REVIEW PAPER ON (ROBOTICS IN SMART FARMING)

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1. Abstract: Plant Irrigation Water Sprinkler Robot System Uses a robot with a single sprinkler that moves through the field with a water tank moves throughout the field spraying water all over it. It is like a moving water tank that automatically moves all over the field spraying water through it. The robot can be equipped with geo fencing sensors so it will cover complete fields without needing any manual intervention.

Keywords: Plant irrigation, Water sprinkler robot, Water tank, sprinkler system and Fertilizers.

2 INTRODUCTION: The limitations of water resources and global population growth have led states and governments worldwide to increase agricultural products per area and optimize soil and water resources productivity with using new irrigation methods. Generally, current irrigations systems are classified into pressure and gravitational systems; the pressure category includes sprinkler and drip irrigation systems and Gravitational system usually involves furrow irrigation. Thus, choosing each system could maximize water productivity and minimize costs of keeping farms. Although, an water Irrigation Sprinkler system could meet the needs with presence and monitoring during the growing season, continual presence of the worker to control irrigation automatic instruments is not economic. Through advancements in technology and advent of processors and controllers, it will be more serious improving the role of farmer as an observer off-field particularly in the light of new irrigation systems.

3 OBJECTIVES:

▶ To Compare Conventional Method of Irrigation With New Technology

▶ TO Make Sample Robotic Model For Irrigation

▶ To Study The Function going Technique Of The Robotic Model

▶ TO Supply Water Partially or Totally for Crop Need

▶ TO Cool both the Soil and the plant

▶ TO Improve Ground Storage

4 LITERATURE REVIEW:

A. Sensor Based Automatic Irrigation Management System The goal of this research is to develop a technology that aids in the process of water regulation by measuring the humidity ratio. The need for water will be signaled by grounded sensors placed across the land area, and it will be given. At the same time, a mechanical system for filling the water tanker when it is empty was set up [12].

B. Automatic Irrigation System for Sensing Soil Moisture Content The goal of this research is to create a system that automatically turns on and off the engine based on moisture. In this regard, I was unable to obtain sufficient information regarding the source of water and the method for managing the withdrawal of water from the supply, as well as information regarding the power supply used in this study [11].

C. Smart Irrigation System using Arduino This technology specializes in the proper application of pesticides in agricultural land in order to combat disease. Flora connected to the sensor and an analytical gadget are included in this machine. A temperature sensor, humidity sensor, motion sensor, light sensor, vibration sensor, and UV sensor are all part of the multi-sensor. The term "sensor" refers to an analytical equipment that analyses a pattern for the presence of a specific substance. The moisture and pH values observed by the multi-sensor are recorded using an Arduino interface, which is then sent to the farmer's mobile phone through GSM.

5 METHODOLOGY

1.Project Formulation

2.Literature Survey

3.Design of the Model

4.Design Calculations

5.Analysis of the Design

6.Fabrication of the model

7.Final Project

6 COMPONENTS AND THEIR FUNCTIONS

Keyboard

There are 4 keys in the remote for controlling the Irrigation Robot. This is interfaced to the controller. The operation of the keys is:

• Forward

• Reverse

• Left turn

• Right turn

➢ **Mild steel:**

Mild steel is steel in which the main interstitial alloying constituent is carbon in the range of 0.12–2.0%. The American Iron and Steel Institute (AISI) definition says. Steel is considered to be carbon steel when no minimum content is specified or required for chromium, cobalt, molybdenum, nickel, niobium, titanium, tungsten, vanadium or zirconium, or any other element to be added to obtain a desired alloying effect; when the specified minimum for copper does not exceed 0.40 percent; or when the maximum content specified for any of the following elements does not exceed the percentages noted: manganese 1.65, silicon 0.60, copper 0.60.

