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PRECISION BEE KEEPING USING IOT

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Abstract – "If the bee disappears from the surface of the earth man would have no more than four years left to live" said by Einstein. Beekeepers facing many problems like colony collapse disorder, loss of bees in swarming period, weather conditions changes. Due to these problems, we get low productivity and honey bee loss. Beekeepers does not know the environmental conditions inside and surround the beehives because of lack of monitoring system. By observing the bee hives we can identify the problems early and take measure. so, this project aims to monitor the bee hives using different sensors to monitor the level of environmental condition like Temperature and Humidity, gas content and sound. So this project proposed to implement the monitoring system using NodeMCUESP8266 Wi Fi module and ubidots application. By developing this system, we are able to control and see the data through smart phone. Ubidots is used to control hardware and display the sensor value.

***Key Words*:** NodeMCUESP8266,Ubidots, sensor

1.INTRODUCTION

Beekeeping is a production branch of the agriculture. Without bees could struggle to sustain the global human population of 7 billion. Honeybees are very important economical insects. Bees are important pollinator not only for pollination of crops, but also for their valuable products. Many micronutrient-rich fruits, vegetables, nuts, seeds, and oils require pollinators to be produced. In fact, close to 75 percent of the world's crops producing fruits and seeds for human consumption depend, at least in part, on pollinators for sustained production, yield and quality. In the previous 50 years, the volume of pollinator-dependent agricultural production has expanded by 300 percent. When a bee takes nectar and pollen from a flower, some pollen from the stamens—the flower's male reproductive organ—sticks to her body hairs. By carrying pollens from one flower to another flower bees improving food production. Pollination also helping to maintain biodiversity and vibrant ecosystem. Bees play essential role in people and plant health.

Changes in land use and landscape structure, intensive agricultural techniques, monocultures, and pesticide use are all threatening bees And Beekeepers face numerous challenges, including colony collapse disorder and low productivity. To ameliorate the above situation, we are going to develop strong monitoring system using Internet of Things (IOT) sensors and device. Internet of things (IoT), is a cloud of interconnected physical devices, which can communicate with each other over the Internet. Physical devices such as microcontrollers, microprocessors, actuators, and sensors will not directly communicate with the Internet; they do so by using an IoT gateway. By this monitoring system we can track, collect and analyse the data of bee colonies. IOT devices can monitor elements such as temperature, humidity, gas content and other variables. IOT sensors are capable to provide farmers information about bee colonies. Using this IOT data farmers can improve their techniques towards farming.

2. LITERATURE REVIEW

S. Cecchi [1], This paper explains about IoT sensors are providing accurate information about beehives. The proposed project aims at developing a multi-sensor platform to monitor the beehives conditions in real time, based on the measurement of sounds emitted by the bees, temperature, humidity, CO2, weight inside the beehive, and weather conditions outside the hive. Monitoring the beehives is very useful to farmers for getting data and analyses them. IOT sensors play vital role in monitoring system. Hardware components used in this project is DHT22 sensor to measure temperature and humidity, ADMP401 for sound acquisition, TelaireTL6615 to measure CO2 and Raspberry pi for controlling the system. Two software used in this project the Raspberry Pi acquisition code has been written in Pyhton2.7, while the server tasks for data visualization and data storage have been implemented using LabView 2016. In this work, a multi-sensor platform capable of real-time monitoring beehives condition has been presented. Such a system has been developed to record the sounds emitted by the bees in the hives, and also other measurable parameters such as temperature, humidity, CO2, hive weight and weather conditions.

XiafuLyu, Shuag Zhang, Qianyong Wang [2] This paper Aiming at the problem that traditional beekeeping does not form a pattern management and requires a lot of manpower, it is difficult to monitor the status of beehives, so an intelligent beehive system for real-time monitoring of beehive status is proposed. The hardware system used in this project is STM32L151C8T6 chip as the main control chip, uses the DHT11 digital temperature and humidity sensor to collect the temperature and humidity information, HX711 chip collects the weight of the beehive, and uses the MMA7361 sensor to collect the posture information of the bee. The intelligent beehive system designed to monitor the real-time function. The beekeeper can check the status of the beehive in real time in the monitoring system anyware. And It reduces the frequency of beekeepers unpacking and saves a lot of labour.

