IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

WATER DOCKET SUPPORT WITH WHIP-SMART DECISION SUPPORT SYSTEM

R.Sabitha
Assistant Professor, Department of
Electronics and Communication Engineering Hindusthan Institute of
Technology, Coimbatore-641 032.

Ramesh.M, **Sathyabharthi.B,** **Manoj.C**
UG Students, Department of Electronics and Communication Engineering, Hindusthan Institute of
Technology, Coimbatore-641 032.

ABSTRACT:

The economy being highly based on agriculture demands innovative and reliable methods of irrigation.The shortcomings of manual methods of irrigation can be rectified using automated process. This system presents the idea of automatic irrigation method the task of automatic irrigation is done through assistance of soil moisture sensor and temperature sensor. In the system, based on the soil moisture sensor and temperature sensor the water pump is controlled by relay which in turn is controlled by the Arduino controller.The water content is constantly judged and whenever moisture level of soil gets low, the system sendsa signal to turn on the motors.The motors automatically stop after soil reaches its maximum upper threshold value which is decided by user. The major advantages of the System include avoidance from water wastage, proper and efficient use of waste water, growth of plants to their maximum potential, less chances of error due to less labour.

KEYWORDS: *IOT Based Agriculture Automation, Microcontroller, Relay, motor, moisture sensor, Humidity sensor, leaf water sensor, Temperature sensor, LCD, OpAmp, Rectifier, Transformer.*

I. INTRODUCTION:

In some countries, agriculture is considered as one of the major source of economic progress. The income of many countries depends directly on agricultural advancement. More over, the continuous increase in the population of a country demands technology. The factors affecting agricultural progress must be studied thoroughly to obtain maximum results. The significant building block of agriculture is the irrigation system. In other words, the efficiency of irrigation system may induce ample effects on agriculture. Irrigation process should provide water to soil consistently when it is needed and stops water flow as well, when soil has soaked enough water. The excess of water in the crops is of no good, not only water is wasted but it also destroys crops.

The 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 Anything which is cost effective, labour saving and energy saving is considered efficient. Hence in this proposed system, a method which uses very less or no labour (runs on its own) has been recommended, saves electricity and is easy to use is achieved using different sensors which sense and tell the user if water is required or not and how much water will be enough for soil so that water wastage is also avoided. The errors which may arise manualirrigation is used are also rectified for the most part using this method.

II. LITERATURE SURVEY:

[1]Wireless sensor network (WSN) refers to a group of spatially dispersed and dedicated sensors for monitoring and recording the physical conditions of the environment and organizing the collected data at a central location.[2]WSNs measure environmental conditions like temperature, humidity, wind, and so on.[3]Wireless sensor based Agriculture field monitoring designed with various futures and the device will be single system with multiple applications, The design which helps to collect, manage and visualize and upload the water level, temperature, moisture content, pH level information in the monitoring land, Where the different sensors are connected to the Arduino , the sensor values are stored in Raspberry [4]pi using Zigbee , then we can know the exact situation of the monitoring land via internet , This is mainly designed to help formers for monitoring the various changes in the agriculture field.

III. EXISTING SYSTEM:

In existing system, Wireless Sensor Network (WSN) is the technology, in which the data collected from the field of interest is transmitted through wireless link. WSN can be used in various fields such as monitoring, wireless measurements, controlling, etc. In the field of precision agriculture and organic farming, it is important to continuously monitor the fields as they are site specific. Monitoring plant health is essential which enriches the productivity of food grainsIndia is an agricultural country and farmers are the backbone. However, often farmers commit suicide due to losses incurred as a result of low price for crops, loss of crops as a result of disease or natural calamities. In addition labor cost is also high. Crop losses due to pests and pathogens are around 20 and 40 % of the total production. Researchers have been striving to find solutions to some of these problems. Green house farming is one such method where plants are grown under controlled environment to maximize the yield. This paper presents image processing technique for disease detection and analysis; indicate percentage of disease; design and development of a low cost automated control system to provide optimum environment conditions for better growth and yield of the crop. An microcontroller can be explored to do the image processing part to eliminate the need for PC. Developed system can be installed with slight modifications anywhere to cultivate any type of crop. Automated controlling of devices eliminates the middleman and help farmers to produce high quality, high yield crops

