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AUTOMATED FARMING SYSTEM USING GSM

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ABSTRACT

Agriculture is the science and art of creating plants and creatures that would lead to the production of crops. For the continuous growth of crops, irrigation i.e., watering of crops and adding fertilizers are essential processes. In this project, an automated farming system model is designed in which the process of drip irrigation and supply of fertilizers is done without using manpower. The drip irrigation system is automated with the help of various sensors such as temperature sensors, humidity sensors, rain sensors and water sensors. The essential supply of fertilizers to the crops will be done with the help of venturi pipes which are known as dripper lines and pH sensors.

KEYWORDS: Temperature Sensor, Humidity Sensor, Rain Sensor, Dripper Lines, pH Sensor.

1. INTRODUCTION

Agriculture plays an important within the Indian Economy. Over 70 percent of the agricultural households depend upon agriculture. Automating the irrigation system lessens the workload of the farmer. The role of various sensors like temperature sensors, humidity sensors, pH sensors, and rain sensors is very important for the purpose of monitoring and automating the irrigation system. Monitoring crops not only prevents the productivity and spread of pests but also guarantees that diseases and weeds that are susceptible to appear are kept in check without causing major inconveniences in terms of performance and final product results.

2. METHODOLOGY

The project consists of Temperature sensor, Humidity Sensor, Rain Sensor, Water flow sensor and pH sensor. The PIC 16F877A microcontroller is used as the controlling unit. The sensors are interfaced with the controller. The temperature sensor is used to measure the temperature of the environment. The humidity sensor is used to detect and measure water vapour in terms of relative humidity. The water flow sensor is used to measure the capacity of water that can flow. The rain sensor is used to detect the occurrence of rainfall. The pH sensor will give information about the pH value of the soil which will be used to determine the number of fertilizers required for the crop. The sensors will monitor the environmental conditions and give the values to the micro controller. The micro controller processes this input and gives a response accordingly. The values are displayed on the LCD. The GSM module in the hardware is used to send messages to the farmer. The SIM card is inserted into the GSM module and the module takes a couple of minutes to get a signal. When it gets a signal during necessary conditions the message will be sent to the farmer. The venturi pipe is designed with a fertilizer suction tube which sucks the fertilizer in the liquid form when vacuum pressure is created. With the help of center valve in the venturi pipe, the flow of liquid fertilizer supply to the crops can be controlled.

3. NECESSARY REQUIREMENTS OF THE PROPOSED SYSTEM

PIC 16F877A microcontroller

General-purpose I/O pins are often considered the only peripherals. They allow the PIC microcontroller to watch and control other devices. To add flexibility and functionality to a tool, some pins are multiplexed with an alternate function(s). These functions depend upon which peripheral features are on the device. In general, when a peripheral is functioning, that pin might not be used as a general-purpose I/O pin. When

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peripheral functions are multiplexed onto general I/O pins, the functionality of the I/O pins may change to accommodate the wants of the peripheral module.. In the case of the Analog to Digital Converter, this prevents the device from consuming excess current if any analog levels were on the A/D pins after a reset occurred.

Temperature sensor
LM35 is a high precision IC temperature sensor with its output proportional to the temperature (in degree C). The sensor circuitry is sealed and thus it's not subjected to oxidation and other processes. With LM35, the temperature is often measured more accurately than with a thermistor. It also possesses low self-heating and doesn't cause quite more than 0.1 degrees Celsius temperature rise in still air.

Rain sensor
A rain sensor or rain switch may be a switching device activated by rainfall. There are two main applications for rain sensors. The primary may be a conservation device connected to an automatic irrigation system that causes the system to pack up within the event of rainfall.

Water flow sensor
The water flow sensor consists of a plastic valve from which the water can be passed. It has water rotor along with a Hall Effect sensor that senses and measures the water flow. When water flows through the valve of the pipe it rotates the rotor. By this, the change is often observed within the speed of the motor.
LCD

A liquid crystal display may be a thin, flat display device made from any number of colour or monochrome pixels arrayed ahead of a light-weight source or reflector. It is used in battery-powered electronic devices as it uses very small amounts of electrical power. Each pixel of an LCD consists of a layer of molecules aligned between the two electrodes, and two polarizing filters, the axes of transmission of which are (in most of the cases) perpendicular to each other. With no liquid between the polarizing filters, light passing through the primary filter would be blocked by the second (crossed) polarizer.

GSM module
A GSM modem is a wireless device that works similarly to a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a hard and fast telephone line while a wireless modem sends and receives data through radio waves. GSM may be a cellular network, which suggests that mobile phones hook up with it by checking out cells within the immediate vicinity. GSM networks operate in four different frequency ranges. Most GSM networks operate in the 900 MHz.

