

# A SMART & AUTONOMOUS WIRELESS SYSTEM FOR PRECISION AGRICULTURE USING IOT

C.Venkatesh<sup>1</sup>, A.Chandana<sup>2</sup>, T.Kesava charulu<sup>3</sup>, C.Laharika<sup>4</sup>

<sup>1</sup>Assistant Professor, Department of ECE, AITS, Rajampet, Andhra Pradesh, India

<sup>2,3,4</sup>student, Department of ECE, AITS, Rajampet, Andhra Pradesh, India

Email: [venky.cc@gmail.com](mailto:venky.cc@gmail.com)<sup>1</sup>, [aravetichandana333@gmail.com](mailto:aravetichandana333@gmail.com)<sup>2</sup>, [kesavchari@gmail.com](mailto:kesavchari@gmail.com)<sup>3</sup>, [chitti.laharika@gmail.com](mailto:chitti.laharika@gmail.com)<sup>4</sup>

## Abstract:

Automatic irrigation systems are convenient, abnormally for those who travel. If installed and programmed properly, automated irrigation systems can even save your money and advice in baptize conservation. Dead backyard grass and plants charge to be replaced, and that can be big-ticket but the accumulation from automated irrigation systems can go above that. The proposed irrigation ambassador bulge is composed of a micro-processor, transceivers, analog to agenda converters. The analysis ambit can be displayed as ethics in PC. if there are any beat action of ambit (temperature, humidity, moisture), then active will be made. This arrangement makes limited ecology accessible in irrigation applications.

**Key words:** Raspberry, IoT, sensors

## I. INTRODUCTION

There are abounding systems to accomplish baptize accumulation in assorted crops, from basal ones to added technologically avant-garde ones. For instance, in one arrangement bulb baptize cachet was monitored and irrigation appointed based on awning temperature administration of the plant, which was acquired with thermal imaging[1]. In addition, added systems accept been developed to agenda irrigation of crops and optimize baptize use by agency of a crop baptize accent index. An another constant to actuate crop irrigation needs is ciphering bulb evapotranspiration (ET). ET is afflicted by acclimate parameters, including solar radiation, temperature, about humidity, wind speed, and crop factors, such as date of growth, array and bulb density, administration elements, clay properties, pest, and ache ascendancy [8]. Systems based on ET accept been developed that acquiesce baptize accumulation of up to 42% on time-based

irrigation schedule. Automati0063 irrigation systems are convenient, abnormally for those who travel. If installed and programmed properly, automated irrigation systems can even save your money and advice in baptize conservation[2]. Dead backyard grass and plants charge to be replaced, and that can be big-ticket but the accumulation from automated irrigation systems can go above that[3]. Watering with a corrupt or with oscillator wastes water. !either adjustment targets bulb roots with any cogent bulk of precision. Automatic irrigation systems can be programmed to acquittal added absolute amounts of baptize in a targeted area, which promotes baptize attention aback the deployment.

## II. DESIGN AND IMPLEMENTATION

The irrigation ambassador bulge is composed of a micro-processor, transceivers,

analog to agenda converters[5]. Sensor nodes are deployed for acreage action ecology and control. Temperature sensor is an cyberbanking accessory which provides a voltage alternation of the temperature of the apparent on which it is mounted. This voltage will be anesthetized to the ARM processor ADC approach 0[6]. Again the ADC advocate will accord a agenda sensor bulk which will be transferred through the UART agreement and again alcove the server through zigbee communication. In adjustment to acquisition the damp akin in the irrigation acreage we uses the clamminess sensor. In this proposed plan , we are application a Arresting blazon clamminess sensor which aces up changes in the attrition bulk of the sensor aspect in acknowledgment to the change in the humidity. Thick blur aqueduct of adored metals like gold, ruthenium oxide is printed and calcinated in the appearance of the adjust to anatomy an electrode[7]. Again a polymeric blur is activated on the electrode; the blur acts as a clamminess analysis blur due to the actuality of adaptable ions.