LIMITATION:

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

I. PROPOSED SYSTEM:

Data fusion or refinement of the WSNs capture data has become a dominant research area; as the majority of our dailylife activities are either partially or completely dependent on these DSS-based networks. In this section, a space free data fusion scheme is presented to enhance accuracy and precision level of the proposed agricultural DSS.. 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 It is efficient method compare then other.The captured data of that is wasp-mote agricultural board in the proposed test-bed, is passed through the noise detection module that ensures the accuracy of the refined data. Moreover, the proposed fusion scheme has the capacity to distinguish outliers or noisy data from the abrupt changing scenarios, i.e., an abrupt change occurs if water directly interacts with soil moisture or leaf wetness sensors.

ADVANTAGES:

- Very easy to build
- Automatic control of motor is possible

DISADVANTAGES:

- Wastage of water
- Excess water in the field
- Requires manpower

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.

- LCD
- OP-Amp
- Moisture sensor
- Humidity sensor
- Leaf water sensor
- Transformer
- Rectifier
- Regulator
- Level converter
- IOT module
- Motor
- Relay
- Relay driver
- Microcontroller

III. COMPONENTS DESCRIPTION:

➢ MICROCONTROLLER:

- Arduino Microcontrollers are used in automatically controlled products and devices, such as automobile engine control systems, implantable medical devices, remote controls, office machines, appliances, power tools, toys and other embedded systems. By reducing the size and cost compared to a design that uses a separate microprocessor, memory, and input/output devices, microcontrollers make it economical to digitally control even more devices and processes. Mixed signal microcontrollers are common, integrating analog components needed to control non-digital electronic systems. In the context of the internet of things, microcontrollers are an economical and popular means of data collection, sensing and actuating the physical world as edge devices.

- A **microcontroller** for is a small computer on a single metal-oxide-semiconductor (MOS) integrated circuit (IC) chip. A microcontroller contains one or more CPUs (processor cores) along with memory and programmable input/output peripherals. Program memory in the form of ferroelectric RAM, EEPROM, NOR flash or OTP ROM is also often included on chip, as well as a small amount of RAM. Microcontrollers are designed for embedded applications, in contrast to the microprocessors used in personal computers or other general purpose applications consisting of various chip.

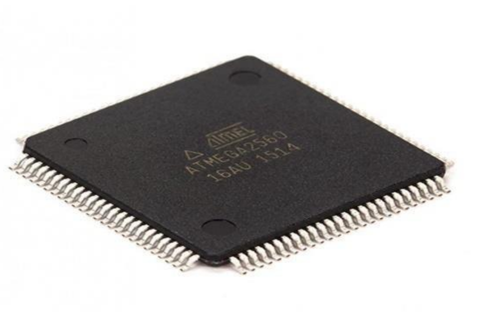


Fig: Microcontroller ATMEGA 2560 IC diagram

- **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.

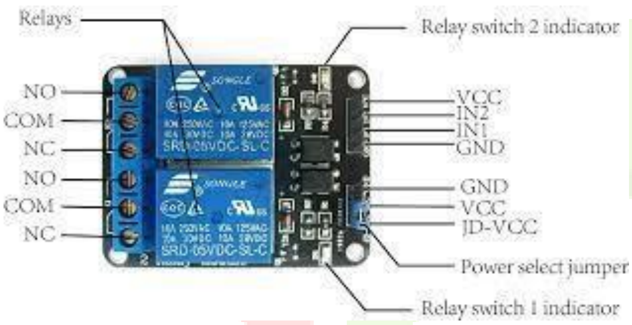


Fig: Relay diagram

- 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.

- **LEAF SENSOR:**

Now monitor plant moisture levels in leaves in real-time to activate irrigation and water systems. Real-time bio-feedback of leaf moisture with a light weight leaf sensor.

Fig: Leaf Wetness Sensor diagram

Features:

- Works on all plants ,Suitable for Vineyards, Greenhouse
- Educators, Agronomists and Consultants.

Benefits:

Leaf Sensor knows when to water ,Helps conserves water

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.

