Automation in Sericulture Farm

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Abstract— *Agriculture is the backbone of India. Nowadays, farmers are facing many economic problems. Hence there is a solution for our farmers to come out of their economic crisis. Sericulture is one of the best ways to earn more money and it can provide self-employment and remunerative returns. The existing method of silkworm rearing requires more development. This project provides a complete protection to the farm and every process has undergone development with the help of electrical and electronics components. It facilitates farmers by adoption of automation in temperature and moisture control, feed supplement. The growth of silkworm involves three stages. These stages require different temperature and moisture level. This is established with the help of temperature and moisture sensors and PIC16F877A micro controller, since the total process is controlled. Various processes like feed supplement, protection and medical safety for silkworm are provided by automation through this project. Power splitter is used and is driven by motordriveL2930. With the help of input keys, inputs are given. This project could be carried out both automatically and manually. This project will help farmers economically so that that they may not spend more time in the sericulture farm.*
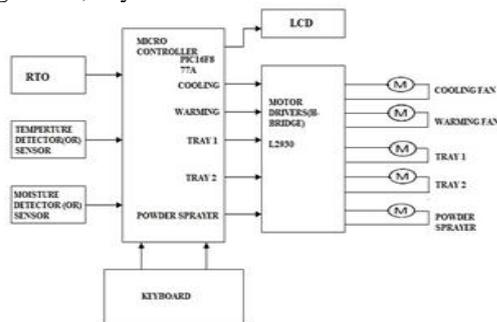
Keywords— *Microcontroller16F877A, Temperature sensor LM35 and Moisture sensor, Overall protection, Motor drive L2930, PIC programming.*

I. INTRODUCTION

The vision of this project is to provide automation in sericulture farm. This will provide the farmers with good efficiency. The farm is fully protected. The microcontroller PIC16F877A will control the overall process taking place in the farm. The temperature and moisture level is sensed with the help of sensors and the values are displayed with the help of an LCD display. Since the microcontroller can handle low power equipments, here we are using motor drive for running the motor. The overall process is under the control of microcontroller.

II. ARCHITECTURE

The architecture includes the various components and all these are controlled by micro controller. The major components include RTO, Temperature sensor, Motor interfacing drives, keyboard and so on.

A. Layout of the Project

The setup enables the farmers to maintain the farm easily. Microcontroller PIC16F877A controls the entire processes which is a 40 pin IC. The input to the controller is from RTO, temperature and moisture sensor. The output from the controller will handle the temperature and moisture, movement of trays.

The project layout will be explained below along with the components required to build the setup:

- The silkworms are placed on the tray.
- The temperature and moisture are monitored and displayed in LCD.
- PIC programming is used to program the microcontroller.
- Motor drive controls the motor operation of H-Bridge.
- Keyboard gives the information for the microcontroller about the operation to be performed.
- To make changes in temperature and moisture values cooling and warming fans are used.

III. DESIGN COMPONENTS

The system consists of both the software and hardware components which are classified as follows:

A. Software Components

a) *PIC programming*: The purpose of the PIC programming is to control the operation of the PIC microcontroller. This program is fed into the printed circuit board through the ports in order to perform required task. It is widely used technology. It is simple and it controls the overall process on the basis of the conditions given in the program.

B. Hardware Components

The growth cycle of the silkworm involves five stages. Silkworm is given to the farmers after the completion of second stage for rearing. Hence in the sericulture farm the silkworms undergo remaining three stages to attain their full maturity. The hardware components that are required to implement the automation process are discussed below:

a) *Microcontroller*: The pic microcontroller 16F877A is the brain of the entire system. The controller receives the commands from RTO, temperature and moisture sensor. Based on the values fed into it, the controller will analyse the sustaining condition of the temperature and moisture is suitable for the silkworm and then it does the controlling operation.

b) *Temperature sensor*: The temperature sensor used here is LM 35. The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in ^{o}C).The LM35 generates a higher output voltage than thermocouples and

may not require that the output voltage be amplified. It is more accurate than a thermistor. The temperature required for third, fourth and fifth stages are 25cel, 24cel and 23cel.