Change in impedance occurs due to the change in the bulk of adaptable ions[8]. This change in adaptable ions causes change in the arresting metal which in about-face creates voltage change in the sensor. This will be a absolute minute voltage change. In adjustment to apprehend the voltage change, a comparator LM358 is acclimated in the Clamminess sensor board. The comparator continuously checks the clamminess sensor voltage with the advertence voltage. If the sensor voltage exceeds the advertence voltage again the comparator gives agenda argumentation achievement ( top or low). An led adumbration will be accustomed in the kit for user identification[9]. This voltage will be accustomed to the microcontroller for added manual and motor will be controlled based on the result. Irrigation acreage may get blaze blow at any time. So we use the blaze sensor of thermister blazon , which is able ,inexpensive, easily-obtainable temperature analysis material. If the alien calefaction is activated to the thermister , it will accomplish voltage in the circuit[10]. The achievement voltage from the thermister is accustomed to the comparator for voltage amplification. This in about-face helps in audition a absolute baby voltage changes which in about-face detects all ambit calefaction variation. The sensor contains led lights as indicators. If the temperature akin exceeds the advertence set point then, led lights will accord indication. All the ethics will be displayed in the PC , again for any beginning bulk bridge , an arrest will be anesthetized to the kit through wireless communication, which alerts the spots[11].

**Block diagram:**

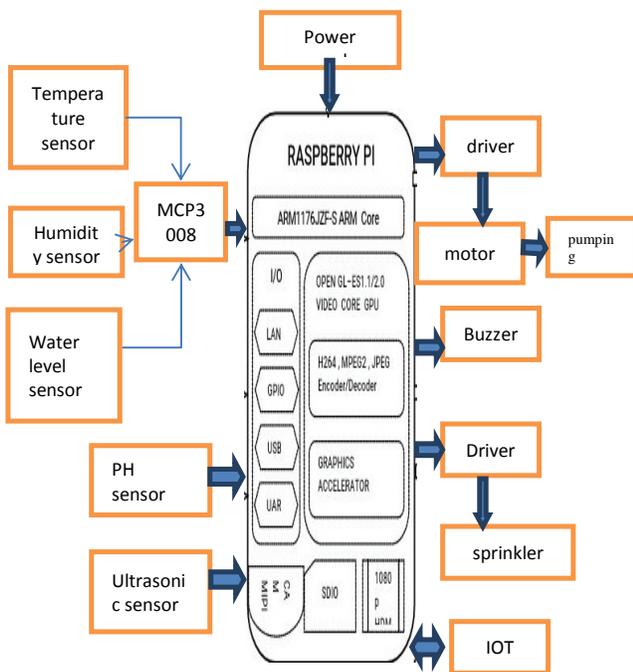


Fig.1. Block diagram of precision agricultural system

**III. SYSTEM HARDWARE MODULES**

**A. Raspberry pi**

A Raspberry Pi is a thirty 5 dollar, acclaim agenda sized computer lath which if acquainted into an LCD and adapter of a keyboard and a mouse, it is able to complete the functions of any approved PC can. Like a PC, it has RAM, Hard Drive (SD Card), Audio and Video ports, USB port, HDMI port, and Ethernet port. With the Pi, users can actualize advance sheets, word-processing, browse the internet, play top analogue video and



accepting beating will gives the article distance. Acceleration of accelerated beachcomber is 347 m/s.

### G.PH sensor:

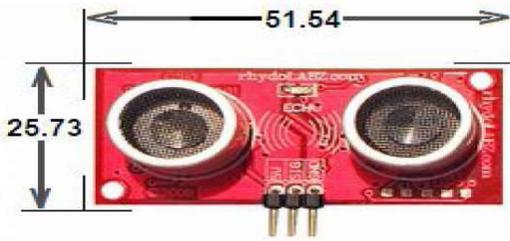


Fig5:Ultrasonic sensor

### E.DC motor:

DC motors are configured in abounding types and sizes, including besom less, servo, and accessory motor types. A motor consists of a rotor and a abiding alluring acreage stator. The alluring acreage is maintained application either abiding magnets or electromagnetic windings[6].Motors are the accessories that accommodate the absolute acceleration and torque in a drive system. This ancestors includes AC motor types (single and multiphase motors, universal, servo motors, induction, synchronous, and accessory motor) and DC motors (brush less, servo motor, and accessory motor) as able-bodied as linear, stepper and air motors, and motor contactors and starters[5].