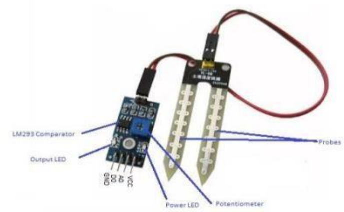


Fig: Moisture sensor diagram

- **HUMIDITY SENSOR:**

- State of the art humidity sensors provide support for internet connectivity and can be flexibly deployed in the Internet of Things (IoT) applications. This facilitates the integration of humidity measurements with the output of other sensors (e.g., temperature sensors) and boosts IoT applications intelligence in various industry applications

- An Relative humidity is useful for many applications, like HVAC (Heating Ventilation Air Conditioning) and comfort optimization applications in Smart Buildings and Facilities Management.
- The quality of a humidity sensor is reflected in its accuracy, reliability, response time, longevity, security, robustness, and ease of deployment. These characteristics also determine the sensor's cost. Furthermore, they drive the selection of humidity sensors for different applications..

- Humidity sensors can be divided into two groups, as each category uses a different method to calculate humidity: relative humidity (RH) sensors and absolute humidity (AH) sensors. Relative humidity is calculated by comparing the live humidity reading at a given temperature to the maximum amount of humidity for air at the same temperature. RH sensors must therefore measure temperature in order to determine relative humidity. In contrast, absolute humidity is measured without reference to temperature.

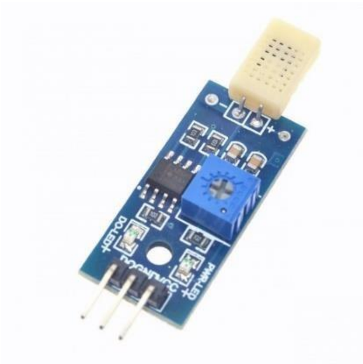


Fig:Humidity Sensor diagram

- **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

- **REGULATOR:**

- Regulator (automatic control), a device that maintains a designated characteristic, as in: ○ Battery regulator ○ Pressure regulator ○ Diving regulator ○ Voltage regulator
- Regulator (sewer), a control device used in a combined sewer system
- Regulator, a device in mechanical watches attached to the balance spring for adjusting the rate of the balance wheel
- Regulator precision pendulum clock, originally used as a time-standard for adjusting or *regulating* other clocks and watches
- Regulator, the throttle of a steam engine
- Regulator, a component of Uilleann pipes, a form of bagpipes

Fig: Regulator LM7812 IC diagram

- 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.

- **LEVEL CONVERTER**

- Though they're share the same shape and size, this bi-directional logic level converter shouldn't be confused with the more "uni-directional" version. This converter can pass data from high to low *and/or* low to high on **all channels**. It's perfect for level-shifting between devices that are sharing a data wire, like I^2C or a one-wire interface.
- Do you have a 3.3V I^2C or SPI sensor that might go up in smoke if connected to a 5V Arduino a 5V device that needs a workaround to be compatible with your 3.3V, Zero, RedBoard Turbo, RedBoard Turbo or Arduino Due?

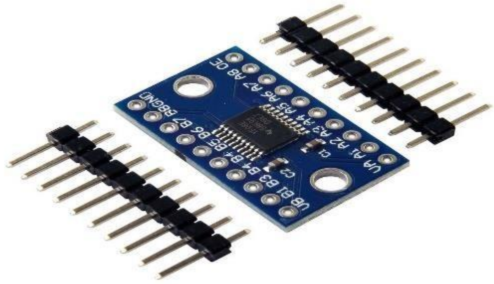
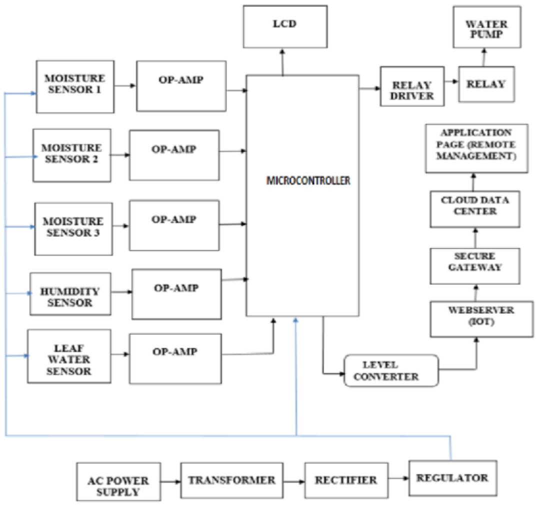


