COONCARE : TRANSFORMATIVE MONITERING FOR SERICULTURE

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Abstract— Sericulture alludes to the raising silkworms to deliver silk. India is the second biggest producer of silk in delivering 15%of the aggregate silk creation along side china. Sericulture is the base of social, economic, cultural and political progress of India.Temperature and humidity play an main role in the developmentof healthy silkworms in every stage, especially during the development of larva. Disinfection is one of the reproving parameter to be considered for healthy and successful silkworm rearing. Sericulture is the significant occupation in the country side of India and techniques utilized by the agriculturists are as yet obsolete. Hence there exists the need of using innovation in Sericulture cultivate.

Keywords-; IoT; Sensors; Image processing; Sericulture;

1.INTRODUCTION

The Internet of Things (IoT) is a recent pattern that made variety of each and every thing to sense and communicate through internet by recognizing itself with a unique addressing scheme and interacting wirelessly with each other to create a smart implementation. The IoT is much more than M2M communication, Wireless Sensor Networks (WSN), 2G/3G/4G, Radio-Frequency Identification (RFID), Bluetooth etc. IoT is a network of networks with unique characters which has applications in multiple domains. IoT world is converging all the fields like cities, industries, agriculture, transportation, energy, education and many more with its own smart intelligence. IoT uses IPv6, which has almost unlimited addressing capacity to assign an unique IP address to every object to identify itself in this world.

Sericulture is the science that deals with production of silk by rearing of silkworm. producing silk is a lengthy, complex process .Silkworm is one of the most important domesticated insects, which produces silk thread in form of cocoon by consuming mulberry leaves during larval period. The seasonal differences in the environmental components considerably affect output of silkworm crop such as cocoon weight, shell weight, and cocoon shell ratio. Sericulture industry combines the attribute of both agriculture and industry. It comprises three distinct activities cultivation of mulberry ,rearing of silkworms and reeling of cocoons.

ASIA is the main producer of silk which produces over 95% of the total global output with bulk production of it is in China and India, followed by countries like Japan, Brazil, USA, Italy and Korea. Sericulture is an art and science raising silk worm for silk production.

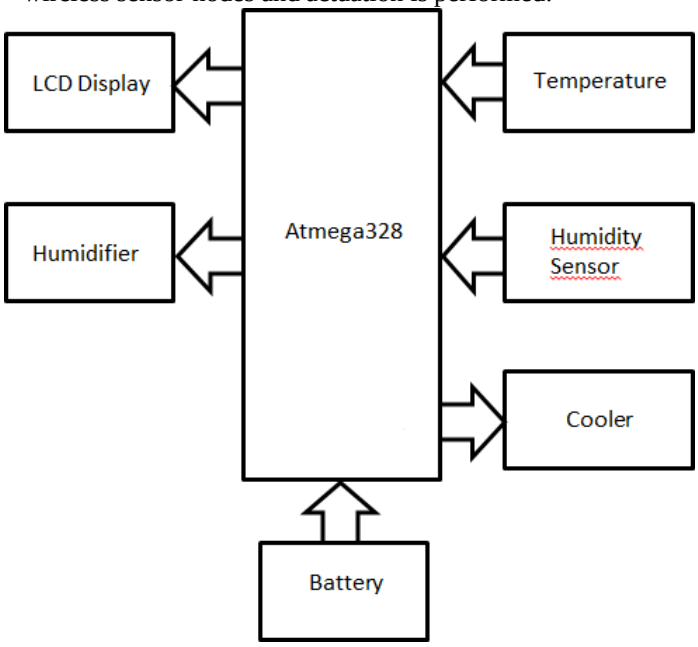
Silk is the outcome of sericulture industry. silk is a strong , shiny fiber that is used o make fabrics. Silk has a natural beauty and no other fabric can match its luxury, luster and elegance . It is the most precious, natural fiber, which has a unique place in the textile world and is rightly recognized as the “Queen of Textiles”. Sericulture activities are broadly classified into two: the agro- based sector and the industrial sector. The agro-based part involves two distinct phases of activities i.e. mulberry cultivation and silkworm rearing. Silkworm rearing is differentiated into two stages: young age rearing from 1st and 2nd in star. The intermediate stage will be the 3rd in star and the rearing of 4th and 5th instars comes under late age rearing.

The temperature and humidity plays a vital role in every stage of sericulture process, with this a lot of care is also needed to be taken to avoid diseases. Temperature, humidity and disinfection process should be managed to get a wonderful silk product. An ideal temperature of 23^0C to 28^0C and humidity in between 65% to 85% is to be maintained. The sensor network utilized in our smart sericulture system comprises of smart sensor nodes interfaced with temperature and humidity sensors to collect every stage life cycle readings inside the system. The automatic controlled actuators namely, air cooler, heater and sprayer maintain the temperature and humidity of the system. Image processing techniques is used to capture the pictures of sericulture process and to know about the status of sericulture process in the system.

Sericulture, being an agro-based rural industry, is highly suitable to the countries having an agricultural base and problems of providing employment to the rural laborers. It is mainly a rural and labor intensive industry requiring relatively low investment and offering high profit potential and foreign exchange Earnings.