Stefania Cecchi, Sssanna Spinsante, Alessandro Terenzi, Simone Orcioni [3], This paper presents a multisensor platform designed to measure the aforementioned parameters from beehives deployed in the field, and shows how the fusion of different sensor measurements may provide insights on the

status of the colony, its interaction with the surrounding environment, and the influence of climatic conditions. Smart sensor systems are being. The Bee board module consists of a RaspberryPi 3B equipped with a Behringer UCA22 sound card (MusicTribe, Manchester, UK), two ADMP401 MEMS microphones (Analog Devices, Norwood, MA, USA), two DHT22 humidity and temperature sensors (Aosong Electronics, Guangzhou, P.R. China), a properly designed weight scale, and a CO2 sensor. The Queen board module consists of a Raspberry Pi 3B equipped with several sensors to acquire weather parameters near the hives and an Ethernet switch that, through a 5 GHz wireless bridge, allows the communication to a remote server where the acquired data is verified and stored. developed for real-time and long-term measurement. A multiparametric acquisition platform has been developed in order to acquire weight measurements, the sound generated by the honey bees, the temperature, the humidity, and also the amount of CO2 generated within each hive. A multisensor platform capable of realizing a real-time and long-term measurement of relevant parameters related to beehives' conditions, such as the hive weight, sounds emitted by the bees, temperature, humidity and CO2 inside the beehive, as well as weather conditions outside, has been presented.

Aleksejs Zacepins, Toms Karasha [4], This paper explains Sensing technologies can be applied in Precision Apiculture to measure various bee colony parameters in a real time. The paper aims to review some practical implementations of temperature measurements for the bee colony monitoring. Temperature measurements can provide a beekeeper with actual and real time data and information about the bee colony behaviour. Based on temperature information beekeepers can detect such colony events like increased food consumption, start of brood rearing, recognition of the pre-swarming state or death of the bee colony. Constant and real time information on bee colony conditions would be a key to study new diseases like colony collapse disorder and to develop new beekeeping tools to improve the hive management and make it more efficient. Wireless sensor network and wired sensors, Remote monitoring and infrared imaging is used to measure the temperature inside the beehives. A number of colony level related parameters currently can be continuously measured: temperature by temperature sensors or infrared imaging, air humidity, gas content, sound, vibration of hive, counting of outgoing and incoming bees, video observation and weighing, but temperature measurements seem to be the simplest and the cheapest way to monitor bee colonies.

Mustafa Man, Wan Aezwani Wan Abu Bakar, Muhammad Azri Bahruddin Bin Abdul Razak [5], discuss Embedded systems in agriculture play vital role in unifying the work involved and improve conservations. Intelligent Stingless Bee Hive System is developed to ease bee farmer or bee owner in monitoring and analysis their hives in real time mode. All experimentations are conducted in the platform of Intel Core i5 Processor, 4GB RAM, NVIDIA GeForce 940M with 2GB Dedicated VRAM and 120 GB SSD with 1TB HDD storage. Temperature Sensor DHT11, GPS GY NEO6MV2, MT3608 these hardware components used. This system is developed for Nature n Trigona Garden to monitoring their hive with Global Positioning System (GPS) tracking and temperature and humidity sensor anytime and anywhere. The system also helps to save time and money because they do not need to check each hive one by one. In addition, the system is safer and more efficient as user can only access after register to the system.

