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Crop Monitoring System Using IOT

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Abstract
Currently, the low agricultural output is causing farmers to suffer. Low crop growth is primarily caused by knowledge of soil fertility and crop selection, even though proper crop selection is the primary booster key for enhancing agricultural yield by doing soil analysis and taking metrological elements into consideration. Farmers with limited experience in conventional farming are finding it difficult to make wise crop selection choices in the current environment. The low soil fertility is caused by the same crop being chosen for each seasonal cycle. The goal of this research is to use IoT devices to create an accurate and efficient system. Compared to the outdated manual laboratory testing procedures, which are subject to human errors, such a system is predictable. A crop's proper selection is mostly important in the agricultural field. As a contribution, we offer Smart Crop Selection (SCS), an IOT-based approach that is based on soil and metrological factor data. These variables include soil moisture content, temperature, and precipitation. Because these issues are not given as much care as they should, existing IoT-based systems are less efficient than our proposed model. Real-time sensory data is transmitted to Firebase cloud for analysis in the suggested model
Keywords: *Agricultural field, IoT, Moisture Content, Smart Crop Selection (SCS), Temperature*

1. Introduction
The creation and application of IoT and machine learning-based smart agriculture technologies is revolutionizing the agricultural industry by increasing crop productivity while lowering costs. The World Bank estimates that if the world population keeps growing at its current rate, food consumption will increase by 50% by 2050. To produce high-quality and large-scale agricultural production, smart technology adoption in agriculture must be prioritized. With the acquisition of time series data from sensors, the IoT and machine learning combo may undoubtedly assist reduce costs and increase production scale. Crop productivity is heavily dependent on a few specific elements. These factors have an impact on around 51% of the crop output. These variables include soil moisture content, humidity, and temperature.

2. Existing System
Consumers using traditional methods may waste a significant amount of water. Thus, the idea of farming by robots was created. The system became dependable as a result of the notable rise in production efficiency achieved by technical advancements. Considering the unique features of soil helps establish how best to manage the water supply. The Pic Micro Controller used in the prior system lacked a digital pin and a Wi-Fi module.

2.1 Drawbacks
- IoT and ml application not possible
- Less accuracy

3. Proposed System
This sensor measures temperature using a Negative Temperature Coefficient Thermistor, whose resistance value decreases as temperature rises. This sensor is typically composed of semiconductor ceramics or polymers in order to obtain a greater resistance value even for the smallest change in temperature. With a 2-degree precision, the DHT11's temperature range is 0 to 50 degrees Celsius. This sensor's humidity range is 20 to 80%, with an

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accuracy of 5%. This sensor has a sampling rate of 1Hz, meaning it provides one reading per second. The DHT11 has a low profile and runs on a power range of 3 to 5 volts. 2.5 mA is the maximum current that is used during measurement.

4. Flow Diagram

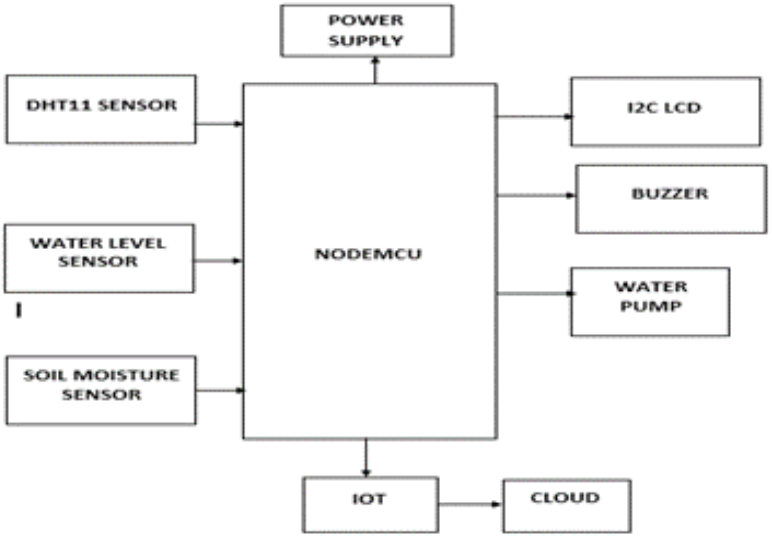

Figure1 Temperature Coefficient Thermistor

5. Sensor for Soil

An analog capacitive soil moisture sensor that uses capacitive sensing to determine soil moisture levels is shown in the figure 1 below. The amount of water in the soil determines how much capacitance is there. The voltage level ranges from a minimum of 1.2V to a high of 3.0V, depending on the capacitance value. The main reason why capacitive soil moisture sensors are utilized is because their long service life is attributed to their ability to withstand corrosion. The resistivity and soil moisture are inversely correlated: conductivity is determined by the amount of water in the soil. Because of its increased conductivity, soil with more water in it has less resistance. Because the soil has less water, it has low conductivity, which raises resistance.