Fig: Level Converter I2C4 diagram

IV. BLOCK DIAGRAM:



WORKING PROCESS:

- Every wasp-mote board collects real time data from various sensors i.e., temperature, humidity, soil moisture and leaf wetness.
- This data, say packet-x, is sent to the gateway either directly or through the relaying nodes.
- In both cases, the transceiver module uses the RTS/CTS handshake approach to avoid collision of packet(s).
- In the proposed experimental setup, the gateway module is directly connected to a central computer via USB cable specifically through port-6 and the received data is (temporarily) stored automatically using Cool Term software. Before DSS, packet-x is passed through the noise detection module to get the refined data let say packety.
- The DSS module of the proposed system checks packet-y against the threshold value, that is 250Hz for soil moisture sensor, and if the threshold value is crossed then the alarming unit is activated along with a text message to the farmer on his mobile or LAN.
- If data is within the defined threshold then it is stored permanently.
- In the proposed DSS, soil moisture parameter is considered due to its vital role in the development of a precise watering schedule.
- For example, if the sensed value is below the threshold value, then that particular area is needed to irrigated on priority basis.
- To further precise the proposed DSS, soil moisture sensors were deployed at three different levels in the agricultural.
- Likewise, atmospheric moister exerts drastic effects on the watering schedules of various crops. Therefore, leaf wetness sensors were deployed in closed proximity.

CONCLUSION:

Smart sensing-enabled networks, such as WSNs, have the ability to predict when and where the irrigation activities need to be performed. These networks enable the farmers to evaluate the required amount of water for irrigation purposes based on the data sensed by various nodes. In this paper, a real-time smart sensing-enabled Decision Support System was presented for optimizing the water schedules for orange orchard. Smart sensing-enabled devices were deployed in different regions for approximately one year to collect soil moisture, temperature, humidity and leaf-wetness of the orchard. The gathered raw data were refined by passing it through a noise module for voutliers detection. The module matches the refined data against the threshold values using a modified. If these data are below the threshold value, e.g., less than 250Hz for the soil moisture sensor, then irrigation activity is scheduled in that region farmer is notified via a text message. Moreover, a modified version of the handshake mechanism was presented to ensure the successful delivery of packets and collision avoidance. Both the experimental and simulation results showed the exceptional performance of our proposed scheme against the existing schemes detection and successful delivery of packets.

REFERENCE:

1) R. Morais, A. Valente, and C. Serôdio, “A wireless sensor network for smart irrigation and environmental monitoring: A position article.” in 5th European federation for information technology in agriculture, food and environment and 3rd world congress on computers in agriculture and natural resources (EFITA/WCCA), pp.45-850.2005. 2) S. Agrawal, and M. L. Das , “Internet of Things—A paradigm shift of future Internet applications.” in International conference on current trends in technology, pp.1-7. IEEE, 2011.

3) Li, H. Xiaoguang, C. Ke, and H. Ketai, “The applications of WiFibased wireless sensor network in internet of things and smart grid.” in 6th IEEE Conference on Industrial Electronics and Applications ICIEA, pp. 789-793.2011.

4) G. Husak and K. Grace, “In search of a global model of cultivation: using remote sensing to examine the characteristics and constraints of agricultural production in the developing world,” Food Security, vol. 8, no. 1, pp. 167–177, 2016.

5) Johan J Estrada-López, Alejandro A Castillo-Atoche, and Edgar Sanchez-Sinencio. Design and fabrication of a 3-d printed concentrating solar thermoelectric generator for energy harvesting based wireless sensor nodes. IEEE Sensors Letters, 3(11):1–4, 2019.

6) Haider Mahmood Jawad, Aqeel Mahmood Jawad, Rosdiadee Nordin, Sadik Kamel Gharghan, Nor Fadzilah Abdullah,

Mahamod Ismail, and Mahmood Jawad Abu-Al Shaeer. Accurate empirical path-loss model based on particle swarm optimization for wireless sensor networks in smart agriculture. IEEE Sensors Journal, 20 (1):552–561, 2019.

