DEVELOPMENT OF ADVANCED AUTOMATION SYSTEM FOR SILKWORM REARING HOUSE

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Abstract: Sericulture means rearing if silkworm to produce silk. Silkworm rearing is difficult and time taking process .the parameter like temperature, humidity and light intensity plays an important role is silkworm rearing . This project helps in observing environmental parameter of silkworm rearing house using NodeMCU. And also can control the light, cooler, heater, exhaust fan. Get the same data Blynk App.
Keywords- Node MCU, MQ2 Sensor, DHT11 Sensor, Sericulture, Rearing house, Exhaust fan, Cocoon, Blynk App.

I. INTRODUCTION

India is second largest silk producer in the world. India contributes 18% of silk to the world. Silkworm rearing is very difficult and time taking method. The seasonal changes affect the environmental conditions of silkworm rearing house, which affect the weight and quality of cocoon. In the present silkworm rearing method the environmental conditions are controlled manually, this process take more time and require manpower, Observing and controlling the atmospheric conditions of silkworm rearing house is difficult. Our project is going to help to observe the temperature, humidity and to detect the smoke and to control the light. It will helps to improve the production of silk and quality of the cocoon. with less man involvement.

II. COMPONENTS

1. ESP32 CAM

Fig.1: ESP32 CAM

In this system it is used for live streaming. ESP32-CAM is a small camera module. it integrates WiFi + Bluetooth with 2 high performance 32-bit LX6 CPUs, maintain frequency adjustment range 80MHZ to 240MHZ.this chip is used for IoT application.

2.FAN

Fig.2: FAN

In this system fan is used for cooling purpose. it need operating voltage of 12V DC. operating current is 0.2Amp, fan spins at ~ 2600 RPM.

3. HEATER

Fig.3: HEATER

Heater is used to rise the room temperature. It's core length: 1.5 meter, core type: cotton braided, Rated voltage: 230V, Rated power: 1000watts.

4 .DHT 11 sensor

DHT 11 is digital temperature and humidity sensor, it uses a capacitive humidity sensor and a thermistor to measure the surrounding air and spits out a digital signal on the data pin. Operating voltage: 3.5V to 5.5V, operating current: 0.3A, temperature range: 0C to 50C, humidity Range: 20% to 90%.is is used to measure temperature and humidity.

5. MQ 2 sensor

Mq2 gas sensor works on 5 V DC. It can detect LPG, Alcohol, Smoke concentrations anywhere from 200 to 10000ppm.It is used to detect the smoke in silkworm rearing house.

6. Voltage Regulator

Microcontroller used in this system need 3.3V supply for that LM2596 Adjustable step down power supply module is used, Input Voltage: 3.2V – 40V DC, Output Voltage: 1.25V-35V DC, Output Current – 2A, MAX 3A.

