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ANDROID BASED INSTINCTIVE NUTRITION ADD-ON & INTENSIVE CARE FOR SMART E-AGRICULTURE

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Abstract:

An automated irrigation system is developed to minimize and maintain water quantity usage for farming. The system will have required sensors of our interest like temperature, moisture, humidity sensors placed in crop field at roots of plants. A micro-controller based relay is used for controlling water supply. Automation is done through IOT i.e., IOT is a shared network that can interact with objects through internet connection. This smart work helps in effective usage of resources like water, fertilizers, electricity. This system is developed for monitoring and maintaining the situation at farm field with sensors. Mobile networks i.e., 3G and LTE, together with smart phones have made tremendous growth in technology. Where objects like micro controller and other are connected to internet with an IP address. This IOT has spread too many fields like home automation, smart agriculture etc., through android mobile app.

KEYWORDS: IOT Based Agriculture Automation, Aurduino, Robot, camera, moisture sensor, Temperature sensor, Text message, Raspberry Pi, Laptop, Android App Blynk.

I. INTRODUCTION:

With the growing adoption of the Internet of Things (IOT), connected devices have penetrated every aspects of our life, from health and fitness, home automation, automotive and logistics, to smart cities and industrial IOT. Thus, it is only logical that IOT, connected devices, and automation would find its application in Agriculture, and as such, tremendously improve nearly every facet of it. Farming has seen a number of technological transformations in the last decades, becoming more industrialized and technology-driven .By using various smart agriculture gadgets, farmers have gained better control over the process of raising livestock and growing crops, making it more predictable and improving its efficiency.

Water is a very precious resource and must be properly utilized. Agriculture is one of those areas which consume a lot of water. And the water is needed in each and every requirements of the humans, animals, plants, etc.

Now a day's internet is widely used. Using internet farmer know about the agriculture field irrigation status. Thus mobile application will be helpful in fulfilling this purpose. It helps farmers to know the status of farm field moisture and temperature through a mobile app and it will make the farmer at some remote places to decide whether he needs to water the field or not. The soil moisture sensor is used for sensing moisture level to find out whether the soil is dry or wet. The moisture sensor and temperature sensor are interfaced with PIC Microcontroller.

II. LITERATURE SURVEY:

[1]An automated irrigation system is developed to optimize water utilization for agricultural crops. The system has a distributed wireless network of sail moisture and temperature sensor placed in the root zone of the plants.**[2]**They have worked with automatic nutrition fertilizer spreading on leaf. Determining the soil condition and water quantity level.**[3]**This paper on " Instinctive Nutrition Add-On & Intensive Care for the APP Development of Smart E-Agriculture" is developed to the automatic nutrition fertilizer spreading to the leaf and robot monitoring the camera. and also developing the mobile android application. This project is using PIC Microcontroller.**[4]**This paper is to minimize this manual intervention by the farmer, saves a lot time for the farmers.

III. EXISTING SYSTEM:

In existing system, the wireless sensor network (WSN) platform is used to senses various parameters. The sensor node (SN) is the relevant component of the system. Through this sensor node the information are obtained and transferred to processor. Hence the particular soil moisture has been obtained and if the moisture content is less than a particular amount then the motor is switched ON and the user is notified through a message that the water is supplied to the plant and when the particular limit of soil moisture has been reached then the motor is switched OFF and notified through a message to the user. So this provides the information to the user through a GSM based process by sending a message to the user that motor is ON/OFF.

Hence this system only concentrates on the usage of the water for the crops and it provides required information about the particular moisture content of the soil and based on the crop planted the limit of the soil moisture has been decided and if the water is required it is automated through a motor to supply required amount of water and intimate the user with a text message that motor is ON/OFF.

LIMITATION:

- Existing system cannot exactly detect infection of the crops.
- Existing system cannot be used to improve the production.

I. PROPOSED SYSTEM:

In the proposed system robotics model provides a facility to control the movement of agricultural vehicle. The quality and quantity of agricultural products can reduce by leaf diseases which have produced and enormous post effect scenario. Early pest detection is a major issue dealt with the plantation crops. First step involves in keen and regular observation of plants. Then the diseased plants will be classified and the affected part of the leaf images will be acquired using camera. These images are then subjected to pre-processing, transformation and clustering. Then, these images are given as input to the processor, and the processor will compare the images. If the image given is affected image, then an automatic pesticide sprayer is involved to spray the pesticide to the localized area in the leaf. If not processor will automatic discard it and the robot will move further.

