for writing embedded C program. Kiel is a cross compiler. Keil development tools for the 8051 microcontroller architecture support every level of software developer from the professional applications engineer to the student just learning about embedded software development. When starting a new project, simply select the microcontroller you use from the Device Database and the µVision IDE sets all compiler, assembler, linker, and memory options. Flash magic for dumping the program. Flash magic is software[3] to burn the hex code to the 8051 microcontroller on chip using COM port and DB9 connector and RS232. We used Proteus[4] for simulating the code on software. We get all the real time ICs to interface and to check the results.

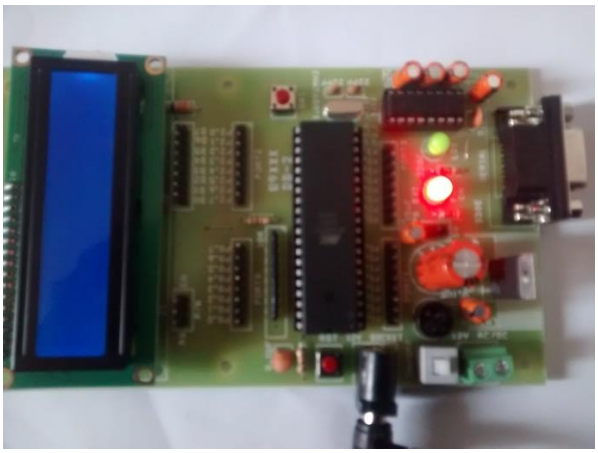
VI. FUNCTION TABLE:

Sl No	Temperature	Exhaust motor	Suction Pump
01	Less than 25	Off	Off
02	Between 25 to 30	On	Off
03	Greater than 30	On	On

Table(1):

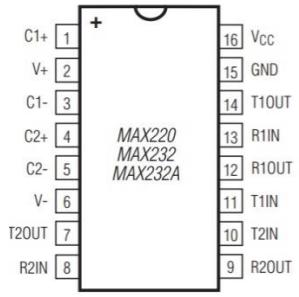
Our system even supports the manual operation it is not only fully programmed. Owner can use the switch to change the control from automatic to manual mode.

VII. DETAILS OF HARDWARE USED:



Fig(2)

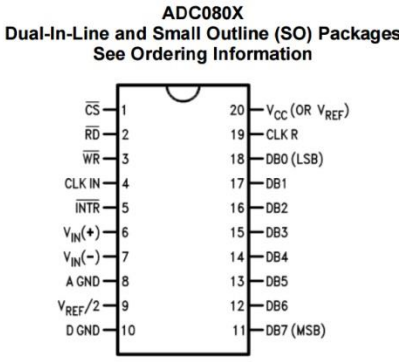
8051 Microcontroller board: The 8051 board is the central processing unit of this system. The code is burnt to the microcontroller using flash magic with help of RS232 cable MAX232 IC. 16x2 LCD display has been soldered and IC MAX232 has been connected. This 8051 IC controls all other IC's and components.MAX232[7] converts from RS232[7] voltage levels to TTL voltage levels and vice-versa. It uses +5v power source that is used for source voltage for 8051.Therefore no need of dual supply for 8051 and MAX232. It has 2 sets of line drivers for transferring and receiving data.



Fig(3)

ADC 0804[8]:

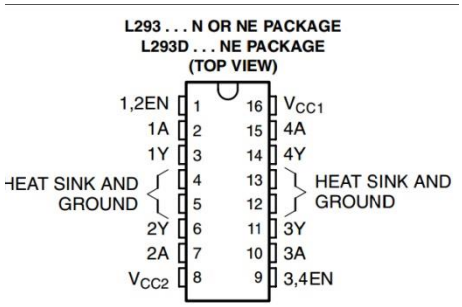
ADC 0804 is a 20pin IC .The speed at which an analog input is converted into digital output is higher. ADC0804 is an 8bit parallel ADC in the family of the ADC0800 series from National Semi-conductor. It works with +5V and has resolution of 8bits in his ADC the conversion time varies depending on the clocking signals applied to the CLKIN pin and it cannot be faster than 110us.



Fig(4)

L293D motor drivers[7]:

The L293D is quadruple high-current half-H driver. The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. This device are designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-supply applications. All inputs are TTL compatible. Each output is a complete totem-pole drive circuit, with a Darlington transistor sink and a pseudo Darlington source. Drivers are enabled in pairs, with drivers 1 and 2 enabled by 1,2EN and drivers 3 and 4 enabled by 3,4EN. When an enable input is high, the associated drivers are enabled, and their outputs are active and in phase with their inputs. When the enable input is low, those drivers are disabled, and their outputs are off and in the high-impedance state. With the proper data inputs, each pair of drivers forms a full-H (or bridge) reversible drive suitable for solenoid or motor applications.



