International Journal of Latest Research in Engineering and Technology (IJLRET)
ISSN: 2454-5031
www.ijlret.com ǁ PP. 91-96

MONITOR AND REGULATE SYSTEM FOR GREENHOUSE, SERICULTURE AND POULTRY FARM

H.S Laxmisagar[1], Venkatarama reddy R[2], Mahmed pasha E[2], Ambuja M[2], Vivek C Mouli[2]

B.M.S. Institute of technology and management
Dodballapur main road, yelahanka, Bangalore, Karnataka, India
Sagar8.hs@gmail.com

Abstract: Monitoring and control of greenhouse, sericulture and poultry farm, environment play an important role in these production and management. To monitor the environment parameters effectively, it is necessary to design a measurement and control system. The objective of this project is to design a simple, easy to install, microcontroller-based circuit to monitor and record the values of temperature, humidity, soil moisture and sunlight of the natural environment that are continuously modified and controlled in order optimize them to achieve maximum growth and yield. The controller used to communicates with the various sensor modules in real-time in order to control the light, aeration and drainage process efficiently inside farming houses by actuating a cooler, heater, dripper and lights respectively according to the necessary condition of the crops. An integrated Liquid crystal display (LCD) is also used for real time display of data acquired from the various sensors and the status of the various devices. Also, the use of easily available components reduces the manufacturing and maintenance costs. The design is quite flexible as the software can be changed any time. It can thus be tailor-made to the specific requirements of the user. This makes the proposed system to be an economical, portable and a low maintenance solution for above mentioned farming houses applications, especially in rural areas and for small scale agriculturists.

Keywords: sensor network, Digital Agriculture, Environment Monitoring; Environment Parameter

I. INTRODUCTION

Monitoring and control of greenhouse, sericulture and poultry farm, and environment play an important role in these production and management. To monitor the environment parameters effectively, it is necessary to design a measurement and control system. The objective of this project is to design a simple, easy to install, microcontroller-based circuit to monitor and record the values of temperature, humidity, soil moisture and sunlight of the natural environment that are continuously modified and controlled in order optimize them to achieve maximum growth and yield. The system comprises of sensors, Analog to Digital Converter, microcontroller and actuators [1]. The controller used to communicates with the various sensor modules in real-time in order to control the light, aeration and drainage process efficiently inside farming houses by actuating a cooler, heater, dripper and lights respectively according to the necessary condition of the crops. An integrated Liquid crystal display (LCD) is also used for real time display of data acquired from the various sensors and the status of the various devices. When any of the above mentioned climatic parameters cross a safety threshold which has to be maintained to protect the crops, the sensors sense the change and the microcontroller reads this from the data at its input ports after being converted to a digital form by the ADC [2]. Also, the use of easily available components reduces the manufacturing and maintenance costs. The design is quite flexible as the software can be changed any time. It can thus be tailor-made to the specific requirements of the user. This makes the proposed system to be an economical, portable and a low maintenance solution for above mentioned farming houses applications, especially in rural areas and for small scale agriculturists.

II. BLOCK DIAGRAM

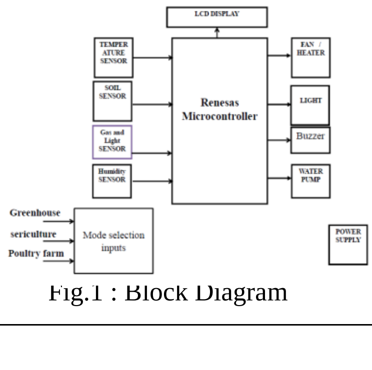

Fig.1 : Block Diagram

In the proposed hardware, there would contain the temperature and humidity sensor, soil moisture sensor, light sensor, gas sensor. The sensor would be connected to the Renesas microcontroller. The sensors send the data to the microcontroller. The motor and DC fan would also be connected to the microcontroller. These motor and DC fan would be accordingly controller based upon the relevant temperature and humidity condition.

