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Smart Irrigation System using IOT

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Abstract: ***In India 70% population depend upon farming and one third of nation's capital comes from farming .Hence our papers aims highlighting the key strategies that can be efficient in agriculture practice and for saving time. Provides a better water management system and concentrate more on problem like over irrigation by providing exact information of water needed. The basic objective of the paper is to include smart irrigation with smart control system and also provide intelligent decision making system based on accurate real time field data.***

I. INTRODUCTION

The use of traditional approach of farming has been carried out since ages. Agriculture practice is carried out by our farmers to meet the food demand of growing population of India. Growth in agriculture sector is necessary for both the social and economic development of our country. But almost half of the population of farmers depend on traditional approach i.e manual labor on field. Water requirement for agriculture differ from crop to crop and also vary from soil to soil as moisture content is different for each soil and differ from places to places. India is a largest user for freshwater, and most of the freshwater is used for agriculture purpose followed by industrial sector and domestic sector.

So, efficient use and management of freshwater is also an important concern. As technology advances, development is also seen in agriculture field. Practice of features involving automated irrigation are now being used. This paper present an smart irrigation for agriculture purpose with the use of devices like raspberry pi and an android platform is also used. In this automated modern technique for irrigation we are using soil moisture sensors and humidity sensor to measure the moisture content , which gives direction to the motor pump that when it should be turned on depending on the requirements. The new system is designed in such a way to work in abnormal conditions and also overcome the flaws of the existing system. This paper focus on online monitoring of agriculture field with the help of Wi-Fi on android phones and parameters such as temperature and soil moisture. The new system is much more efficient and effective as compared to traditional approaches.

II. LITERATURE SURVEY

A. Wireless Sensor Networks

The architecture consists of various WSN nodes placed in field under irrigation and a base station located nearer to field which is at a particular defined distance to record, monitor and analysis the data received from multiple WSN nodes. The sensors are connected to microcontroller which process the data and perform the particular action in detail. The block diagram consist of various subsystem such as Solar Energy Harvesting PV cells, Boost convertor and storage devices for storing energy. The energy produced from the convertor is not enough to drive the microcontroller so boost convertor is used to maximize the voltage. This paper present the Dynamic Irrigation system through sensors and on stream cameras for the conservation of water resource and pesticide avoidance. This system is experimented through proteous7 simulation software.

B. Low Cost System

In this paper we present a prototype which consists of number of sensors placed at different directions of farm field. Each sensors are integrated with wireless networking device and the data received by ATMEGA-328 microcontroller which is on ARDUINO-UNO development board. Soil moisture sensor include comparator ((LM393) which converts analog data to discrete. Two soil probes consist of two thin copper wires each of 5 cm length which can be immersed into the soil under test. The circuit gives a voltage output corresponding to the conductivity of soil.

The Arduino-Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. Soil moisture sensors are used to sense the moisture level in soil and send the data to wireless network device and the data from network device send to ARDUINO-UNO where an ATMEGA-328 Microcontroller process the data and calculate the percentage of dryness.

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C. Arduino Based System

In this paper an automated irrigation system for efficient water management and intruder detection system has been proposed. In this system, various sensors such as pH, soil moisture, DHT11, PIR (intruder detecting system) and pressure sensors are connected to the input pins of arduino microcontroller. The sensed values from the sensors are displayed in LCD. The Microcontroller used here is an Arduino UNO. The UNO is a Microcontroller board based on ATMEGA 328P. The ATMEGA 328P has 32kB of flash memory for storing code. The ESP8266 Wi-Fi module is a self - contained SOC (System on Chip) with integrated TCP/IP (Transmission Control Protocol/Internet Protocol) protocol stack that can give any microcontroller access to any Wi- Fi network. Measuring four parameters such as soil moisture, temperature, humidity and pH values and the system also includes intruder detecting system.

D. Raspberry Pi Based System

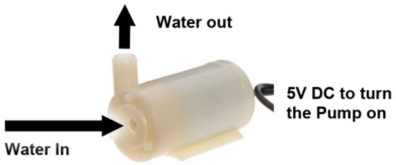
This paper presents an smart irrigation system for agriculture farm with the use of devices like raspberry pi. Python programming language is used for automation purpose. webcam is interfaced to Raspberry Pi via Wi- Fi module. Raspberry Pi is the heart of the system. The Raspberry Pi Model B+ incorporates a number of enhancements and new features. Improved power consumption, increased connectivity and greater IO are among the improvements to this powerful, small and lightweight ARM based computer. The Raspberry Pi cannot directly drive the relay.