Fig(5)

Function Table:

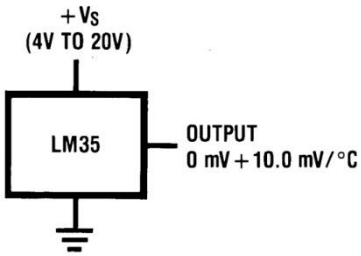
(each driver)

INPUTS†		OUTPUT
A	EN	Y
H	H	H
L	H	L
X	L	Z

H = high level, L = low level, X = irrelevant,
Z = high impedance (off)
† In the thermal shutdown mode, the output is in the high-impedance state, regardless of the input levels.

Table(2)

LM35 temperature sensor[7]:
The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ˚ Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1⁄4˚C at room temperature and ±3⁄4˚C over a full −55 to +150˚C temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. As it draws only 60 µA from its supply, it has very low self-heating, less than 0.1˚C in still air. The LM35 is rated to operate over a −55˚ to +150˚C temperature range, while the LM35C is rated for a −40˚ to +110˚C range (−10˚ with improved accuracy).



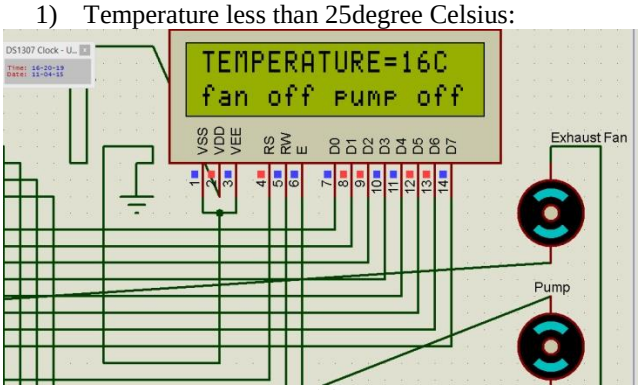
Basic Centigrade Temperature Sensor (+2˚C to +150˚C)

Fig(6)

VIII. RESULTS

The real time simulation is done in proteous for different temperature conditions. The program is dumped into the micro controller in the proteous software by sending the created .hex file. The result can be verified at three different conditions.

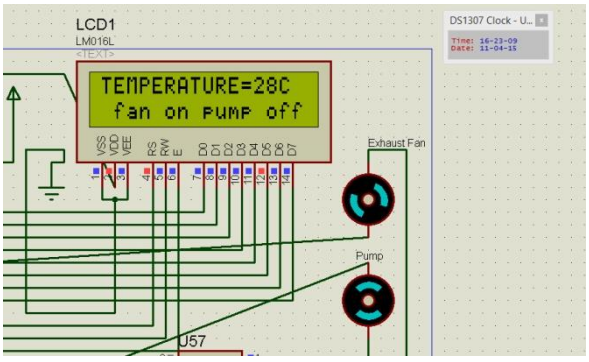
1) Temperature less than 25degree Celsius:



Fig(7)

We can observe from LCD that at temperature 16 degree Celsius (less than 25 degree Celsius) both pump and exhaust fan are OFF.

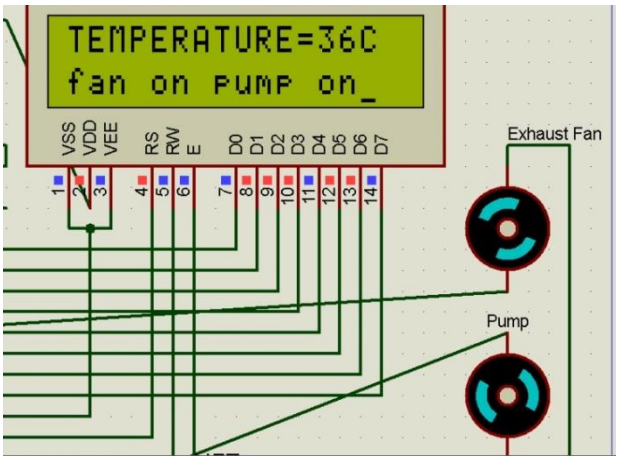
2) Temperature between 25 and 30 degree Celsius:



Fig(8)

We can observe from LCD that at temperature 28 degree Celsius (between 25 and 30 degree Celsius) exhaust fan is ON and pump is OFF. We can observe the position of motor.