7. 4- Channel Relay Module

Supply Voltage – 3.7V to 6V, Trigger Current – 5mA, Current when the relay is active- ~70mA(Single), ~300mA (all four), Relay maximum contact voltage – 250VAC,30VDC, Relay maximum current – 10A.
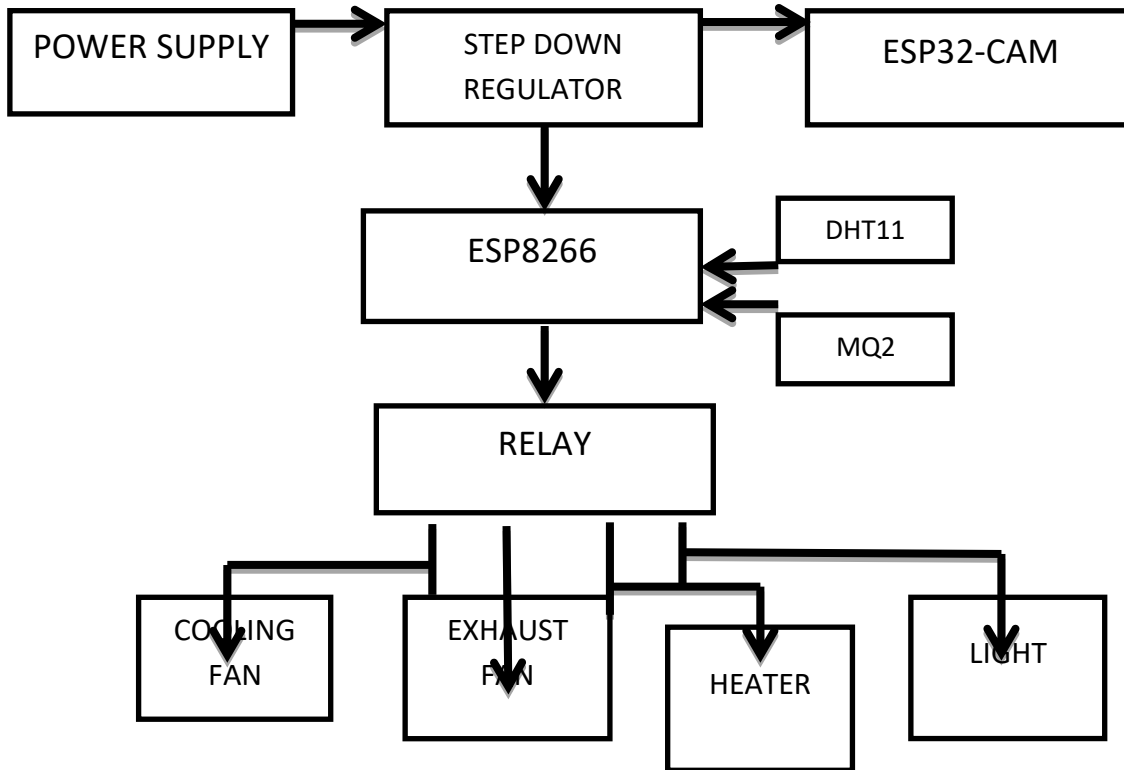
8. ESP8266

Fig.4: ESP8266

The ESP8266 is a low cost WiFi module. it has 4MB flash memory, power: 3.3 V DC. It the brain of our project it is used to collect data from the sensor and control the cooler, heater, light and exhaust fan.

III. METHODOLOGY

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POWER SUPPLY  →  STEP DOWN REGULATOR  →  ESP32-CAM
                        ↓
    DHT11  →  ESP8266  ←  MQ2
                ↓
             RELAY
      ↓      ↓       ↓       ↓
 COOLING  EXHAUST  HEATER  LIGHT
  FAN      FAN
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In this proposed system, there is a ESP32-CAM module for live streaming. Which works as CCTV camera it has microSD card slot that can be used to take images and store the images. here ESP8266 (NodeMCU) is used which is a microcontroller. it has inbuilt Wi-Fi module to which the DHT11 sensor (temperature & humidity sensor) and MQ2 (gas sensor) is connected. The temperature and humidity conditions of the silk warm rearing house is sensed using DHT11 and the data is sent to the microcontroller. There are some atmospheric conditions for silkworm rearing house .i.e temperature should be within 24^0C to $26\,^0C$ and humidity should be less then75%.we have written the program to maintain these conditions if the temperature exceeds then 26^0C fan will turn ON, if the temperature is bellow $24\,^0C$ then heater will turn ON. If humidity exceeds 75% then exhaust fan will turn ON. We have connected MQ2 sensor to the ESP8266 the check the air quality. ESP8266 is interfaced with the Blynk app it is an android application in which temperature, humidity live data can be monitored and also get an alert notification if smoke is detected. This system can also control the room light through the Blynk app.

