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LORA BASED SMART IRRIGATION SYSTEM FOR REMOTE AREAS

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Abstract - *Lora devices and wireless radio frequency technology (LoRa Technology) into its Autonomous Irrigation Solution (AIS).WaterBit provides irrigation automation for growers based on analysis of granular, ground-truth data collected through the WaterBit system, including line pressure and flow, soil moisture and temperature and more. With WaterBit's AIS, growers maximize yield on all soil types, while optimizing labour and other input resources. The complete solution is used in a wide range of crops including grapes, berries, nuts, cotton, corn and green leaves. The purpose of waterbit in the development of its solution was to create the most reliable and highest quality network product in agriculture. To achieve this, WaterBit disposed of the batteries in its production units and allowed duplex communications as well as better control with LORA Technology.*

Key Words: Lora, raspberry pi b+, IOT and Smart Irrigation.

1. INTRODUCTION

Agriculture is considered to be the idea of existing for the human species as it is far from being the main source of food grains and different uncooked materials. It plays a key role in the economic growth of the country. It also gives enough employment opportunities to people. The growth of the agricultural region is crucial to the improvement of the country's economic situation. Unfortunately, conventional techniques of farming are nevertheless used by many farmers who end up producing few plants and fruits [2]. This paper proposes to use a system to monitor the field data, which provides additional attention to the field. Make agriculture smart by embedding the IoT [4]. This document is intended for an intelligent irrigation system based mainly on ESP32 LORA. The video displays different environmental elements such as temperature, humidity and the amount of water required across crops, using sensors such as temperature, soil moisture and water flow [5]. The information is accumulated and given to the ESP 32 located in the farm that is linked to any other ESP32 located inside the variety of two to 9KM (variety may be advanced if an antenna with excessive benefit is used) via LORA protocol and the motor is controlled automatically by using moisture sensor and water flow sensor.

2. LITERATURE SURVEY

Agriculture is a subject where water is needed in greater quantity. As a result of high crop yields, Oversight is an important job for farmers. Due to a variety of agricultural issues, further development is also urgently required and practical economic strategies for growing plants Wasteful water is a real issue in agriculture. During cultivation, the fields receive a larger amount of water. There are a number of strategies for saving or manipulating water waste in agriculture [9]. Globally, most irrigation structures paint manually. These previous strategies are superseded by semi-automatic and automated processes. The standard strategies available are like drip irrigation, sprinkler system, ditch irrigation, terraced irrigation. The global irrigation scenario is classified by extended hobby for better agricultural efficiency, negative performance and reduced access to water for agriculture. These problems can be rectified if we employ clever irrigation structures. For instance, measuring the humidity profile of a field, the purpose of this keep the plants out of the water, to obtain the temperature because plants are also susceptible to temperature. The parameters are computed with different sensors [11]. Thanks to the Internet of Things, agricultural merchandise will have a clean boom state, higher garage preservation and exceptional quality. Thanks to the development of the Internet of Things, its innovation has been closely linked to all factors of agriculture. The usual accessible methods look like drip irrigation, irrigation system, ditch irrigation, terraced irrigation. The global irrigation situation is characterized by an increased interest in improved agricultural efficiency, poor performance and reduced access to water for agriculture. Those problems can be fixed if we use intelligent irrigation systems. Smart irrigation strategies have been proposed for use of various devices: ESP8266, Arduino, ZigBee, GSM, GPRS, Smartphone[10]. By using above mentioned techniques the crop yield is increased to some level and man power also reduced but ESP8266 turned into used like an extension to Arduino to ship the information over the WiFi protocol without connecting it to the internet. GPRS and GSM indulge more price from the carrier provider. ZigBee is an outdated protocol [1][2]

3. SYSTEM OVER VIEW

All hardware and sensor components are connected to ATMega 328p IC, and information is passed to farmers in form of application notification by using the LORA module at a range of 2 to 10 km with an operating frequency of 433 MHZ.