6. Benefits of Water Level

- Simple installation
- Low maintenance
- Alerts you when water levels are too high or too low
- Low and high alerts
- Compact design Automatic water level adjustment
- Reduces water and electricity usage
- Helps prevent seepage of tanks overflowing onto roofs and walls
- Automatic operation saves manually labor time
- Uses minimal energy, ideal for continuous operations
- Indicates water levels in any kind of storage tank or body of liquid
- A water alarm is loud so you can easily hear it

7. Water Pump Working Principle

The positive displacement principle and kinetic energy are the two basic components that drive a water pump's operation. While some pumps can power other types of drivers, such as gasoline or diesel engines, others require AC or DC electricity to operate the water pump's motor. The water pump is a multipurpose household tool that is lightweight and portable. Large volumes of water are pumped from one location to another using these pumps. A water pump's primary function is versatility. A well-chosen and high-quality pump can be ideal for many

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tasks such as draining water from a low-lying area that has flooded, replenishing swimming pools and bathtubs and recirculating pesticide or fertilizers.

8. Software Required

The GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL)[1] govern the dissemination of the project's open-source hardware and software, allowing anyone to produce Arduino boards and distribute software. Commercial preassembled Arduino boards are available, as well as Homemade kits. An assortment of microprocessors and controllers are used in Arduino board designs. Sets of digital and analog input/output (I/O) pins on the boards allow them to be interfaced with different expansion boards (shields) and other circuits. To show figure 2 the boards have serial communications interfaces, some of which support USB (Universal Serial Bus), which is also used to load software from personal computers

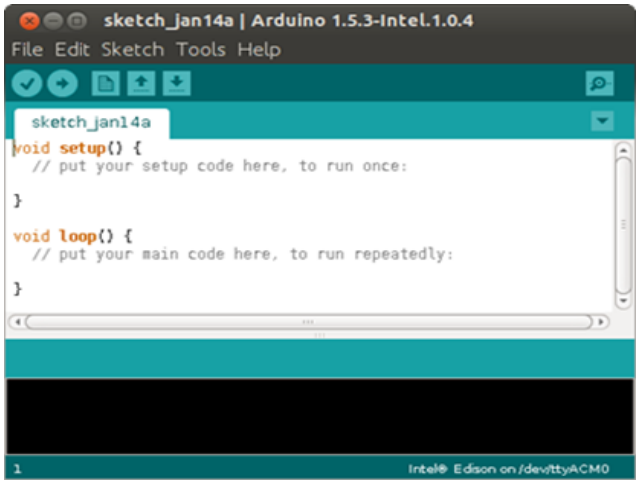

Figure 2 The Gnu Lesser General Public License (Lgpl)

9. Cloud

There are three key features that set cloud services apart from conventional web hosting. It is elastic, meaning a user can have as much or as little of a service as they want at any one time; it is offered on demand, usually by the minute or the hour; and it is completely handled by the provider figure 3 (all the customer needs is a personal computer and Internet connectivity). Interest in cloud computing has increased due to notable advancements in virtualization and distributed computing, as well as better access to high-speed Internet.

Figure 3 Imp cloud to high-speed internet

- **Private View:** Information about your channel that is visible only to you is displayed on this page.
- **Public View:** Use this page to see chosen fields and channel visuals if you decide to make your channel publicly accessible.
- **Channel Settings:** Every channel parameter you specified upon creation is displayed on this screen. From this tab, you can modify, clear, or remove the channel.
- **Sharing:** Channel sharing options are displayed on this tab. A channel can be made private, shared with all users (public), or shared with just a subset of users.
- **API Keys:** Your channel's API keys are shown on this tab. To read from and write to your channel, use the keys.
- **Data Import/Export:** You can import and export channel data using this tab.

10. Future Scope

The system can be enhanced further to add following functionality: Use of soil moisture sensors, environment sensors, pH sensors to increase the accuracy while predicting the crop. Locations market requirements can be considering, and neighbourfarmers crop while suggesting the suitable crop.

Conclusion

In this paper we have proposed an innovative approach for smart agriculture using two emerging technologies: Internet of Things and Machine Learning. With the use of both live and historical data helps to increase the accuracy of the result. Also comparing multiple ML algorithms enhances the accuracy of the system. Thus system will be

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used to reduce the difficulties faced by the farmers and will increase the quantity and quality of work done by them.

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