2. SERICULTURE MONITORING AND ACTUATION

IoT based silkworm rearing house consists of sensors and actuators, which is attached with battery operated wireless sensor nodes. Sensors will provide the real time data and based on the readings, decision will be taken by smart wireless sensor nodes and actuation is performed.



The node will be receiving an interrupt request either for sensor data or to start the actuation system. If the interrupt request is detected for actuation system, the disinfection spray will be switched on for fixed amount of time and continues the process of the system.

3. EXSTING SYSTEM

In starting days, the silkworm is cultivated in the room where the temperature and cooling is increased in the sense we need to shift the room for the silkworms. And time to time the food and leaves to be provided , if it is not provided the silkworms used to die. The medicine is not sprayed properly the insects use to die. So now we implementing the Automated Smart sericulture system to avoid the drawbacks of the earlier silkworm productions.

4. PROTOTYPE IMPLEMENTATION

The IoT based smart sericulture system prototype for real time monitoring of the parameters and performing the automated actuation with serial camera which is placed inside the system

to capture real images to know the status .we have two sensors LM35 temperature sensor, which maintains an accuracy of +/- 0.4^0C at room temperature, +/- 0.8^0C over a range of 0^0C to 100^0C with a sensitivity of 10mv/^{0}C and it operates at 5V DC input with ground pin and output pin connections.

The DHT11 is both digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and find out the digital signal on the data pin.DHT11 maintains 20-80% humidity readings with 5% accuracy, 2.5mA max current is used during the conversion and consists 4 pins with input power pin to operateat DC 3V to 5V. Both the temperature and humidity sensors provide an analog output. We have used three relay circuits, forthe three actuation systems namely disinfection system, air cooler and heater. This relay performs the switching operationenabling the actuator to operate for desired time.

The converted data is transmitted to the connected 6LBR using multi-hop RPL routing protocol through neighbor sensor nodes using wireless radio transceiver CC2420. The 6LBR will take care of header compression, fragmentation and reassembly of data packets. The 6LBR can be realized connecting to the internet over 3G, Wi-Fi or wired Ethernet. The TelosB mote is used as border router and connected to raspberry pi ,where raspberry pi is connected to internet using Ethernet connection. The data can be accessed by the end user in real time using CoAP Copper (Cu) Mozilla Firefox add-on and also the data can be stored in database for further analysis. The ADC converted data of sensors are compared to the predefined threshold values. First the temperature data will be compared with the threshold, if the temperature is above threshold, the cooler will be switched on and if it is below the threshold the heater actuation system will be powered on. After fixing the temperature, humidity will be compared with the threshold values and same procedure of temperature will be followed to fix the humidity value within threshold values. This complete actuation system process will be automatically handled by sensor node and the real time temperature and will be transmitted to the end user. humidity

5. PROPOSED SYSTEM

The proposed system consists of the temperature , humidity sensors and air cooler, digital image processing, sprayer. By using the automated sericulture we can automatically control the heating process in the silkworm rearing house.

6. ADVANTAGES

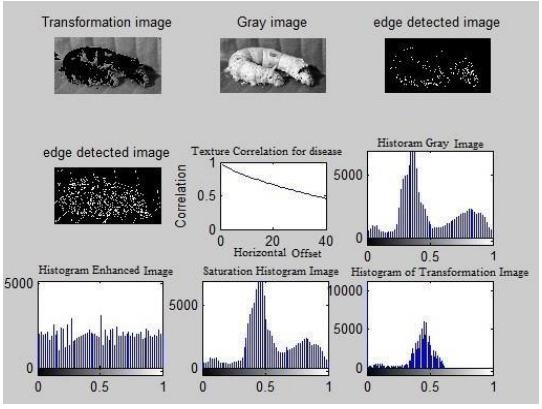
- ✓ High employment potential
- ✓ Provides vibrancy to rural economy
- ✓ Low gestation, high returns
- ✓ Eco-friendly
- ✓ Women –friendly occupation
- ✓ Ideal programme for the worker section of the society
- ✓ Scope for professional Training
- ✓ Facilities for seri-cultrists