➢ **Sprinkler:**

An irrigation sprinkler (also known as a water sprinkler or simply a sprinkler) is a device used to irrigate agricultural crops, lawns, landscapes, golf courses, and other areas. They are also used for cooling and for the control of airborne dust. Sprinkler irrigation is the method of applying water in a controlled manner in way similar to rainfall. The water is distributed through a network that may consist of pumps, valves, pipes, and sprinklers. Irrigation sprinklers can be used for residential, industrial, and agricultural usage. It is useful on uneven land where sufficient water is not available as well as on sandy soil. The perpendicular pipes, having rotating nozzles on top, are joined to the main pipeline at regular intervals of time. When water is allowed to flow through the main pipe under pressure with the help of pump it, escapes from the rotating nozzles. It gets sprinkled on the crop. In sprinkler or overhead irrigation, water is piped to one more central locations within the field and distributed by overhead high pressure sprinklers or guns.

➢ **Micro Controller:**

Depending on the key pressed the controller will be transmitting the data. Here in this project we are using Arduino Uno microcontroller board. The controllers play a major role in the project, there by the following description mainly focuses about Micro controller and its architecture because it is treated as heart of the project work. Today, there is no such instrument that can function without Micro controller. Micro controllers have become an integral part of all instruments. Many tedious from simple to dedicated tasks are left over to the controller for solutions. The Microcontroller used in this project work is ATMEGA 328P, basically this IC belongs.

➢ **Channel Relay:**

The 4 Channel Relay Module is a convenient board which can be used to control high voltage, high current load such as motor, solenoid valves, lamps and AC load. It is designed to interface with microcontroller such as Arduino, PIC and etc. The relays terminal (COM, NO and NC) is being brought out with screw terminal. It also comes with a LED to indicate the status of relay. The 4 Channel Relay Breakout is an easy way to use your Arduino, Raspberry Pi, or other microcontroller to switch high voltages and high current loads. The board is both 3.3V and 5V logic compatible and uses 4 digital outputs to control 4 individual relays.

➢ **Dot Board:**

Perf board is a material for prototyping electronic circuits (also called DOT PCB). It is a thin, rigid sheet with holes predrilled at standard intervals across a grid, usually a square grid of 0.1 inches (2.54 mm) spacing. These holes are ringed by round or square copper pads, though bare boards are also available. Inexpensive perfboard may have pads on only one side of the board, while better quality perfboard can have pads on both sides (plate-through holes). Since each pad is electrically isolated, the builder makes all connections with either wire wrap or miniature point to point wiring techniques. Discrete components are soldered to the prototype board such as resistors, capacitors, and integrated circuits. The substrate is typically made of paper laminated with phenolic resin (such as FR-2) or a fiber glass-reinforced epoxy laminate (FR-4).

➢ **Battery:**

This is an important block why because all the components require power supply to be operating. Micro controller requires +5v, relay and DC motors require +12v. In the transmitter a 9v battery is used and a voltage regulator in order to derive the required power supply for the micro controller i.e., 5v. And in the receiver as we require a maximum of 12v we are using a 12v battery to operate the relay and the DC motors. Again voltage regulator is used to derive 5v DC.

➢ **Wheels:**

Wheel land carrier, The Wheel of robots is located in Robot hell that has written upon it the name of every robot on earth. The robot Devil uses it to choose which robot will lose their hands to fry. Bender's name is right next to the robot devil's name. Wheeled robots are robots that navigate around the ground using motorized wheels to propel them. This design is simpler than using treads or legs and by using wheels they are easier to design, build, and program for movement in flat, notso-rugged terrain

➢ **RF Transmitter:**

This project is divided into two modules i.e., the transmitter and the receiver (Agrobot). The transmitter i.e., the remote has been equipped with Keyboard and RF transmitter, which have been interfaced using microcontroller Atmega3268P. RF Receiver

> ## A RF Receiver:

as explained in the block diagram the RF receiver will be demodulating the received signal. The demodulated output will be the actual data signal i.e., original signal that is transmitted from the transmitter. The RF receiver consists of 3 pins. First is ground, second is the output, which is connected to the micro controller and the third, is the Vcc.