❖ **SENSORS**

- **Temperature sensor**

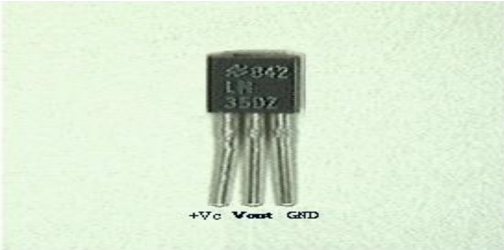

Fig.2: Temperature sensor

The LM35 its typical accuracies of ±1⁄4˚C at room temperature and ±3⁄4˚C. The LM35's low output impedance. 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. The LM35 can be applied easily in the same way as other integrated-circuit temperature sensors English units as identifiers in trade, such as 3.5-inch disk drive.

- **Humidity sensor(T110)**

Fig.1.3: *Humidity sensor(T110)*

Absolute Humidity is the exact measure of the amount of water vapour in the air. It is normally expressed in terms of relative humidity. Relative humidity, expressed as a per cent, is the ratio of actual moisture in the air to the highest amount of moisture air at that temperature can hold. A capacitive device with special material as a dielectric, the electrical characteristics of which change according to the amount of humidity in the air.

- **Light sensor (LDR Light-dependent resistor)**

photo resistor, photoconductor, or photocell, is a variable resistor whose value decreases with increasing incident light intensity. An LDR is made of a high-resistance semiconductor. If light falling on the device is of high enough frequency, photons absorbed by the semiconductor give bound

- **Microcontroller(RANESES R5F102AA)**

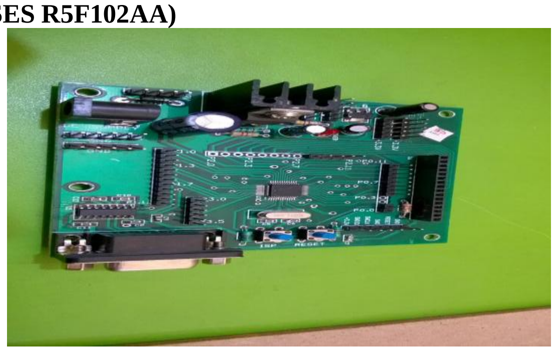

Fig 4: Microcontroller

General-purpose register: 8 bits × 32 registers (8 bits × 8 registers × 4 banks) ROM: 512 KB, RAM: 32 KB, Data flash memory: 8 KB On-chip high-speed on-chip oscillator On-chip single-power-supply flash On-chip debug unction On-chip power-on-reset (POR) circuit and On-chip watchdog timer (operable with the dedicated low-speed on-chip oscillator) I/O ports: 16 to 120 (N-ch open drain: 0 to 4) Timer 16-bit timer: 8 to 16 channels, Watchdog timer: 1 channel Different tential interface: Can connect to a 1.8/2.5/3 V device 8/10-bit resolution A/D converter (VDD = EVDD =1.6 to 5.5 V): 6 to 26 channels Power supply voltage: VDD = 1.6 to 5.5 V

