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Remote monitoring Honeybee Hive

(A Low Cost Real-Time Remote Monitoring of Honeybee Hive)

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Abstarct : To track the nectar collection in each chamber and to inform the occasion to place additional box.To record the physical parameters like temperature and humidity for developing theknowledge about bee behavior that will help to improve productivity.he honey bees build the traditional honey bee hive on walls, woods, and mud.Honey harvesting using artificial honeybeehive is becoming a new way of agriculture toproduce more amount of honey from a small area.The artificial colony has a verticalalignment of hive boxes to collect the honey. Once the weightof a box reaches thethreshold value, a new box will be placed on the top. The temperature andhumidity shouldbe maintained at a standard level for beneficial harvesting. At present, manually, thesemetrics are monitored, and the necessary action is taken for smooth collection.

Keywords : Honeybee, Honeybee hive,hive, honeyproduction, hivecolonys,Remote monitoring honeybee hive,internet of honeybees

I. INTRODUCTION

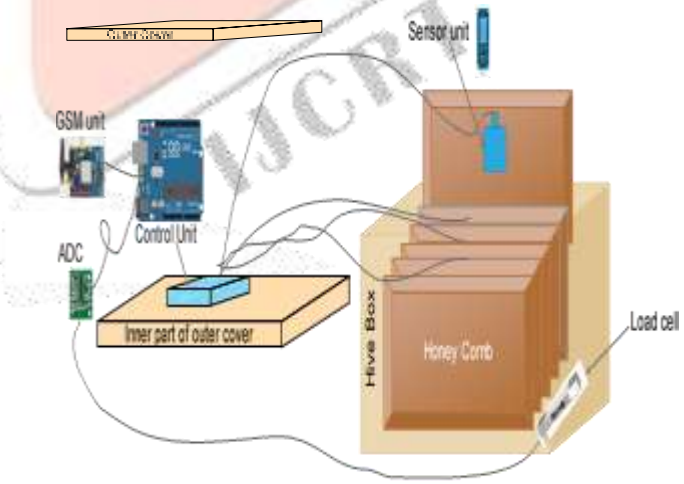
The honey bees build the traditional honey bee hive on walls, woods, and mud.Honey harvesting using artificial honeybee hive is becoming a new way of agriculture toproduce more amount of honey from a small area. The artificial colony has a vertical alignment of hive boxes to collect the honey. Once the weight of a box reaches thethreshold value, a new box will be placed on the top. The temperature and humidity shouldbe maintained at a standard level for beneficial harvesting. At present, manually, thesemetrics are monitored, and the necessary action is taken for smooth collection. The amountof honey collected in the hive differs through different seasons. During summer thecollection will be more that needs checking of load of hive box very often which is adifficult process for a large scale honeybee farm. The humidity level inside the hive boximpacts the health of the bee which is to be monitored frequently during winter. In theproposed smart honeybee hive, these metrics will be collected from each chamber throughsensors and sent to the owner for remote monitoring through a GSM connection which canhelp the farmer in timely action. In overall, the purpose of this project is to build anautomated system that records data from a bee hive at regular intervals for later analysis.

II. LITERATURE REVIEW

We first proposed a remote monitoring honeybee hive.This is the smartest way of monitoring the honeybee hive.Here the hive will be fully like remote controlled.small kind of changes or notification should be identified by the system.The proposed system should be to handle all kinds of the safety of the honeybee and the same time the honey production should also maintain and measurable.The Honey Comb having the inner layer for the place of weighting sensors and the some of the sensors that should be placed in the portion.The weighting sensors should be used to measure the weight of the honey saved in the honeycomb.And also the Humidity sensors and the Temperature sensor also used to analyse the health of gthe honeybees.And also these kind of sensors are used to verify the temperature meseaurement does not higher than the limited value.The data that should be collected from that system should be transmitted to the receiver by the help of the Gsm Module and ADC(analog to digital convertor).

III. METHODOLOGY

The overall setup of the proposed hive is shown in Figure.1. The traditional wooden honeybee hive will be used to fabricate the remote real-time monitoring unit.



3.1 Components of honeybee hive

The hive box contains some honeybee combs to collect honey and will be kept in parallel. In the comb, the monitoring unit that includes a temperature sensor and humidity sensor will be placed in a sealed box. At the bottom layer of the hive box, the

weighing sensors will be set to record the weight of the combs. This box is closed by a cover at the top. At the inner side of the cover, the Arduino controller along with the GSM module, to be placed. This unit will collect the data from the sensors and transmit them to the farmer. The structure of proposed smart hive is given in Figure.1.