7) Jirapond Muangprathub, Nathaphon Boonnam, Siriwan Kajornkasirat, Narongsak Lekbangpong, Apirat Wanichsombat, and Pichetwut Nillaor. Iot and agriculture data analysis for smart farm. Computers and electronics in agriculture, 156:467–474, 2019.

8) Amarendra Goap, Deepak Sharma, AK Shukla, and C Rama Krishna. An iot based smart irrigation management system using machine learning and open source technologies. Computers and electronics in agriculture, 155:41–49, 2018.

9) Rahim Khan, Ihsan Ali, Muhammad Zakarya, Mushtaq Ahmad, Muhammad Imran, and Muhammad Shoaib.

Technology-assisted decision support system for efficient water utilization: a real-time test-bed for irrigation using wireless sensor networks. IEEE Access, 6:25686–25697, 2018.

10) Stefanos A Nikolidakis, Dionisis Kandris, Dimitrios D Vergados, and Christos Douligeris. Energy efficient automated control of irrigation in agriculture by using wireless sensor networks. Computers and Electronics in Agriculture, 113:154– 163, 2015.

11) Bright Keswani, Ambarish G Mohapatra, Amarjeet Mohanty, Ashish Khanna, Joel JPC Rodrigues, Deepak Gupta, and Victor Hugo C de Albuquerque. Adapting weather conditions based iot enabled smart irrigation technique in precision agriculture mechanisms. Neural Computing and Applications, 31(1):277–292, 2019.

12) D Kent Shannon, David E Clay, and Newell R Kitchen. Precision agriculture basics, volume 176. John Wiley & Sons, 2020.

13) Dmitrii Shadrin, Alexander Menshchikov, Dmitry Ermilov, and Andrey Somov. Designing future precision agriculture: Detection of seeds germination using artificial intelligence on a low-power embedded system. IEEE Sensors Journal, 19(23):11573–11582, 2019.

14) Hrusikesh Panda, Hitesh Mohapatra, and Amiya Kumar Rath. Wsnbased water channelization: An approach of smart water. In Smart CitiesOpportunities and Challenges, pages 157–166. Springer, 2020.

15) Federico Viani, Michael Bertolli, Marco Salucci, and Alessandro Polo. Low-cost wireless monitoring and decision support for water saving in agriculture. IEEE sensors journal, 17(13):4299–4309, 2017.

16) Joaquín Gutiérrez, Juan Francisco Villa-Medina, Alejandra NietoGaribay, and Miguel Ángel PortaGándara. Automated irrigation system using a wireless sensor network and gprs module. IEEE transactions on instrumentation and measurement, 63(1):166–176, 2013.

17) Anat Goldstein, Lior Fink, Amit Meitin, Shiran Bohadana, Oscar Lutenberg, and Gilad Ravid. Applying machine learning on sensor data for irrigation recommendations: revealing the agronomist's tacit knowledge. Precision agriculture, 19(3):421–444, 2018.

18) Mahir Dursun and Semih Ozden. A wireless application of drip irrigation automation supported by soil moisture sensors. Scientific Research and Essays, 6(7):1573–1582, 2011.

19) Neha K Nawandar and Vishal R Satpute. Iot based low cost and intelligent module for smart irrigation system. Computers and Electronics in Agriculture, 162:979–990, 2019.

20) A Dahane, B Kechar, Y Meddah, and O Benabdellah. Automated irrigation management platform using a wireless sensor network. In 2019 Sixth International Conference on Internet of Things: Systems, Management and Security (IOTSMS), pages 610–615. IEEE, 2019. [18] Tran Anh Khoa, Mai Minh Man, Tan-Y Nguyen, VanDung Nguyen, and Nguyen Hoang Nam. Smart agriculture using iot multi-sensors: A novel watering management system. Journal of Sensor and Actuator Networks.

21) J Balendonck, J Hemming, BAJ Van Tuijl, L Incrocci, A Pardossi, and P Marzialetti. Sensors and wireless sensor networks for irrigation management under deficit conditions (flow-aid). 2008.