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IoT Based Smart Agriculture Monitoring, Automation and Intrusion Detection System

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Abstract

Manual irrigation is still widely used in agricultural field using traditional drip and can watering. However, traditional irrigation systems are inefficient and inexact, leading to either insufficient or excessive watering. Moreover, it is difficult for farmers to predict suitable quantities at the appropriate time. Manual monitoring of the crop field may also lead to human error and is potentially risky for rural areas. Farmers may also not be aware of intrusions if they are not on location. Therefore, this project is designed to

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develop a smart monitoring and automated irrigation system to provide not only efficient water consumption based on specific conditions, but also enables real-time monitoring of the environment. Furthermore, this system prevents damage to plants and reduces the likelihood of plant theft. This system uses NodeMCU ESP32 as a microcontroller that collects environmental data such as humidity, temperature, soil moisture levels from sensors. The NodeMCU is integrated with a relay and RTC module to irrigate plants at specific times and is also equipped with a passive infrared sensor to detect intruders near the crop-field. Upon detection, an ESP32 camera is used to automatically capture the current conditions and farmers will be subsequently notified. Warnings are also sent to farmers upon detection of unwanted circumstances such as extreme temperature, which could prevent instances of open burning. The utility of the developed prototype is evident in the way it automatically irrigates the crop field without human intervention. Farmers may monitor and manually control the irrigation process using an attached Android application. Additionally, they may manually activate a buzzer warn off any potential malicious actors. © Published under licence by IOP Publishing Ltd.

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