3.2 Data collection through sensors

a. Weight monitoring

A pair of weighing sensor is to be used to monitor the weight of the combs. They will be placed at the bottom in parallel at the ends of the box. An analog to digital converter (PCF 8591) to convert the received analog weight to digital. If the received metric indicates overweight, then the Arduino will send a message through the GMS module to the farmer. The weight sensor and analog to digital converter are shown in Figure.2.

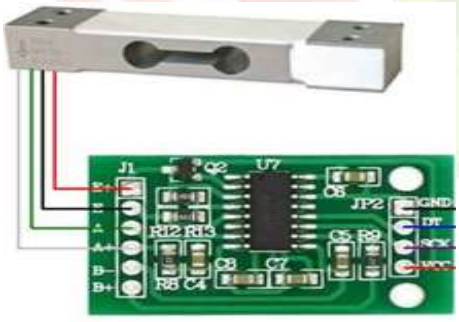


Figure 2. Load cell with analog to digital convertor

b. Temperature and humidity monitoring

The temperature and humidity inside the chamber is recorded by a temperature sensor placed in the sensor unit. It continuously records the temperature and sends it to the Arduino controller. The received temperature value will be compared with the threshold value. The threshold value is determined based on the climatic condition depending on the season. If the temperature and humidity are too high or too low, it should be immediately reported to the farmer by a message through the GSM unit. The temperature sensor for Arduino board is shown in Figure.3.

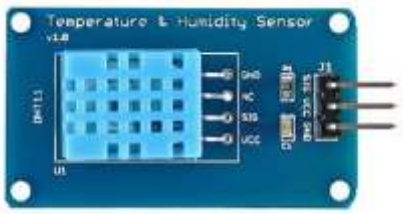


Figure 3. Temperature and humidity sensor

3.3 Data manipulation using Arduino UNO

The Arduino board is acting as the central control to receive and process the data from the sensors. Depending on the data collected from the sensors, the message is described. The controller generates a packet in a particular format and sends it to the user through the GSM module. The Arduino UNO board is shown in Figure.4.

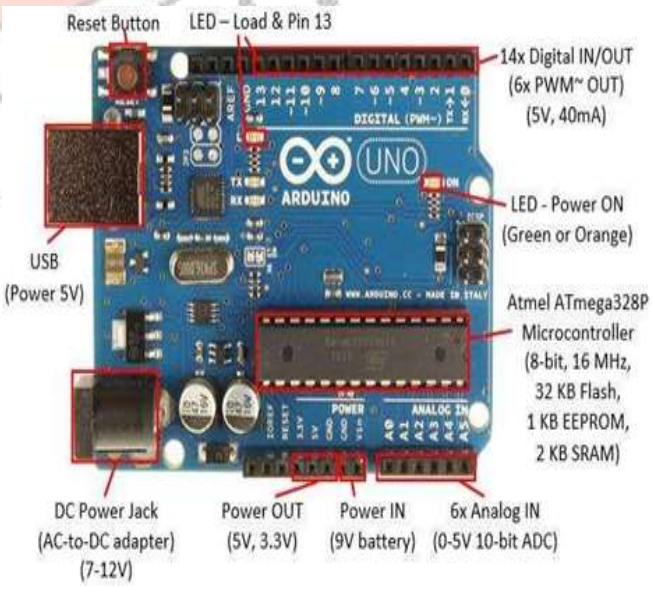


Figure 4. Arduino UNO board

3.4 Data transmission using GSM module

The packet generated by the Arduino controller will be sent to the farmer using a GSM module which has the connectivity with the internet. This will provide fast data transfer from the honeybee hive to the farmer's display. The GSM shield that can provide message and call service is shown in Figure 5.