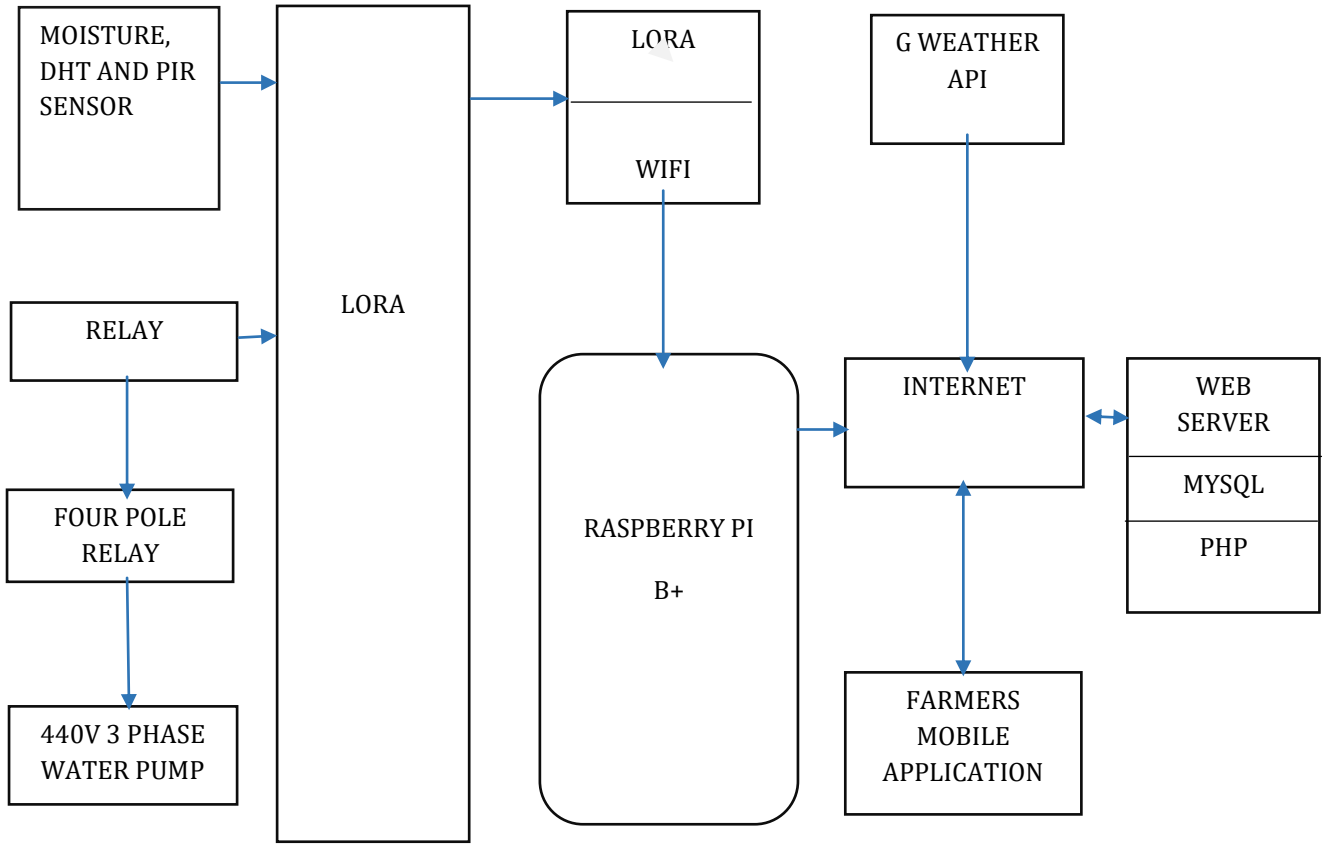


Fig-1: Block diagram of smart irrigation

4. DESIGN AND IMPLEMENTATION SETUP

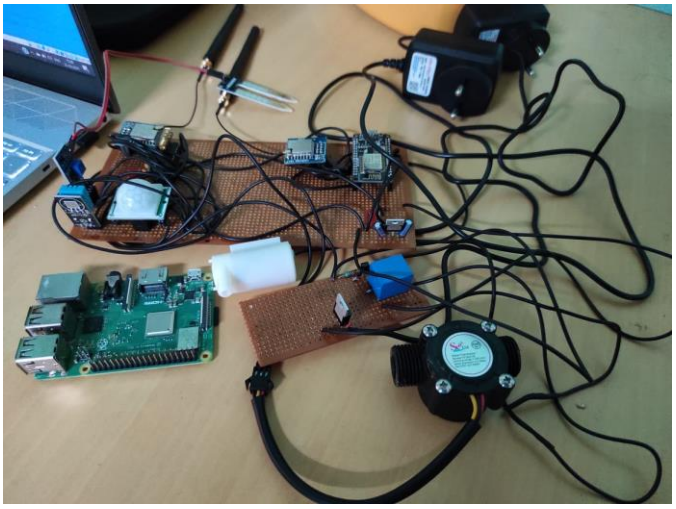


Fig-2: Hardware connection

In smart irrigation system, we use different types of sensors to replace the farmer approximately the sphere. Sensors utilized are water waft sensor that may degree the quantity of water utilized, a soil moisture sensor that may compute the moisture of the sphere maintaining the plants from waterlogging troubles and a temperature sensor to test the temperature in view that plants are temperature touchy as well. Thus the system conscious the farmer so that water pump is grown to become directly to keep the crop. All sensors mentioned above are connected to the board and this setup was placed in a different corner of each field. All sensors are checked and the reading of this one is also treated by ATMega328P IC. All processed readings are transmitted to farmers using LORA technology.