Temperature sensor

c) *Moisture sensor*: The moisture sensor senses the moisture level that prevails in the farm. The moisture sensor monitors the level and the existing level is not suitable for the silkworm at that particular stage means it gives information to the microcontroller to make changes in the moisture level.

d) *RTO*: It is the fact that most of the digital electronic devices run some sort of operating systems inside. There are many operating systems developed for microcontrollers too. The phrase "Real time" indicates that the response of operating system is quick. Microcontrollers don't have much space for code. Thus the operating system has less scope to be advanced.

e) *IR sensor*: IR sensor consists of a transmitter and a receiver. Here in this project IR sensor is used to detect the entering of insects and rats inside the farm as it may harm the silkworm which is very sensitive. It gives alarm when any reptile enters into the farm.

f) *Trays*: In this trays are used where the silkworm is placed. This is compact for the silkworms and there are two trays which are used in different stages of silkworm. The trays can be removed manually after completion of each stage. The mulberry leaves are placed in the trays which are the feed for the silkworms.

g) *Motor drive*: Microcontroller is capable of running low power equipments only. Hence to run the fans and other heavy power equipments the motor drive is used. The motor drive used here is L2930 which is very powerful H-bridge motor drive.

Motor drive L2930

h) *Cooling and warming fans*: Based on the temperature and moisture level existing in the farm, the fans are switched on. When temperature is high, exhaust fan is on and when moisture level is high warming fan is high. The fans are operated based on the conditions prevailing in the farm. 12V motor is used to run the fans.

i) *Powder splitter*: The silkworms are very sensitive and hence it many get infected soon. To prevent the silkworms from extinction a powder is sprayed above them to protect them from infection. The powder splitter moves over the tray and hence the powder is sprayed even on the tray without wastage.

j) *LCD display*: The process taking place in the farm changes and hence LCD display exhibits the process going on through its display panel.

k) *Keyboard*: The operation that is to be performed by the microcontroller is given as input through keyboard. Based on the input given the microcontroller performs its controlling operation.

IV. CIRCUITS DIAGRAM

Circuit diagram

The overall circuit consists of RTO, IR sensor, Temperature sensor LM35, moisture sensor, PIC microcontroller 16F877A, motor drive L2930, powder splitter, cooling and warming fans, trays and keyboard. The working of the controller is fully based on the requirement of the farm. The IC used here is programmable IC, hence it could perform any type of controlling operations

V. ADVANTAGES & LIMITATIONS

- Automated processing is a major advantage in this project.
- The sericulture farm is protected and entrance of insects is detected using IR sensor.
- Protects the silkworm from extinction since the wastages are removed periodically.
- The motor drive used here is more efficient.
- The temperature and moisture level in the farm are controlled automatically.
- It helps farmers come out of their economic crisis.
- This project is economically feasible.

Limitations

- Initial investment is high.
- Microcontroller can't run high power equipments.
- Trays must be replaced manually.

VI.   CONCLUSION

Automation has become an essential thing in day to day life. This project deals with basic automation processes that could be brought in sericulture farm. Further investment and usage of modern technologies can bring drastic changes in the field of sericulture. Hence this project could be integrated with upcoming technologies. Surely this project would help farmers to come out of their economic crisis.

REFERENCES

[1] H. Ali, A. Ali, R. Syed, A. Khan, and I. Khan, "SCADA implementation of industrial temperature automation," *International Journal of Computer Science and Network Security (IJCSNS)*, vol.11, no.8, pp. 145-150, 2011.

[2] I. Kaur, "Microcontroller based home automation system with security," *International Journal on Advanced Computer Science and Applications (IJACSA)*, vol. 1, no. 6, pp. 60-65, 2010.

[3] J. Villafuerte, Implementation of the product "Cold spray".

[4] Central silk board, Bangalore, "Note on the performance of Indian silk industry and functioning of central silk board," 2015.

[5] N. Agarwal and G. SubramanyaNayak, "Microcontroller based home security system with remote monitoring," *Special Issue of International Journal of Computer Applications*, *International Conference on Electronic Design and Signal Processing (ICEDSP)*, pp. 38-41, 2012.

[6] Analysis of silk production Website. [online]. Available: http://randomwire.com/silk production.

[7] Understanding the working of temperature sensor and its description Website. [online]. Available: http://en.m.wikipedia.org , www.electronics.tutorials.com, www.electriccircuit.com .

[8] Study about motor drive Website. [online]. Available: www.ti.com/product/LM2930 .