ADVANTAGES:

- It is efficient method compare then other.
- Handle different irrigation actions.
- To optimize water use for agricultural crops.
- We can easily monitor every process in the Sensor network using IOT.
- Robot is monitor to the camera.

II. SYSTEM SPECIFICATION:

➢ HARDWARE REQUIREMENTS:

The hardware requirements may serve as basis for a contract for the implementation of the system and should therefore be a complete and consistent specification of the whole system.

- Arduino
- Raspberry pi
- Relay
- Temperature sensor
- Moisture sensor
- IR sensor
- LCD display
- Wi-Fi module
- Raspberry pi Camera

➢ SOFTARE USED:

- Raspberry pi(c programming).
- Arduino Uno (python programming).
- Vnc Viewer.
- Node MCU (Blynk).
- Thing speak

III. COMPONENTS DESCRIPTION:

➢ ARDUINO:

- Arduino is an open source and software company, project and user community that designs and manufacturing microcontroller kits for building digital devices and interactive objects that can sense and control both physically and digitally. Its products are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL),[1] permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form or as do-it-yourself (DIY) kits.
- Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards or breadboards (shields) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler tool chains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project.

Fig: Arduino Uno diagram

➢ RASPBERRY PI:

- The Raspberry Pi is series of small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation to promote the teaching of basic computer science in schools and in developing countries. The original model became far more popular than anticipated, selling outside its target market for uses such as robotics. It does not include

peripherals (such as keyboards, mouse and cases). However, some accessories have been included in several official and unofficial bundles. Raspberry Pi 3 Model B was released in February 2016 with a 64 bit quad core processor, and has on-board Wi-Fi, Bluetooth and USB boot capabilities. On Pi Day 2018 model 3B+ appeared with a faster 1.4 GHz processor and a 3 times faster network based on gigabit Ethernet (300 Mbit / s) or 2.4 / 5 GHz dual-band Wi-Fi (100 Mbit / s).

- The motors are controlled with the help of the inputs given from the Raspberry Pi to the IC. The inputs to the IC's pin no 2 and 7 are for the first motor connected at pin 3 and 6. The inputs to pin 10 and 15 are for the second motor which is connected at pin no 11 and 14 as shown in the figure. The inputs are logic 0 or logic 1 given from the Raspberry Pi . Raspberry Pi can be plugged into a TV, computer monitor, and it uses a standard keyboard and mouse.

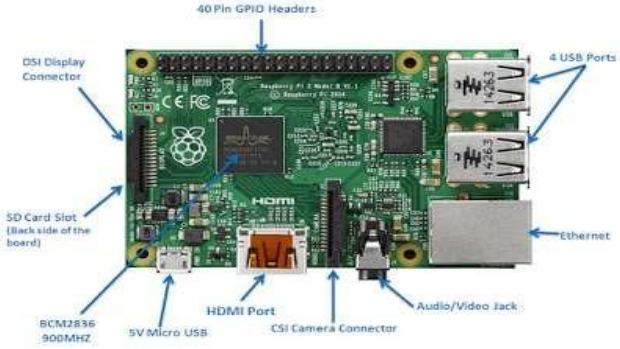

Fig: Raspberry pi diagram

➢ **FEATURES:**

- The Raspberry Pi is a credit card-sized single-board computer.
- A 1.2GHz 64-bit quad-core ARMv11 CPU
- 1GB RAM
- 4 USB ports
- 40 GPIO pins
- Full HDMI port
- Ethernet port
- Combined 3.5mm audio jack and composite video
- Camera interface (CSI)
- Display interface (DSI)
- Micro SD card slot.

➢ **RELAY:**

- A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

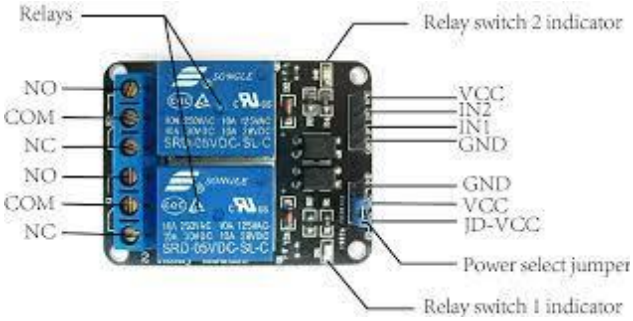

Fig: Relay diagram

- A type of relay that can handle the high power required to directly control an electric motor or other loads is called a contactor. Solid-state relays control power 42 .
- voltage is applied to the reset coil the contacts will transition. AC controlled magnetic latch relays have single coils that employ steering diodes to d.