III. PROPOSED SYSTEM

The proposed paper work uses various components for the development of efficient model that can be used in real time agriculture practice.

A. 5V Water Pump

Micro DC 3-6V Micro Submersible Pump mini water pump is used for mini water circulation system. It is also used for automated irrigation system. This is a low cost, small size Submersible Pump Motor which can be operated from a 2.5 ~ 6V power supply. It can take up to 120 liters per hour with very low current consumption of 220mA. The continuous working life is 500 hours. The driving power can be direct current or magnetic power.

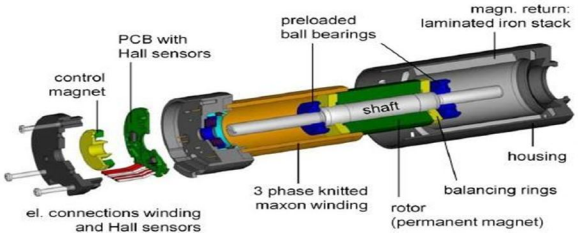


B. Adafruit IO

Adafruit IO is a system that makes data useful. Our focus is on ease of use, and allowing simple data connections with little programming required.IO includes client libraries that wrap our REST and MQTT APIs. IO is built on Ruby on Rails, and Node.js.Adafruit.io is a cloud service - that just means it runs for the user and don't have to manage it. Users can connect to it over the Internet. It's meant primarily for storing and then retrieving data but it can do a lot more.

C. DC Motor

DC motors are widely used, inexpensive, small and powerful for their size. Reduction gearboxes are often required to reduce the speed and increase the torque output of the motor. Several characteristics are important when selecting DC motors and these can be split into two specific categories. The first category is associated with the input ratings of the motor and specifies its electrical requirements, like operating voltage and current. The second category is related to the motor's output characteristics and specifies the physical limitations of the motor in terms of speed, torque and power.



Internal Structure of DC Motor

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D. Sensors

Various sensors are used for implementation of the proposed system designed. The DHT11 sensor is used for temperature and humidity sensor. This module integrates DHT11 sensor and other required components on a small PCB. The DHT11 sensor includes a resistive-type humidity measurement component, an NTC temperature measurement component and a high-performance 8-bit microcontroller inside, and provides calibrated digital signal output.

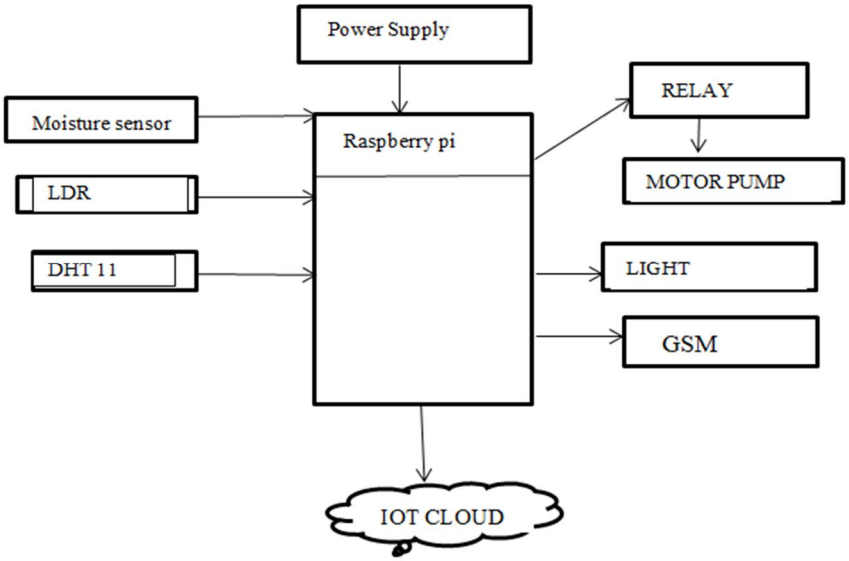
Various temperature sensors are available and depending on the application, range, accuracy and budget suitable sensor is chosen to accomplish the task of temperature measurements. The device collects information from various temperature sensor and convert it to a form understandable by other devices.

E. Raspberry Pi

It is just like a small computer that comes with CPU, GPU, USB ports and i/o pins and can be connected with external peripherals and helps in running number of operations like regular computer.

First generation Raspberry Pi was developed in 2012, with the intention of making computer learning easy. It is tiny single board computer that comes with CPU,GPU,USB port and i/o pins capable of doing some functions. It comes with quad processor that show robust performance and speed exhibits more than 80% accuracy. The RAM designed for raspberry pi 3 is also much more efficient as compared to previous versions.