> ## DC Motor:

Permanent magnet DC motor responds to both voltage and current. The steady state voltage across a motor determines the motor's running speed, and the current through its armature windings determines the torque. Apply a voltage and the motor will start running in one direction; reverse the polarity and the direction will be reversed.

Fig. Proposed model reference image
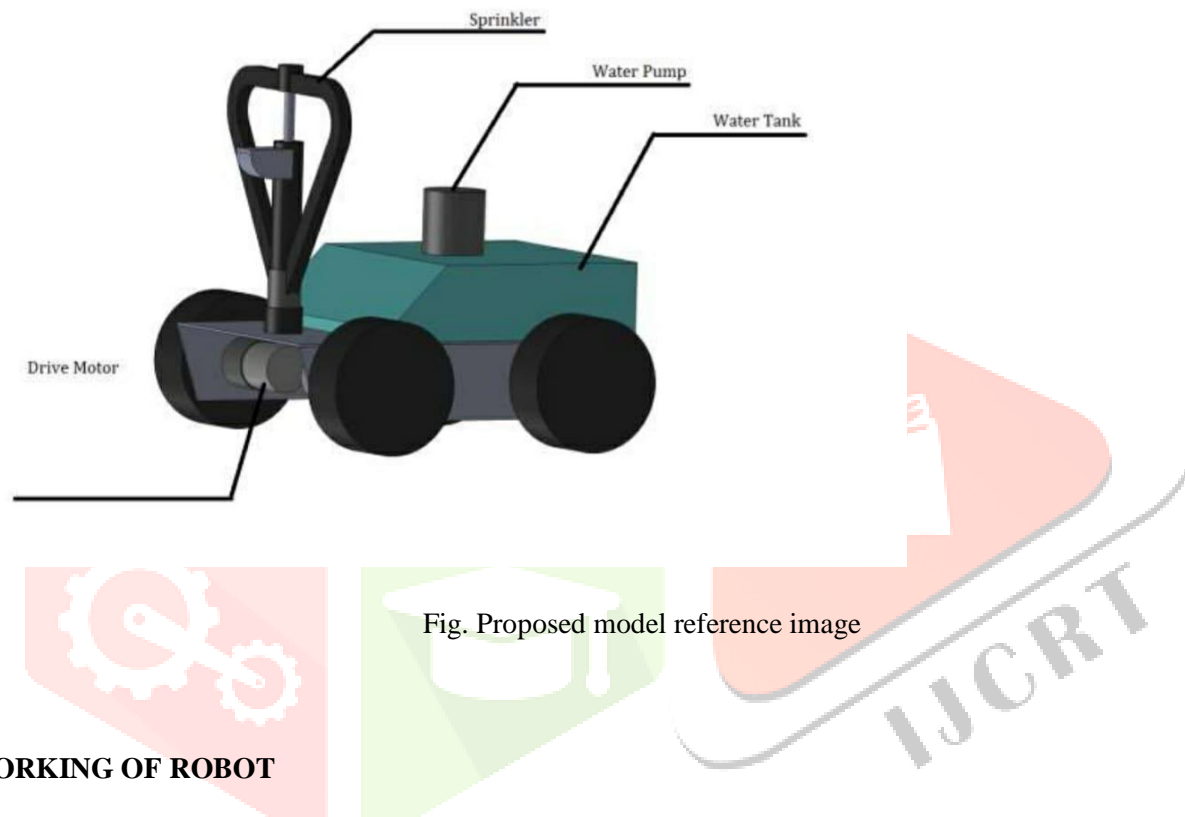
7 WORKING OF ROBOT