➢ **TEMPERATURE SENSOR:**

Temperature is one of the most commonly measured parameter in the world. They are used in your daily household devices from Microwave, fritzes, AC to all fields of engineering. Temperature sensor basically measures the heat/cold generated by an object to which it is connected. It then provides a proportional resistance, current or voltage output which is then measured or processed as per our application. Temperature sensor are basically classified into two types

- Non Contact Temperature Sensors: These temperature sensors use convection & radiation to monitor temperature.
- Contact Temperature Sensors: Contact temperature sensors a further sub divided into three type
  1. Electro-Mechanical(Thermocouples).
  2. Resistive Resistance Temperature Detectors (RTD).
  3. Semiconductor based. (LM35, DS1820 etc).
- In this article we will be discussing about LM35 Temperature Sensor which is a semiconductor based sensor. LM35 Temperature Sensor is basically a very low cost and easily available Sensor.

Fig: LM35 Temperature sensor diagram

➢ **MOISTURE SENSOR:**

- Moisture is the presence of a liquid, especially water, often in trace amounts. Small amounts of water may be found, for example, in the air (humidity), in foods, and in various commercial products.
- Moisture also refers to the amount of water vapors present in the air.

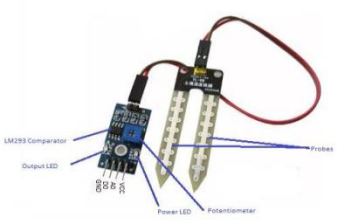

Fig: Moisture sensor diagram

➢ **IR SENSOR:**

- IR Sensor Module Circuit. ... IR sensor is very popular sensor, which is used in many applications in electronics, like it is used in Remote control system, motion detector, Product counter, Line follower Robots, Alarms etc.
- An infrared sensor is an electronic device, that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measures only infrared radiation, rather than emitting it that is called as a passive IR sensor.
- Connect your IR LED to a Power module and head into a dark room (the darker the better). Hold the LED close to and directly pointing at the camera, then take a picture. Most cameras see infrared as purple light, so if you see a very faint purple dot you know your camera can take pictures with the IR LED.

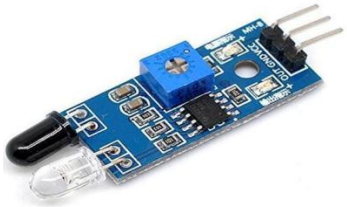

Fig: IR Sensor diagram

➢ **LCD display:**

- LCD is used in a project to visualize the output.
- 16x2 LCD is used in project which indicates 16 columns and 2 rows. So, total 32 characters we can display on 16x2 LCD.
- It can also use in a project to display the pesticide name to be spray on the crops.

Fig: LCD display diagram

➢ **WI-FI MODULE:**

- The ESP8266 Wi-Fi module integrated TCP/IP protocol which has an ability to give any microcontroller to access Wi-Fi network. It is cost effective with the huge growing community. It can host an application or offload all Wi-Fi function from other application. This module has powerful enough onboard processing and storage capacity that allows it to be integrated with the sensor and other application through GPIO with the minimal runtime. It transforms the module into an IOT solution.

Fig: wi-fi module 8266 diagram

- The data transferring happen between the Arduino and an application. It also explains how the conditions will be selected by the user. The Wi-Fi module acts as an host between the application and Arduino, playing an important role in reading and writing data to the Arduino.

➢ **RASPBERRY PI CAMERA:**

- A webcam is a video camera that feeds or streams its image in real time to or through a computer to a computer network. When "captured" by the computer, the video stream may be saved, viewed or sent on to other networks travelling through systems such as the internet, and e-mailed as an attachment. When sent to a remote location, the video stream may be saved, viewed or on sent there. Unlike an IP camera (which connects using Ethernet or Wi-Fi),a webcam is generally connected by a USB cable, or similar cable, or built into computer hardware, such as laptops.
- The term "webcam" (a clipped compound) may also be used in its original sense of a video camera connected to the Web continuously for an indefinite time, rather than for a particular session, generally supplying a view for anyone who visits its web page over the Internet. Some of them, for example, those used as online traffic cameras, are expensive, rugged professional video cameras.

Health care

- Most modern webcams are capable of capturing arterial pulse rate by the use of a simple algorithmic trick. Researchers claim that this method is accurate to ±5 bpm.