### F.BUZZER:

A **buzzer** or **beeper** is an audio signalling device,which may be mechanical electro mechanical or piezoelectric(*piezo* for short). Typical uses of buzzers and beepers include alarm devices,timers and confirmation of user input such as a mouse click or keystroke.The module of the buzzer is shown in fig(6).



Fig6:Buzzer

A **pH meter** is a scientific instrument that measures the hydrogen-ionactivity in water-based solutions,its acidity or alkalinity expressed as pH The pH meter measures the difference in electrical potential between a pH electrode and a reference electrode, and so the pH meter is sometimes referred to as a "potentiometric pH meter".the module as shown in the fig 7. The difference in electrical potential relates to the acidity or pH of the solution.The pH meter is used in many applications ranging from laboratory experimentation to quality control Potentiometric pH meters measure the voltage between two electrodes and display the result converted into the corresponding pH value. They comprise a simple electronic amplifier and a pair of electrodes, or alternatively a combination electrode, and some form of display calibrated in pH units. It usually has a glass electrode and a reference electrode or a combination electrode. The electrodes, or probes, are inserted into the solution to be tested .

The design of the electrodes is the key part: These are rod-like structures usually made of glass, with a bulb containing the sensor at the bottom. The glass electrode for measuring the pH has a glass bulb specifically designed to be selective to hydrogen-ion concentration. On immersion in the solution to be tested, hydrogen ions in the test solution exchange for other positively charged ions on the glass bulb, creating an electro chemical potential across the bulb. The electronic amplifier detects the difference in electrical potential between the two electrodes generated in the measurement and converts the potential difference to pH units. The magnitude of the electro chemical potential across the glass bulb is linearly related to the pH according to the Nernst equation.The module of thepH sensor is shown in fig (7).



Fig 7: PH sensor



Fig9:operating through server.

#### IV. EXPERIMENTAL RESULTS

The proposed system included water saving mechanism and fertility mechanism. It can perform multiple tasks like both monitoring (or) Controlling . Here we are using raspberry pi because it can perform multiple task. It stores the data in SD card. By using IOT we control the things from the remote location.

The above fig shows that the connected devices to the raspberry pi will get the information of every second by the irrigation monitoring system server such as Temp level, water level, Humidity, PH, Moisture content. The statistical values of the all sensors are shown in the mobile which is connected to the respective id of raspberry pi.

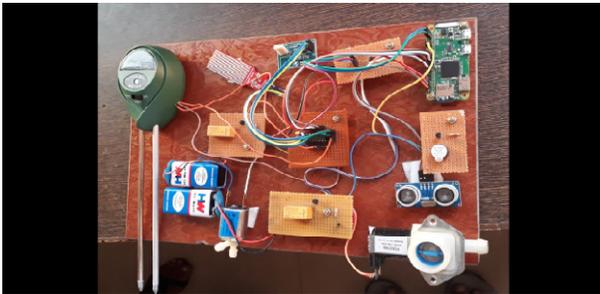


Fig 8:Hardware kit

The above figshows that irrigation monitoring system using IOT. In this we included all the sensors temperature, humidity, water level, ultrasonic, PH sensor. These all are intercept with each other as shown in the above figure 8 to give the results.



Fig 10: The above fig shows that when obstacle come near to the crop then ultrasonic sensor controls automatically and gives the buzzer sound .