Figure 5. GSM shield

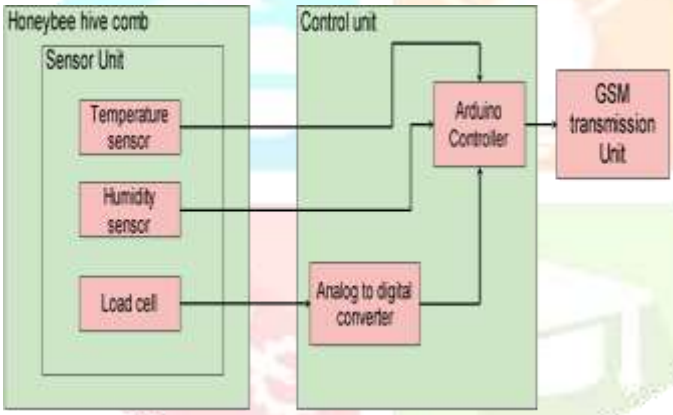
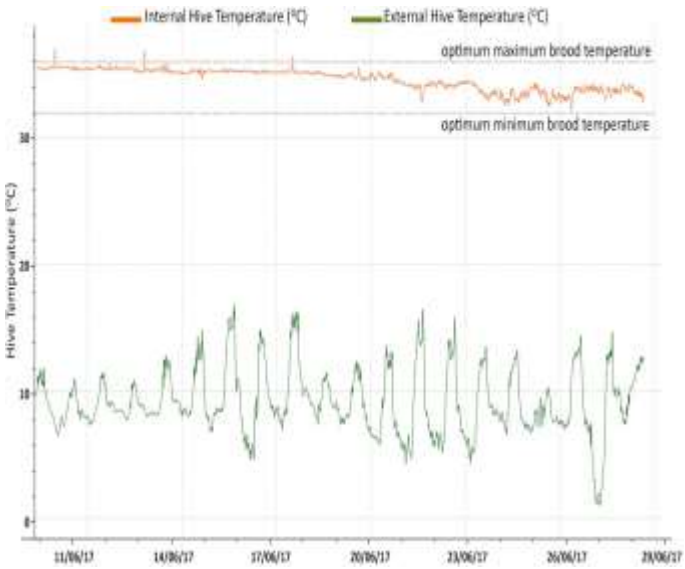


Figure 6. Block diagram of proposed system

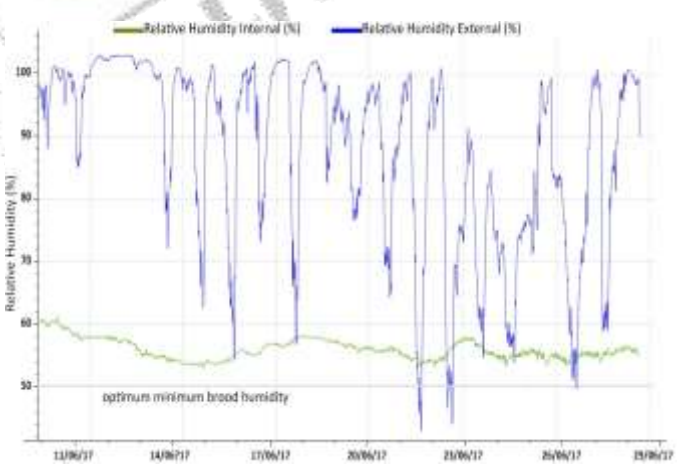
IV. EXPERIMENTAL RESULTS AND DISSCUSSION

Hive Temperature :



The temperature and humidity inside the chamber is recorded by a temperature sensor placed in the sensor unit. It continuously records the temperature and sends it to the Arduino controller.ICT have developed the beehive meter for precision remote monitoring of these key internal parameters. To calculate both the diurnal variations in hive weight and calculate daily weight gains and losses a scale **resolves total hive weight to ±1g (<120kg)**.

Humidity :

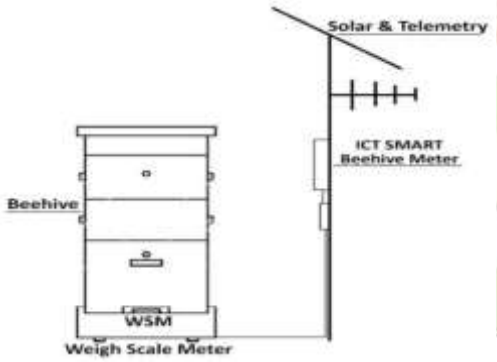


This Graph should be explain the Internal and External level of the Relative Humidity levels.That data should be represented for the particular time period. Hive thermoregulation is monitored using internal and external measurement of brood temperature and humidity. Data is

logged to the ICT Universal Telemetry Hub (C-Node) and transmitted to a cloud based server via the GSM network. An optional satellite communications upgrade is available for servicing apiaries located outside of the GSM network range

Weigh Scale :

Graphs can be generated for selected periods for trend observation and comparative analysis of data within a colony as well as between different colonies.Hive weight show clearly defined diurnal patterns as foragers leave and return to the hive. Brood temperature data shows thermoregulation of the hive within between 32.2 - 35.9°C as winter temperatures fluctuate between 1 - 16°C; humidity is maintained between 53 – 61% with external humidity fluctuations of 42 – 100%.



V. CONCLUSION

We have proposed a Remote Monitoring Honeybee Hive It has the following excellent properties : (1) High Successful monitoring the hive and safety for the honeybees and maintain the health of the bee's.(2)To record the physical parameters like temperature and humidity for developing the knowledge about bee behavior that will help to improve productivity.(3) Ultimate theme of this project is to increase To track the nectar collection in each chamber and to inform the occasion to place additional box and also to protect against the honeybess diseases.

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