3. METHODOLOGY

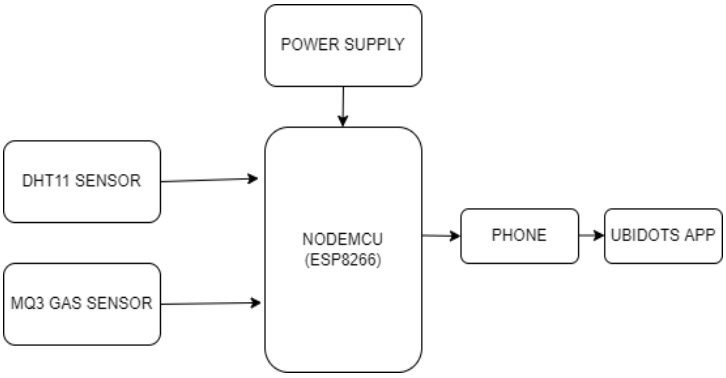

FIG-1. BLOCK DIAGRAM

4. FLOW CHART

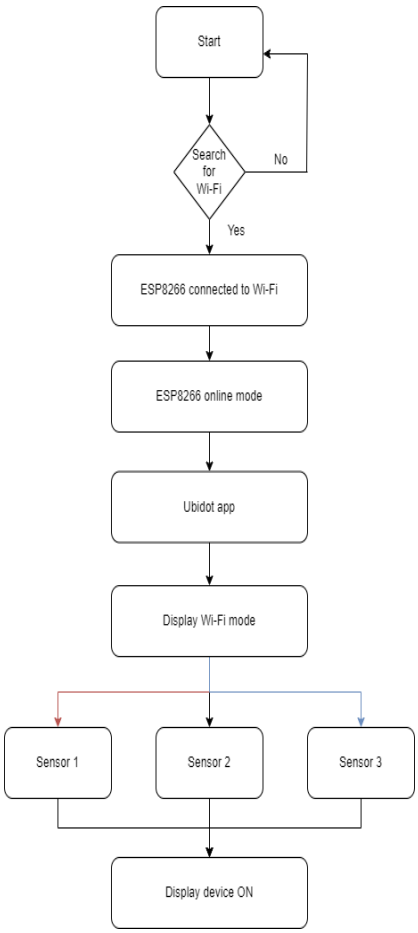

Fig.2.FLOW CHART

EXPERIMENTAL SETUP

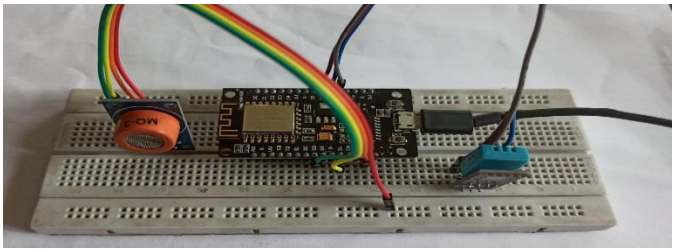

FIG.3. Experimental setup

UBIDOT MOBIL APP OUTPUT

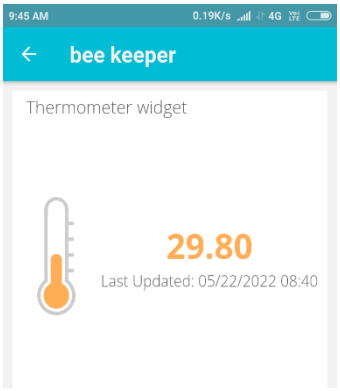

Fig.4.Temperature widget output

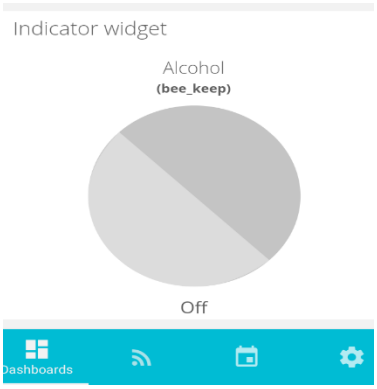

Fig.5. Indicator widget output

3.CONCLUSIONS

The proposed method is based on IOT-based smart bee keeping. The sensor values are successfully sent to the cloud computing server. Also, the user can get the sensor values in real time using Ubidots mobile application. The DHT11 sensor is connected to Node MCU, which is connected to the internet through the Wi-Fi module. Using the ubidots app, users can monitor the beehive continuously. The user can do the operation anywhere in the world and if we have the internet. The data from the sensors can be analyzed to get a clear idea about the bee hive.

FUTURE SCOPE

In future,the system can be improved by adding self-powering technologies using different energy harvesting method such as piezoelectric energy harvesting, Electro magnetic and Electrostatic transducers. Bees communicate within the colonies by waggle dance, during the dance bees produce specific pulse sound.By observing the sound of beehives we can get more data about beehives.

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