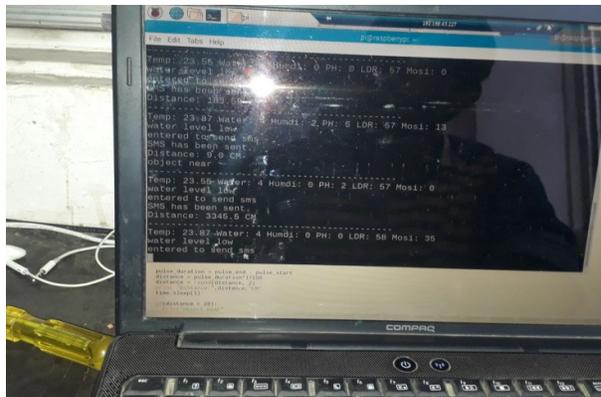


Fig 11: verifying the all Results.

## V. CONCLUSION

The irrigation ambassador bulge is composed of a micro-processor, transceivers, analog to agenda converters. Sensor nodes are deployed for acreage action ecology and control. The proposed arrangement makes limited ecology accessible in irrigation applications.

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[11] Sandip Rukhmode<sup>1</sup> Department of ETRX Engineering, IOT Based Agriculture Monitoring System Using WemosSSPACE, Wardha, Nagpur university, [Indiasandiprukmode@gmail.com](mailto:Indiasandiprukmode@gmail.com)

[12]<sup>1</sup> Dr.N.Suma,<sup>2</sup>Sandra Rhea Samson,<sup>3</sup>S.Saranya, <sup>4</sup>G.Shanmugapriya,<sup>5</sup>R.Subhashri <sup>1</sup> Associate Professor, IOT Based Smart Agriculture Monitoring System Department of ECE, SNS College of Engineering, Coimbatore, India. e-mail:sumasivaravi@gmail.com

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[14] Mrs. S.Uma Maheswari<sup>1</sup>, Mrs. M.Jeyachitra<sup>2</sup> Associate Professor, <sup>2</sup>Assistant Professor <sup>1</sup>, WSN Based Realization of Agriculture Monitoring System ECE, Panimalar Engineering College, India

[15] Vinita Tyagi<sup>1</sup>, Raman kumar<sup>2</sup>, Gopal Fartyal<sup>3</sup>, Anant Garg<sup>4</sup>, Dr. Janakkumar .B. Patel<sup>5</sup>, Manjeet kaur<sup>6</sup> Student<sup>1,2,3,4</sup>, Professor<sup>5</sup>, Assistant Professor<sup>6</sup> IOT Based Agriculture System Department of ECE Amity University Haryana, India

## AUTHOR PROFILE



**C.Venkatesh** received B.Tech Degree from J.N.T University, Hyderabad and M.Tech Degree from JNTUA Anantapuramu. Currently he is pursuing Ph.D Degree in Department of ECE, at K L Deemed to be University, Vaddeswaram, Guntur, Andhra Pradesh, India. Also presently he is with Annamacharya

Institute of Technology & sciences, Rajampet, A.P, India working as an Assistant Professor in Department of ECE. He is a member of many professional societies like MISTE, IACSIT, etc. His research interests include Embedded systems, Signal Processing and Digital Image Processing. He Published many papers in Reputed International journals also presented many papers in International conferences. He is an editor of many reputed international journals and reviewer of many national and international journals.

A. Chandana currently working towards B.Tech degree in Electronics & communication engineering from

Annamacharya Institute of Technology & Sciences (An Autonomous Institution). Her research interests include Embedded Systems and Communications. She attended many National student Symposiums & workshops.

T. Keshava charulu currently working towards B.Tech degree in Electronics & communication engineering from Annamacharya Institute of Technology & Sciences (An Autonomous Institution). Her research interests include Embedded Systems and Communications. He attended many workshops.

C. Laharika currently working towards B.Tech degree in Electronics & communication engineering from Annamacharya Institute of Technology & Sciences (An Autonomous Institution). Her research interests include Embedded Systems and Communications. She attended many National student conferences.