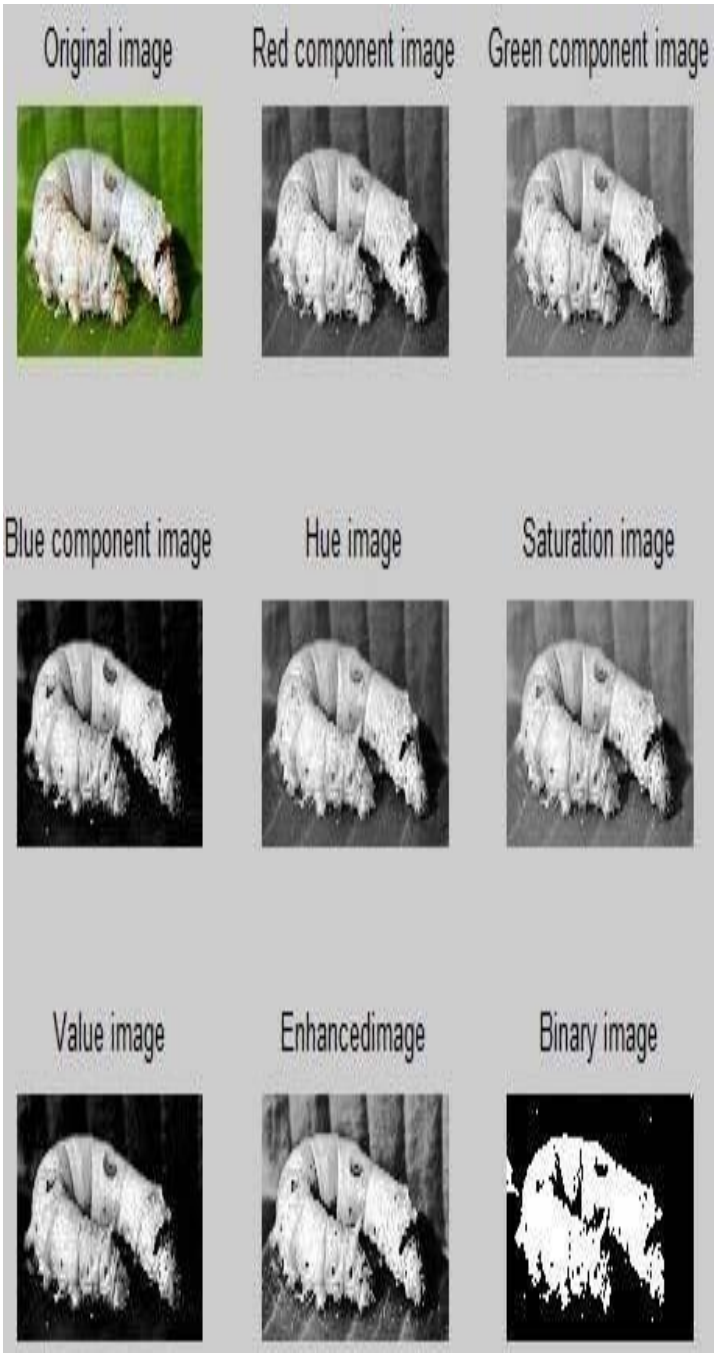
Sericulture Monitoring and Actuation System

7. IMAGEPROCESSING OFSERICULTURE

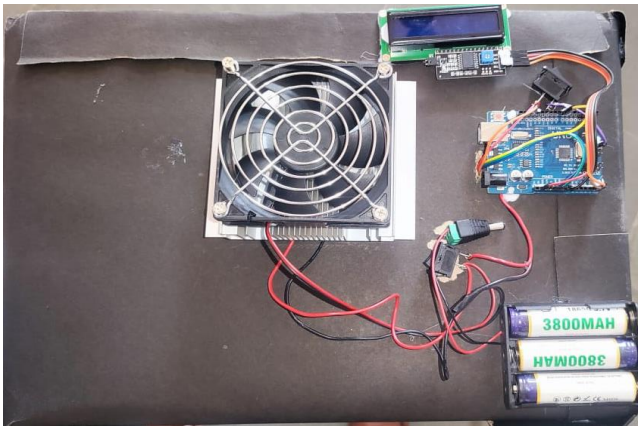
The original captured image of the silkworm is converted into a computerized frame using image processing, further it is used to extract the improved version of the image or some valuable information from the image. The two types of methods used in image processing are analog and digital image processing. Analog techniques of image processing can be used for the hard copies like printouts and photographs. Digital Processing techniques are used in manipulation of the digital images by using computers. Here the raw data from serial camera is collected and it will undergo various stages of processing. The three general phases that undergoes the data have to use the digital techniques which are pre-processing, enhancement and display, information extraction. The Matlabwill be utilized for numerical computation, visualization, and application development by using multiple built-in algorithmsfor signal processing.

Identify the color change in the body of the worms, which indicates the different stages and the Light yellowish indicates that they have reached to the cocoon stage and the graphical representation





Worm Image Transformation



Top View of Monitoring and Actuation system for sericulture.

Side View of Monitoring and Actuation system for sericulture.

Raspberry pi as Border Router for 6LoWPAN Network.

8. CONCLUSION

This complete paper will present a design of IoT based smart monitoring and automated actuating sericulture system using image processing technologies. The sericulture will enable the end user to monitor and to actuatethe sericulture system in real time by making use of an internet. Prototype will operates in real time for monitoringand actuation inside the system and preliminary test proves that implemented prototype is successfully capable to monitor the parameters in real time and to control the condition inside the deployed environment and has several advantages in term of remote monitoring, automated actuation to suitable condition inside the system .

Future work includes the field deployment of CoAP-based sericulture sensors network and its connectivity to IPv6 backbone for real-time monitoring over the internet. In addition to temperature and humidity many more other parameter sensors can be interfaced with this system and to make it more smart and intelligent. The image capturing can be wirelessly performed to make it more compatible and smarter.

9. REFERENCES

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