HIBER-BEE-HIVE SUPERVISING TECHNOLOGY

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Abstract- **Apiculture is the practice of keeping and monitoring bee and their hives. Honey bee colonies require almost daily inspection by bee keepers. But nowadays bee keepers unable to monitor the bee colony because of their busy schedule so this paper introduce a new technique to monitor weight, outside and inside temperature, humidity, opening and closer of bee hive. The existing system using a GSM module to monitor bee hive parameters. One of the disadvantage of this technique is the information where send to only one person. The proposed method use remote monitoring of bee hive parameter can be based on internet of thing (IOT) concept.**

Keywords— Apiculture, honeybee health, IOT concept, microcontroller (ESP8266), force sensors.

I. INTRODUCTION

Nowadays automatized and automatic control solutions can be applied not only in industrial manufacturing but also for biological system control and monitoring tasks

While controlling biological process it is important not only to grant stable and convenient environmental parameters, activity and behavior of the biological object. One of such parameter is bee family or bee colony.

Honey bee colonies require almost daily inspections by bee keepers remote monitoring using wireless sensors placed inside the bee hives, enable bee keepers clear insight into bee colony health, without need of constant disturbance caused by manual inspection various type of parameter can be monitored inside the bee hive such as temperature, humidity, weight of the bee hive and opening and closer of bee hive.

Remote monitoring of bee hive parameters can be based on internet of things (IOT) concept. IOT represent the idea of connecting physical object that contain sensing, networking and computing capabilities with other object and services through the internet IOT.

IOT enable possibility that every device with appropriate capability could be accessible through the internet, anywhere in the world.

II. SYSTEM ARCHITECTURE

The implemented system consist of micro controller (ESP8266) as a main processing unit for the entire system and all the sensors and devices can be connected with the microcontroller to retrieve the data from them and it processes the analysis with the sensor data and updates it to the internet though Wi-Fi module connected with it.

A. Block diagram

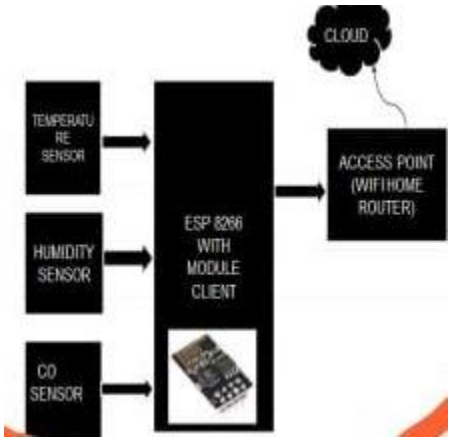

Fig-1 Block diagram of the project

B. Wi-Fi module

Fig-2 ESP8266

Here we used ESP8266 Wi-Fi module which is having TCP/IP protocol stack integrated on chip. So that it can provide any microcontroller to get connected with Wi-Fi network. ESP8266 is a programmed SOC and any microcontroller with a supply voltage of 3.3 voltages. The module is configured with AT commands and the microcontroller should be programmed to send the AT commands in a required sequence to configure the module in client mod. The module can be used in both client and server modes.

C. Sensor

The system consists of temperature and humidity sensor (DHT11), weight sensor (force sensor) and position sensor (KY.017 mercury tilt switch module). These 3 sensors will measure the primary environmental factors temperature, humidity, weight of bee hive and position of bee hive.

This entire sensor will give the analog voltage representing one particular weather factor. The microcontroller will convert this analog voltage into digital data.

D. Temperature and Humidity sensor

The DHT11 is an essential, ultra minimal effort computerized temperature and humidity sensor.

Fig-3 Temperature and Humidity sensor DHT11

It utilizes a capacitive humidity sensor and a thermistor to gauge the surrounding air and releases a digital data on data pin (no analog information pins required). It works on 3-5 volt power supply. Good for 20-80% humidity readings with 5% accuracy and for 0-50°c temperature reading ±2°c accuracy.

E. Force sensor

It is a force sensitive resistor with a round 0.5 diameter, sensing area

Fig-4 force sensor

This FSR sensor is not a strain gauge, load cell or pressure transducer while it can be used for dynamic measurement, only qualitative result are generally obtainable, force accuracy ranges from approximately ± 5% to ±25% depending on the consistency of the measurement and actuation system, the repeatability tolerance held in manufacturing and the use of part calibration. The FSR can sense the applied force anywhere in the range 100 g -10kg .

F. Tilt switch sensor

Arduino KY-017 mercury tilt switch module, it uses a small mercury ball that complete as the circuit when we tilt the module

Fig-5 Tilt switch KY-017 mercury tilt switch module

Tilt switch is suitable for analyzing the position of bee hive. This module consist of a mercury switch, a 680Ω resistor and a LED that will light up when tilt is detected and send a alert message to the beekeeper using IOT. It works on 3.3 – 5.5 V power supply.

G. Thing speak

According to its developers, "Thing speak"is an open source Internet of Things (IOT) application and API to store and retrieve data from things using the HTTP protocol. Over the internet (or) via local Area Network. Thing speak enables the creation of sensors logging applications, locations tracking applications and a social network of things with status updates.

Thing speak has integrated support from the numerical computing software MATLAB from math works allowing. Thing speak user to analyze and visualize uploaded data using MATLAB without requiring the purchase of a MATLAB license from math works.

III. RESULT AND DISCUSSION

After sensing the data from different sensor devices, which are placed in honey bee colony. The Sensed data will be automatically sent to the web server, when a proper connection is established with server device. The web server page will allow monitoring and controlling the system. The web page gives the information about the temperature, humidity, weight of bee hive and opening and closure off bee hive. The sensed data will be stored in cloud (Google Speed Sheets). The data stored in the cloud can be used for the analysis of the parameter and continuous monitoring purpose. All the above information will be stored in the cloud, So that we can provide trending of temperature and humidity levels and weight of bee hive and opening and closure off bee hive at any point of time.

IV. CONCLUSION

In this paper to introduce smart way to monitor bee colony activities. To implement this need to deploy the sensor devices in the bee hive for collecting the data and analysis. Then collected data and analysis results will be available to the end user through the Wi-Fi. At any time the honey production can be measured by using the weight function of the system and measuring the temperature, humidity and opening and closure of bee hive health of the bees can be evaluated.

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