IV. WORKING MODEL



Block Diagram Of The Proposed System

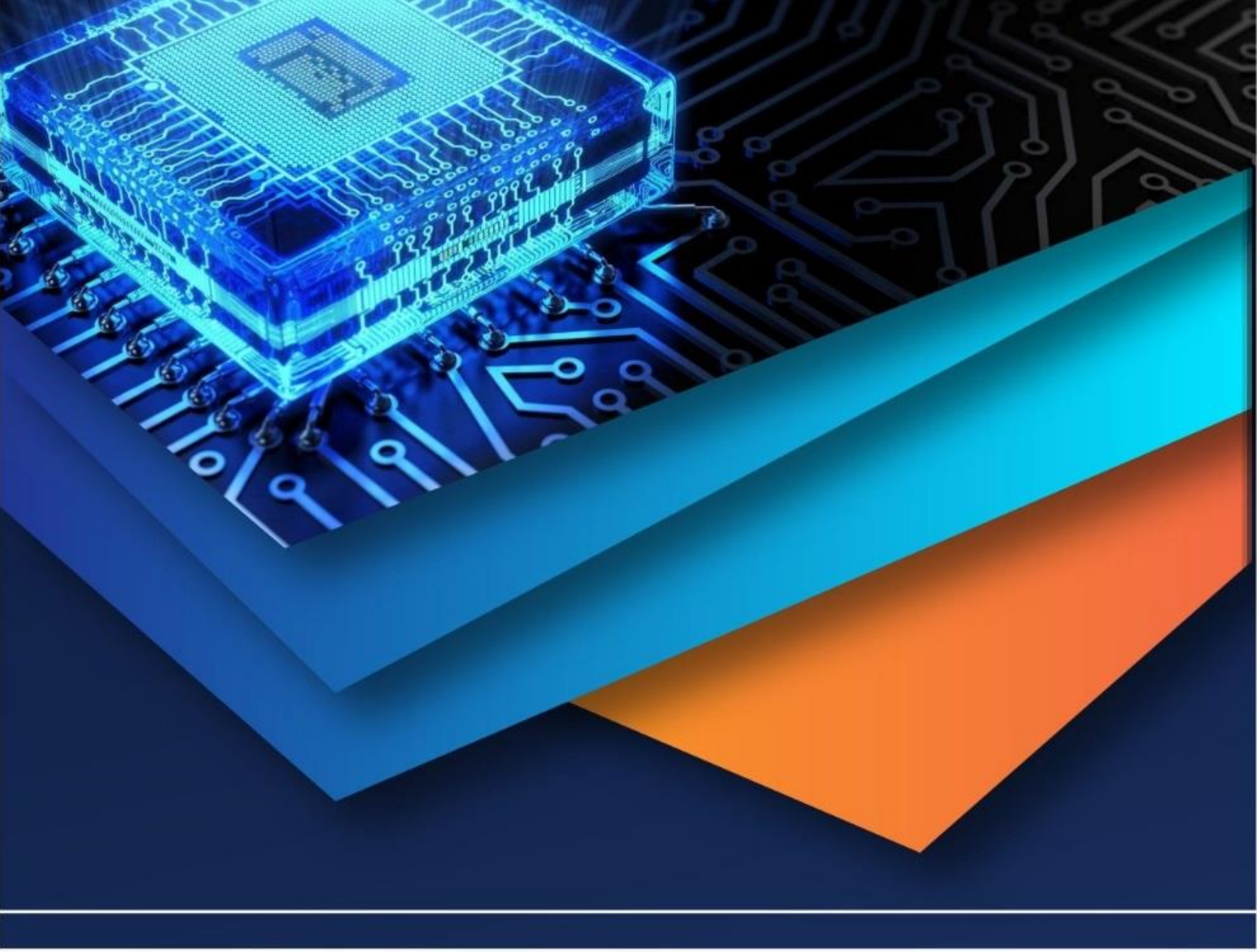
V. CONCLUSION

The proposed uses a fully automated model which is much more efficient and cost effective as compared to traditional model. Since the population is growing the need for such an efficient model is required. The system provides the time to time details of the crops on the android phones of the users where data can be monitored and the data can be used for future references also. The data received on the android phones of the user help the farmers to decide whether the motor should be turned on automatically or as per user's requirement. The entire system is monitored by microcomputer called raspberry pi. The GSM module is used to transfer data to user's android phones.

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