III. HARDWERE AND SOFTWERE OF SYSTEM

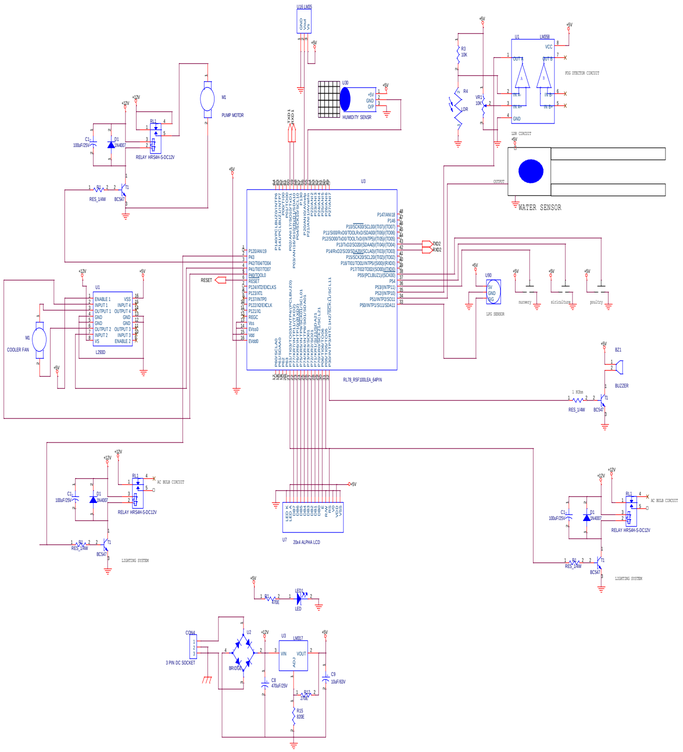

Fig5 : schematic of the system

A. HARDWARE IMPLEMENTATION

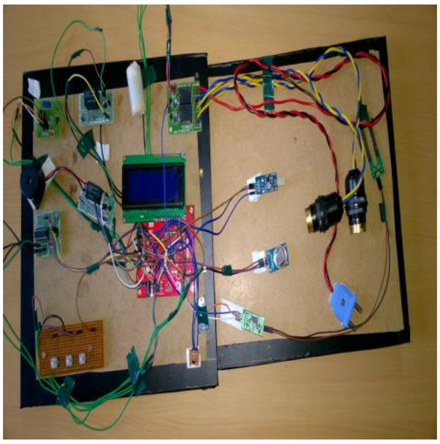

Fig 6: connections as per schematic of the system

TABELE 1: Environmental parameters

Environmental parameters					
Sl. No	**Mode**	**Temperature ^{0}C**		**Humidity %**	
		Min	Max	Min	Max
1	Green house	18	32	75	85
2	Poultry farm	20	34	70	85
3	Sericulture	19	28	65	85

B. SOFTWERE USED
CUBE SUITE

Operating Environment for using Cube Suite

- **Hardware environment**
- ✓ Processor: At least 1 GHz (support for hyper threading/multicore CPU)
- ✓ Main memory: At least 1 GB (2 GB or higher fot Windows 7 (64-bit OS)),2 GB or higher recommended
- ✓ Display: Resolution at least 1,204 x 768; at least 65,536 colors
- ✓ Interface: USB 2.0 1.2 Software environment

- **software environments**
- ✓ Windows Vista (32bit, 64bit)
- ✓ Windows 7 (32bit, 64bit)
- ✓ .NET Framework 3.5 (Windows 7)
- ✓ Runtime library of Microsoft Visual C++ 2008 SP1
- ✓ Internet Explorer 6.0 or later

IV. RESULT ANALYSIS

Readings taken at room temperature of 27^{0}C

TRANSDUCER'S READINGS

- ***SOIL MOISTURE SENSOR***

Tolerance= ± 0.2 V

TABLE 2: SOIL MOISTURE SENSOR READINGS

Soil Condition	**Transducer Optimum Range**
Soil is dry	0V
Optimum level of soil moisture	1.9- 3.5V
Slurry soil	>3.5V

- ***HUMIDITY SENSOR***

FORMULA:
Tolerance= ±0.1V

RH = ((Vout / Vcc) – 0.16)/0.0062, typical at 25°C where, Vsupply = 4.98V

TABLE 3: HUMIDITY SENSOR READINGS

Percentage RH (RELATIVE HUMIDITY)	**Transducer Optimum Range**
0%	0-0.8V
0% to 9.81%	0.8-1.1V
12.9% to 20.1%	1.2-1.45V
22.7% to 30.06%	1.5-1.725V
30.8% to 40.5%	1.75-2.05V
41.3%to50.3%	2.075-2.35V
51%to 60.02%	2.375-2.65V
61.6%to70.5%	2.7-2.975V
71%to80.2%	3-3.275V
81.1%to 90%	3.3-3.6V
91%to 100%	3.6-3.9V