4.1 LORA TECHNOLOGY

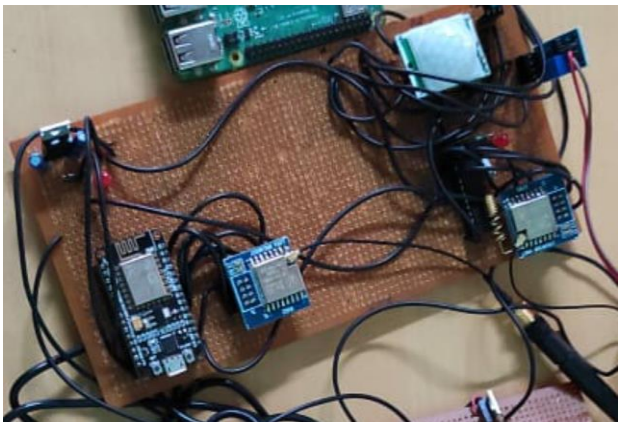


Fig-3: Lora and wifi module

LORA (Long Range) was founded by Semtech in 2012.It uses modulation called CSS .Data range was up to 50kps.Lora uses unlicensed ISM band that means sub giga hertz and operating frequency is 433Hz. [8] It can cover the range from 2 to 10 km basic on the size of the antenna. Lora on the transmitter side transmits the value detected by the sensor to Lora on the receiver side using the overall Wi-Fi connection.

4.2 RASPBERRY PI B+

Fig-4: Raspberry pi board

Here raspberry pi board act as server so each farmer will be provided with an login id and password, it is connected to power supply and raspberry pi has been installed with software called MYSQL and PHP. In the end the whole value detected will reach the farmer by App notification which is developed using the language C, C++. Furthermore, if the moisture content in the field proves to be low or high, the motor will be switched on or off automatically.

5. RESULT

5.1 APP OUTLOOK

Fig-5: App outlook

5.2 APP INTERFACE

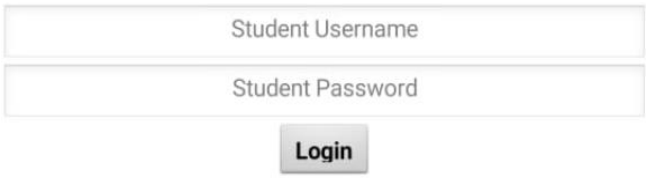
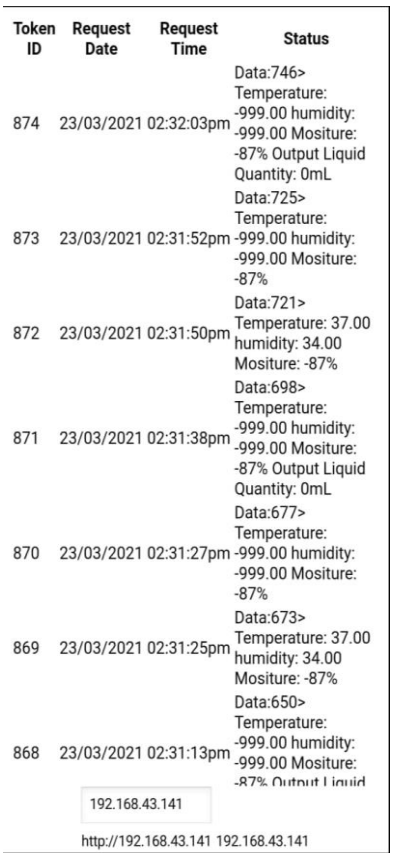


Fig-6: Login screen

5.3 SENSORS SENSED VALUE

In the picture below, we can see the condition of the sensors with the respective time and date. Where the token ID shows the count of notifications received in the application.



Token ID	Request Date	Request Time	Status
874	23/03/2021	02:32:03pm	Data:746> Temperature: -999.00 humidity: -999.00 Mositure: -87% Output Liquid Quantity: 0mL
873	23/03/2021	02:31:52pm	Data:725> Temperature: -999.00 humidity: -999.00 Mositure: -87%
872	23/03/2021	02:31:50pm	Data:721> Temperature: 37.00 humidity: 34.00 Mositure: -87%
871	23/03/2021	02:31:38pm	Data:698> Temperature: -999.00 humidity: -999.00 Mositure: -87% Output Liquid Quantity: 0mL
870	23/03/2021	02:31:27pm	Data:677> Temperature: -999.00 humidity: -999.00 Mositure: -87%
869	23/03/2021	02:31:25pm	Data:673> Temperature: 37.00 humidity: 34.00 Mositure: -87%
868	23/03/2021	02:31:13pm	Data:650> Temperature: -999.00 humidity: -999.00 Mositure:

192.168.43.141

http://192.168.43.141 192.168.43.141

Fig-7: Sensors sensed value

6. CONCLUSION

The LORA based mainly conversation fully has been formulated in the spirit of convenience of use, low cost and renovation. The gadget allows to present a better yield of the culture that leads to a higher income for the person and growth with the inside of the meal production. For future improvement, an additional safety system can be added as CCTV and recorded footage can be transmitted to farmers via application notification using the same LORA system.

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