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LoRa Wireless Sensors Network for Fruit and Vegetable Growing Application

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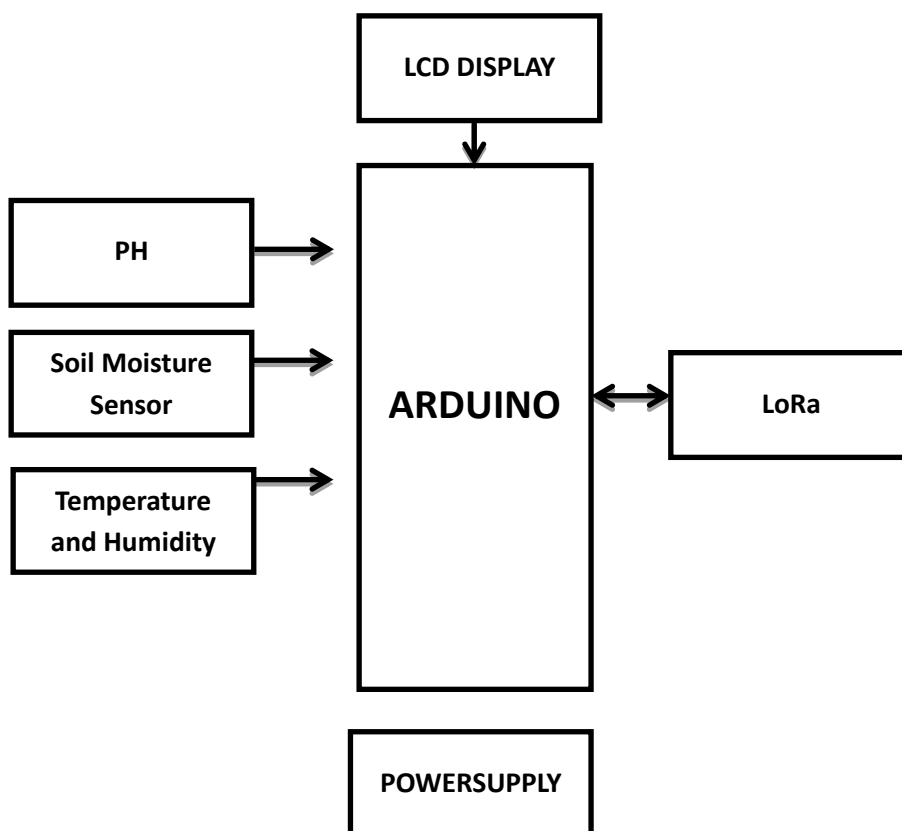
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ABSTRACT: Lora devices and wireless radio frequency technology (LoRa Technology) into its Autonomous Irrigation Solution (AIS).it provides irrigation automation for growers based on analysis of granular, ground-truth data collected through the Waterbit system, including line pressure and flow, soil moisture and temperature and more. With 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. LoRa has low power consumption, so it may operate around ten years with a single battery, in addition to its long range of coverage. Therefore, a smart irrigation system equipped with LoRa has

I. 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. 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. 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. 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.

**Fig 1: BLOCK DIAGRAM: (N1)**

The Step down Transformer is used to step down the main supply voltage from 230V AC to lower value. This 230 AC voltage cannot be used directly, thus it is stepped down. The step down voltage is consists of 12V. The Transformer consists of primary and secondary coils. To reduce or step down the voltage, the transformer is designed to contain less number of turns in its secondary core. The output from the secondary coil is also AC waveform. Thus the conversion from AC to DC is essential. This conversion is achieved by using the Rectifier Circuit/Unit.

II. 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. 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. 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. 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.

III. METHODS

A simple electromagnetic relay, such as the one taken from a car in the first picture, is an adaptation of an electromagnet. It consists of a coil of wire surrounding a soft iron core, an iron yoke, which provides a low reluctance path for magnetic flux, a moveable iron armature, and a set, or sets, of contacts; two in the relay pictured. The armature is hinged to the yoke and mechanically linked to a moving contact or contacts. It is held in place by a spring so that when the relay is de-energized there is an air gap in the magnetic circuit. In this condition, one of the two sets of contacts in the relay pictured is closed, and the other set is open. Other relays may have more or fewer sets of contacts depending on their function. The relay in the picture also has a wire connecting the armature to the yoke. This ensures continuity of the circuit between the moving contacts on the armature, and the circuit track on the Printed Circuit Board (PCB) via the yoke, which is soldered to the PCB.

When an electric current is passed through the coil, the resulting magnetic field attracts the armature and the consequent movement of the movable contact or contacts either makes or breaks a connection with a fixed contact. If the set of contacts was closed when the relay was de-energized, then the movement opens the contacts and breaks the connection, and vice versa if the contacts were open. When the current to the coil is switched off, the armature is returned by a force, approximately half as strong as the magnetic force, to its relaxed position. Usually this force is provided by a spring, but gravity is also used commonly in industrial motor starters. Most relays are manufactured to operate quickly. In a low voltage application, this is to reduce noise. In a high voltage or high current application, this is to reduce arcing.