The robot works autonomously, it is used for watering plant spared in wide range of area. The whole system is powered by using li-ion battery pack which is rechargeable in nature. The working of system is very easy and only need one time setup. Firstly the user have to mark all the locations of trees using a GPS device and fed their geographical co-ordinates of trees into microcontroller. Than the robot will determine the shortest path for the target location and reach the location by using four installed motors, the robot determines the obstacles by using ultrasonic sensor and send measured distance to control unit and whenever it detects any obstacles it turns 900 left and then 900 right after it check the obstacles again and again follow same procedure. When robot reaches it targeted location it pumps out water using sprinkler and after completing water it moves to another location of watering. A sensor is installed in the water tank for measuring water level and a sensor for calculating remaining battery life and required battery for reaching recharge and refilling point when it detects the required battery is 5% more than the battery required for reaching recharge point robot start moving towards starting point. The installed GSM modules send real time status of robot location and the remaining trees for watering each minute and if robot is unable to reach recharge point and the remaining battery power is 3% than the robot stops all functions and send the GPS co-ordinates to user each hour for safety purpose.

8 FUTURE SCOPE

The robot can be interfaced with sensor to send back the information to the user.

The robot can be programmed remotely through a mobile to carry out specific task.

The robotic arm can be modified to have gripper and more versatile arm to carry out more critical jobs.

The robotic arm can be designed with a web cam to send the snap shots of the location.

9 CONCLUSIONS

By implementing the proposed system there are various benefits for the government and the farmers. For the government a solution for energy crisis is proposed. By using the automatic irrigation system it optimizes the usage of water by reducing wastage and reduces the human intervention for farmers.

The excess energy produced using solar panels can also be given to the grid with small modifications in the system circuit, which can be a source of the revenue of the farmer, thus encouraging farming in India and same time giving a solution for energy crisis

10 REFERENCES

[1] Joao Rolim, Jose Teixeira, "The design and evaluation of travelling gun irrigation systems: Enrolador software", Journal of the Brazilian Association of Agricultural Engineering, 2016 ISSN: 1809-4430, v.36, n.5, 917-927

[2] S. Harishankar, R. Sathish Kumar, Sudharsan K.P, U. Vignesh and T.Viveknath, "Solar Powered Smart Irrigation System", Advance in Electronic and Electric Engineering, 2014, ISSN 2231-1297, Volume 4, Number 4, pp. 341-346

[3] Varun Dhawan, Anindu Bose, Vishal Danve, "Solar Powered Gardener", International Journal on Recent and Innovation Trends in Computing and Communication, 2016, ISSN: 2321-8169 Volume: 4 Issue: 3 454 – 457

[4] Simon Blackmore, Bill Stout, Maohua Wang, Boris Runov, "Robotic agriculture – the future of agricultural mechanization" 5th European Conference on Precision Agriculture Uppsala, Sweden 9-12th June 2005

[5] Anurag D, Siuli Roy and SomprakashBandyopadhyay, "Agro-Sense: Precision Agriculture using Sensor-based Wireless Mesh Networks", ITU-T "Innovation in NGN", Kaleidoscope Conference, Geneva 12-13 May 2008.

[6] C. Arun, K. Lakshmi Sudha "Agricultural Management using Wireless Sensor Networks – A Survey"2nd International Conference on Environment Science and Biotechnology IPCBEE vol.48 (2012) © (2012) IACSIT Press, Singapore 2012.

[7] Bogena H R, Huisman J A, OberdÊrster C, etal. Evaluation of a low cost soil water content sensor for wireless network applications [J].Journal of Hydrology, 2007.

[8] R.Hussain, J.Sehgal, A.Gangwar, M.Riyag" Control of irrigation automatically by using wireless sensor network" International journal of soft computing and engineering, vol.3, issue 1, march 2013.

[9] Izzatdin Abdul Aziz, MohdHilmiHasan, Mohd Jimmy Ismail, MazlinaMehat, NazleeniSamihaHaron, "Remote Monitoring in Agricultural Greenhouse Using Wireless Sensor and Short Message Service (SMS)", 2008.

[10] Jeonghwan Hwang, Changsun Shin, and Hyun Yoe "Study on an Agricultural Environment Monitoring Server System using Wireless Sensor Networks", 2010.