IV. RESULT

In the proposed system we are able to maintain the atmospheric parameter of the silk worm rearing house. we are able to control the temperature between 24^0C to 26^0C , if the temperature goes below 24^0C then heater will turn ON, if temperature goes above 26^0C cooler will turn ON with the help of microcontroller, we can also get notification on Blynk app if smoke is detected in silkworm rearing house. If humidity is more than 75% then exhaust fan will turn ON. We can monitor the temperature and humidity live data on Blynk app. we can see live streaming on chrome with the help of ESP32 CAM. We can also control the light with the help of Blynk app.
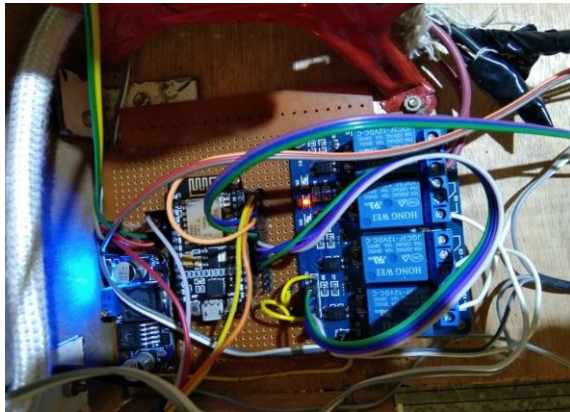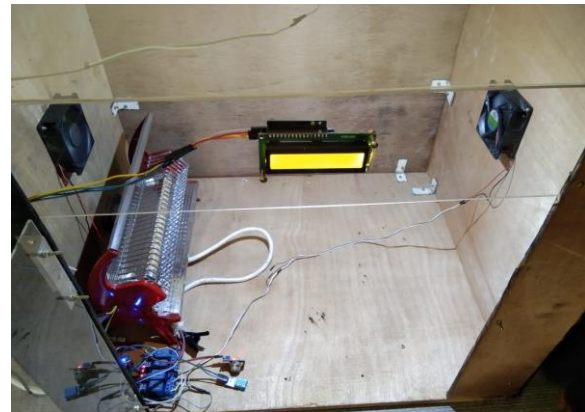
Fig.5: Circuit connection
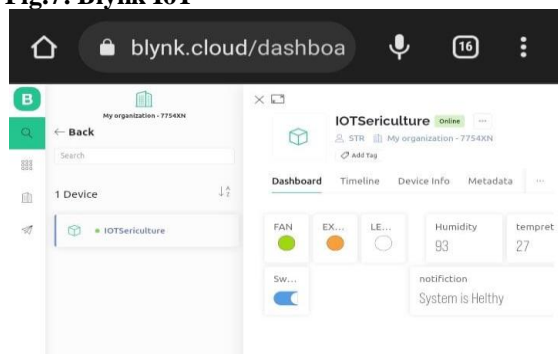

Fig.6: Front view

Fig.7: Blynk IoT

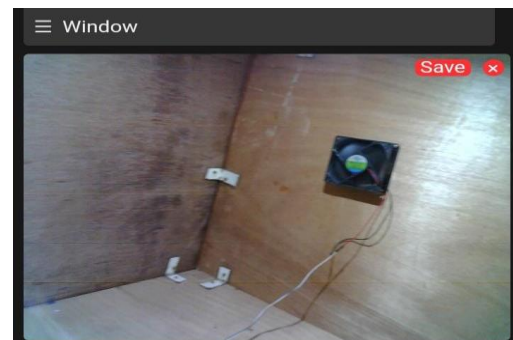
Fig.8: LCD

Fig.9: Blynk cloud

Fig.10: Live stream

V. CONCLUSION

This "Development of advanced automation system for silkworm rearing house" gives automation and guided control in sericulture advances by using NodeMCU. The proposed system controls the environmental condition of silkworm rearing house. Required preset value for parameter like temperature, relative humidity can be stable based on the environmental circumstances. On the bases of requirement fan, heater, exhaust fan is turned ON and OFF based on required environmental condition. Able to see the temperature, humidity, quality of gas on Blynk app.

VII. FUTURE SCOPE

This proposed project required continuous internet connectivity. In future it can be improved by using GSM Module to send notification directly on user mobile through the SMS without using internet. also this system can be used in Indoor farming by making small changes.

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