Video monitoring

- Webcams may be installed at places such as childcare centers, offices, shops and private areas to monitor security and general activity.
- Webcams typically include a lens, an image sensor, support electronics, and may also include a microphone for sound. Various lenses are available, the most common in consumer-grade webcams being a plastic lens that can be screwed in and out to focus the camera. Fixed-focus lenses, which have no provision for adjustment, are also available.
- As a camera system's depth of field is greater for small image formats and is greater for lenses with a large f-number (small aperture), the systems used in webcams have a sufficiently large depth of field that the use of a fixed-focus lens does not impact image sharpness to a great extent.

Fig: Raspberry pi camera diagram

- The Raspberry Pi Camera v2 is a high quality 8 megapixel Sony IMX219 image sensor custom designed add-on board for Raspberry Pi, featuring a fixed focus lens. It's capable of 3280 x 2464 pixel static images, and also supports 1080p30, 720p60 and 640x480p60/90 video.

IV. BLOCK DIAGRAM:

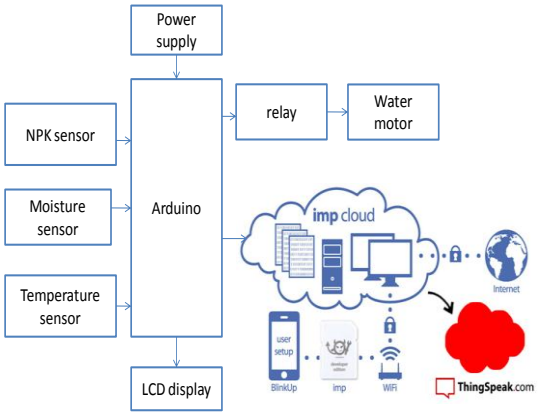

Fig: IOT Based Environmental and soil moisture monitoring

WORKING PROCESS:

- The Supply is connected to step down transformer ,which is used to step down voltage from 230 to 12 volts.
- This is connected to rectifier ,to convert AC to DC .
- Moisture sensor is used to sense the moisture content in the soil and Temperature sensor is used to detect the temperature in the environment.
- These signals are sent to Arduino and the relay is connected with the Arduino.
- NPK sensor is used to measure the nutrient level of the soil.
- LCD is connected with the Arduino which is used to display the moisture level of the soil, temperature of the environment and nutrient level of the soil.
- Wi-Fi module is used to connect with the mobile.
- Node MCU is used to upload dates and results in the blynk app and in the things speak .
- Pump motor is used to remove excess water content in the soil and also to supply water if there is scarcity of water.

V. BLOCK DIAGRAM:

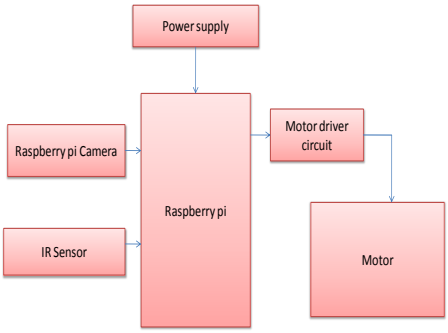

Fig: Leaf sensing and image capturing robot

WORKING PROCESS:

- *The DC gear motor is used to move the robot near to the plants to detect and capture the image of the leaf.*
- *DC gear motor is powered by using the battery.*
- *The camera is used to detect the image of the leaf and the IR sensor is used to detect the plant and these signals are given to raspberry pi.*
  All these results can be viewed in Vnc viewer.
- *Motor Driver IC like L293D or L298 is used for this purpose which has two H-bridge drivers. Hence, each IC can drive two motors. Motor driver does not amplify the current; it only acts as a switch (An H bridge is nothing but 4 switches).*
- *Drivers are enabled in pairs, with drivers 1 and 2 being enabled by the Enable pin. When an enable input is high (logic 1 or +5V), the associated drivers are enabled and their outputs are active and in phase with their inputs.*
- *When the enable pin is low, the output is neither high nor low (disconnected), irrespective of the input.*
- *Direction of the motor is controlled by asserting one of the inputs to motor to be high (logic 1) and the other to be low (logic 0). To move the motor in opposite direction just interchange the logic applied to the two inputs of the motors. Asserting both inputs to logic high or logic low will stop the motor*

CONCLUSION:

Agriculture, and selected mobile wireless communication technology to achieve greenhouse-site monitoring. Remote monitoring system with internet and wireless communications combined is proposed. At the same time, taking into account the system management, information management system is designed. The collected data by the system provided for agricultural research and management facilities. Research shows the greenhouse monitor system based on IOT technology has certain precision of monitor and control. According to the need surrounding monitor, this system has realized the automatic control on the environmental temperature factors.

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