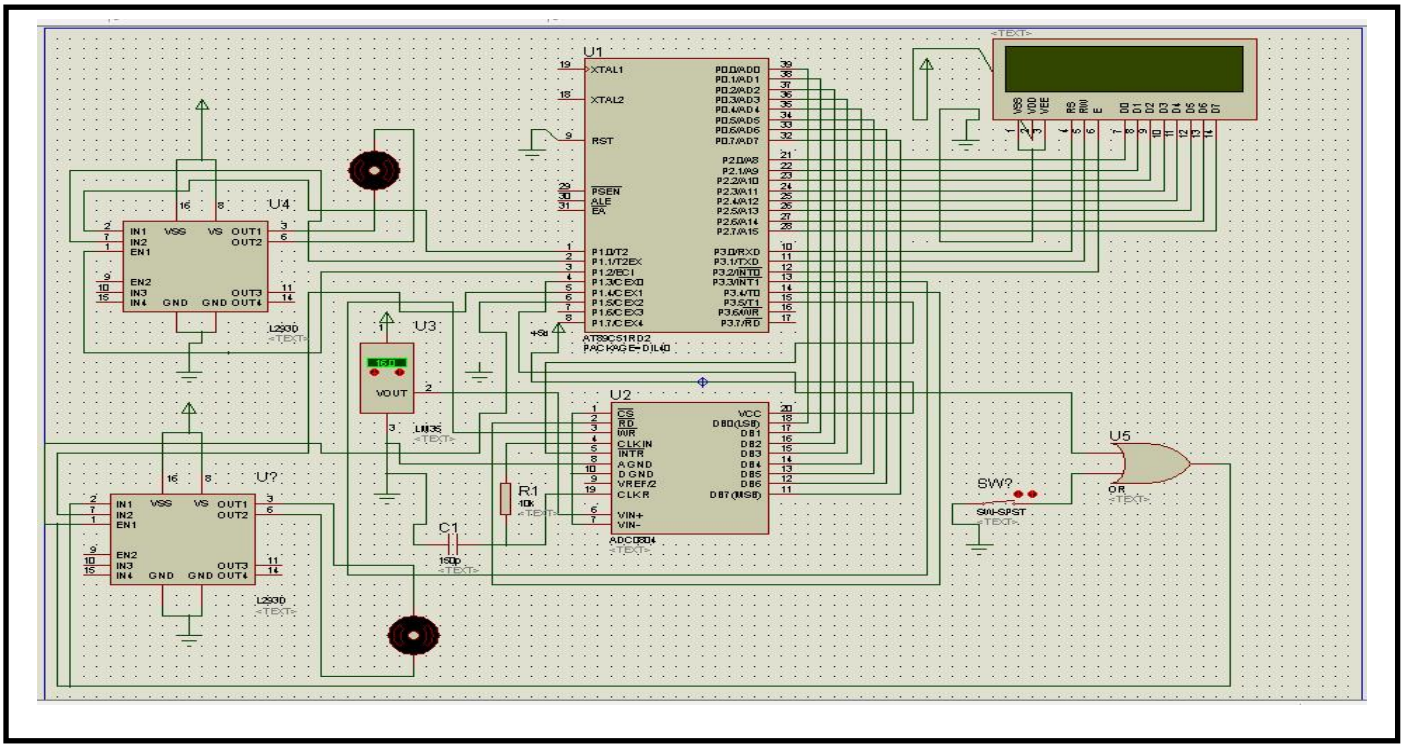
3) Temperature greater than 30 degree Celsius:



Fig(9)

We can observe from LCD that at temperature 36 degree Celsius (above 30 degree Celsius) both exhaust fan and pump are ON. We can observe the position of motor.

IX. PROPOSED CIRCUIT:



Fig(10)

The above circuit diagram shows the proposed circuit for the prototype we designed.

X.CONCLUSION:

We incorporated interfacing method, to interact with the necessary components, of 8051.From the above obtained results we can conclude that the smart irrigation system using 8051 microcontroller we can improvise from manual labor work into a smart automatic system which makes work easier and quicker. Also the system is economic, reliable and efficient. Even the manual operation of the system is possible. The above mentioned topic finds its main application in domestic practice of irrigation system.

XI. FUTURE DEVELOPMENTS

This is just a prototype. Its applications can be very widely used. Some of the best methods of improvising this project are:

Interfacing duplex GSM to this microcontroller the code can be written in embedded C so that if the owner sends the request from his GSM sim, the GSM module which is interfaced should send a message to that number regarding temperature. We can interface humidity sensor to this prototype so that it should sense the air humidity and control the suction pump. Water level indicators can be introduced to microcontrollers so that owner can keep track on available water source. As microcontroller needs only 12V supply solar energy can be used instead of power supply.

XII .REFERENCES:

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