- ***LIGHT SENSOR***

  Tolerance = ±0.1V

TABLE 4: LIGHT SENSOR READINGS

Illumination Status	**Transducer Optimum** Range
OPTIMUM ILLUMINATION	0V-0.69V
DIM LIGHT	0.7V-2.5V
DARK	2.5V- 3V
NIGHT	3V-3.47V

- ***TEMPERATURE SENSOR***

  FORMULA:
  Temperature (0C) = (Vout/5) *100 (0C /V)

TABLE 5: TEMPERATURE SENSOR READINGS

Temperature range in degree Celsius	Temperature sensor output(Vout)
10 0C	0.5V
15^0 to 20^0C	0.75-1.0V
20^0 to 25^0 C	1.0-1.25V
25^0 to 30^0C	1.25-1.5V
30^0 to 35^0C	1.5-1.75V

35^0 to 40 ^{0}C	1.75-2.0V
40 ^{0} to 45 ^{0}C	2.0-2.25V
45 ^{0} to 50 ^{0} C	2.25-2.5V
50 ^{0} to 55 ^{0}C	2.5-2.75V
55 0 to 60 ^{0}C	2.75-3.0V
60 ^{0} to 65 ^{0}C	3.0-3.25V
65 ^{0} to 70 ^{0}C	3.25-3.5V
70 ^{0} to 75 ^{0}C	3.5-3.75V
75 ^{0} to 80 ^{0}C	3.75-4.0V
80 ^{0} to 85 ^{0}C	4.0-4.25V
85 ^{0} to 90 ^{0}C	4.25-4.5V
90 ^{0} to 95 ^{0}C	4.5-4.75V
95 ^{0} to 100 ^{0}C	4.75-5V

V. APPLICATONS AND ADVANTAGES

- ✓ Can be used in green houses , Sericulture and Poultry farm to control the temperature, soil moisture, humidity and light for the proper growth of plants
- ✓ With little modification, this project can be used in Mechanical companies to measure various parameters of operating machines like temperature and light.

VI. CONCLUSION

A step-by-step approach in designing the microcontroller based system for measurement and control of the five essential parameters for farming house, i.e. temperature, humidity, soil moisture, Gas and light intensity, has been followed. The results obtained from the measurement have shown that the system performance is quite reliable and accurate.

Although the enhancements mentioned in the previous chapter may seem far in the future, the required technology and components are available, many such systems have been independently developed, or are at least tested at a prototype level. Also, integration of all these technologies is not a daunting task and can be successfully carried out.

Further improvements will be made as less expensive and more reliable sensors are developed for use in agricultural production.

REFERENCES

[1]. Stipanicev D, Marasovic J, "Network embedded greenhouse monitoring and control" Proceedings of 2003 IEEE Conference on Control Applications, Vol.2, June, pp. 1350 - 1355, 2003.

[2]. Turnell, D.J. deFatima, Q.V., Turnell, M., Deep, G.S., Freire, R.C.S., ―Farm Web-an integrated, Modular farm automation system, Proceedings of IEEE International Conference on Systems, Man, and Cybernetics, Vol.2, Oct., pp. 1184 - 1189, 1998

[3]. Rebecca Tyson Northen, Orchids As House Plants, Dover Publications, New York, 2nd Edition, 1985.

[4]. LeongBoon Tik, Chan ToongKhuan, SellappanPalaniappan Monitoring of an Aeroponic Greenhouse with a Sensor Network International Journal of Computer Science and Network Security.Vol.9, March pp. 240, 2009.

[5]. National Semiconductors, CMOS Logic Databook.

[6]. Ramakant Gayakwad, Operational Amplifiers Linear Integrated Circuits, Prentice Hall of India, 3rd Edition]. Vol. 24, pp. 101-105, July 2012.

[7]. SENSORS- The Journal of Applied Sensing Technology, Advanstar Communications. vol. 42, pp. 321-328, Mar 1995.

[8]. [8] Leong Boon Tik, Chan Toong Khuan, Sellappan Palaniappan *Monitoring of an Aeroponic Greenhouse with a Sensor Network* International Journal of Computer Science and Network Security.Vol.9, March pp. 240, 2009