If the coil is energized with DC, a diode is frequently installed across the coil, to dissipate the energy from the collapsing magnetic field at deactivation, which would otherwise generate a voltage spike dangerous to circuit components. Some automotive relays already include that diode inside the relay case. Alternatively a contact protection network, consisting of a capacitor and resistor in series, may absorb the surge. If the coil is designed to be energized with AC, a small copper ring can be crimped to the end of the solenoid. This "shading ring" creates a small out-of-phase current, which increases the minimum pull on the armature during the AC cycle

By analogy with the functions of the original electromagnetic device, a solid-state relay is made with a thyristor or other solid-state switching device. To achieve electrical isolation an optocoupler can be used which is a light-emitting diode (LED) coupled with a photo transistor.

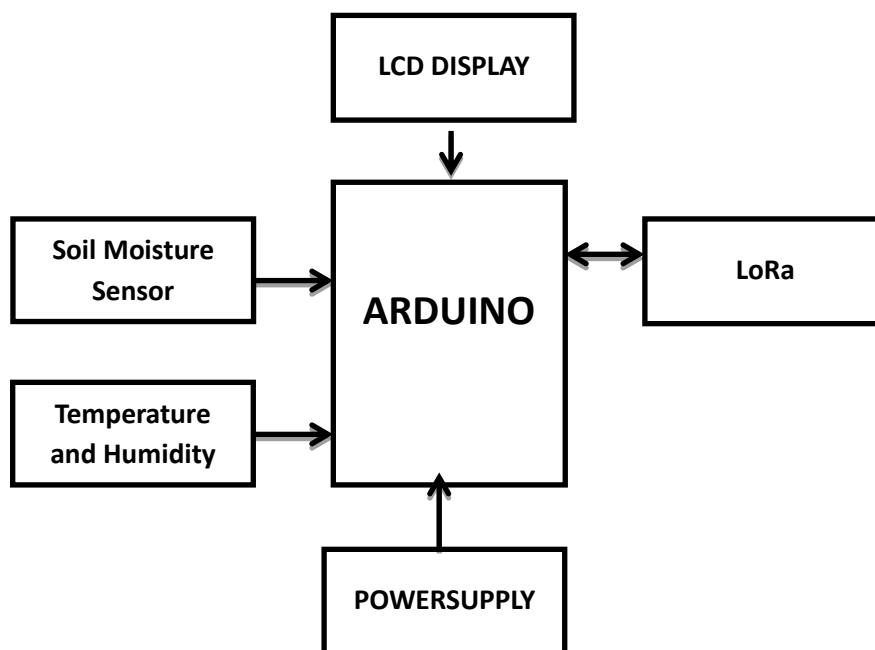


Fig 2: BLOCK DIAGRAM: (N2)

Isolate the controlling circuit from the controlled circuit when the two are at different potentials, for example when controlling a mains-powered device from a low-voltage switch. The latter is often applied to control office lighting as the low voltage wires are easily installed in partitions, which may be often moved as needs change. They may also be controlled by room occupancy detectors in an effort to conserve energy,

Logic functions. For example, the Boolean AND function is realized by connecting normally open relay contacts in series, the OR function by connecting normally open contacts in parallel. The change-over or Form C contacts perform the XOR (exclusive or) function. Similar functions for NAND and NOR are accomplished using normally closed contacts. The Ladder programming language is often used for designing relay logic networks.

IV. RESULT ANALYSIS

The applications of IoT and LoRa technologies have received great interest for their support of different applications in large-scale agriculture farms. This work presented the results of the hardware and software platform which target large-scale farms. The proposed platform overcomes the challenge of legacy solutions, including hardware and services, to support extended coverage. Detailed descriptions for the proposed architecture have been given, including the communication between sensor nodes, LoRa gateways, and the network server for real applications in Chile.

Although most of the research has been carried out by conducting different experiments for different crop farms, this work has focused on designing and building the complete sensor network with low costs (infrastructure investment and operating expenses). Furthermore, the developed LoRa simulation model using FloRa showed the network performance with respect to data delivery ratio, energy consumption, throughput, number of collisions and spreading factor distribution.

Sketch – The first new terminology is the Arduino program called “sketch”. Structure

Arduino programs can be divided in three main parts: Structure, Values (variables and constants), and Functions. In this tutorial, we will learn about the Arduino software program, step by step, and how we can write the program without any syntax or compilation error.

Let us start with the Structure. Software structure consist of two main functions –

- Setup() function
- Loop() function

Fig 7.1: setup and loop function screen

Void setup () { }

- PURPOSE – The setup() function is called when a sketch starts. Use it to initialize the variables, pin modes, start using libraries, etc. The setup function will only run once, after each power up or reset of the Arduino

Void Loop () { }

- PURPOSE – After creating a setup() function, which initializes and sets the initial values, the loop() function does precisely what its name suggests, and loops consecutively, allowing your program to change and respond. Use it to actively control the Arduino board.

Decision making structures require that the programmer specify one or more conditions to be evaluated or tested by the program. It should be along with a statement or statements to be executed if the condition is determined to be true, and optionally, other statements to be executed if the condition is determined to be false.

V. CONCLUSION

This project work presents use of hardware module and android mobile app for smart irrigation system. by using this latest technology we can transfer the data without the third party support, and by using the method the network issue is being resolved. And the growth of the plant and yield of the agriculture is stepping to new stage. Here with the use smart sensor we are monitoring and controlling the various parameter of the agriculture. The hardware model will help them to avoid the all-time manpower support.

By using the technology the transmission of information is meet its goal effectively without any disaster of data loss. And the main feature of the system is it is purely configured technology. If once we fix the installation and the working setup it will continuously do its duty with effectively for its master.

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