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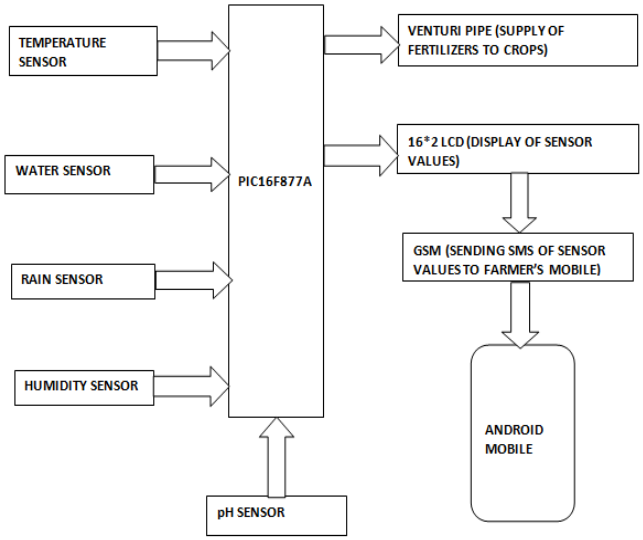
4. METHODOLOGY



Block diagram

The project consists of Temperature sensor, Humidity Sensor, Rain Sensor, Water flow sensor and pH sensor. The PIC 16F877A microcontroller is used as the controlling unit. The sensors are interfaced with the controller. The temperature sensor is used to measure the temperature of the environment. The humidity sensor is used to detect and measure water vapour in terms of relative humidity. The water flow sensor is used to measure the capacity of water that can flow. The rain sensor is used to detect the occurrence of rainfall. The pH sensor will give information about the pH value of the soil which will be used to determine the number of fertilizers required for the crop. The sensors will monitor the environmental conditions and give the values to the micro controller. The micro controller processes this input and gives a response accordingly. The values are displayed on the LCD. The GSM module in the hardware is used to send messages to the farmer. The SIM card is inserted into the GSM module and the module takes a couple of minutes to get a signal. When it gets a signal during necessary conditions the message will be sent to the farmer. The venturi pipe is designed with a fertilizer suction tube which sucks the fertilizer in the liquid form when vacuum pressure is created. With the help of center valve in the venturi pipe, the flow of liquid fertilizer supply to the crops can be controlled.

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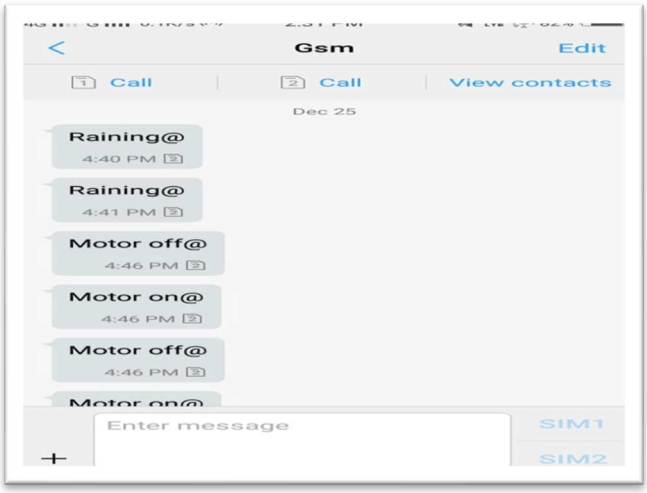
5. RESULTS AND DISCUSSION

Results

Display of sensor values in LED



Message received by a farmer

Discussion

The required power supply for the project was given and the values of the sensors were displayed on the LCD .'T' indicates the value of temperature. 'H' indicates the value of humidity. The 'Dry' statement indicates that the content of soil moisture is dry. If the soil has moisture, it indicates the statement as 'wet'. The '0.0L' column of LCD indicates the value of water flow. 'Ph' indicates the Ph value of the soil. 'NR' indicates that there is no rainfall. If there is occurrence of rainfall, it would be indicated as 'R'. The 'Raining', 'Motor off' and 'Motor on' conditions will be sent to the farmer through GSM and the farmer would receive the messages in his mobile as shown.

6. CONCLUSION

For the effective utilization of the water in agriculture, it is mandatory to have a system that can support the farmer and act as a guide to irrigate their fields. This automated drip irrigation seems to be a real-time feedback system control system that monitors and controls all the activities of drip irrigation efficiently. This method enhances the uniform application of water and fertilizers to all the crops in the field at the same time. It increases agricultural productivity to a greater extent. It is obvious that rainwater and groundwater levels are decreasing day-by-day, thereby increasing the requirement of new systems to utilize the water resources effectively for agriculture. The

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economy and growth of a country purely depend on agriculture income. By considering all these factors the automated drip irrigation system is designed. The system decides the necessity of irrigation according to the values received by the micro controller. This system will be able to contribute to the socio-economic development of the nation. It is user-friendly and can be easily understood and implemented by the farmer.

7. ACKNOWLEDGEMENTS

In the future, the project can be expanded by adding a camera that could capture the image of the leaf. By processing this image the cause of any disease in the crop can be identified. The power supply for automated drip irrigation can be supplied by installing solar panels which will save energy. This can be extended by saving the rainwater by designing rainwater harvesting pit. A cloud system can be designed wherein the data absorbed from the sensors can be stored in the cloud for future reference.

REFERENCES

[1] AbhijitPathaka, Mohammad AmazUddina, Md. JainalAbedina, Karl Anderssonb, RashedMustafac, Mohammad Shahadat Hossainc(2019) "IoT based Smart System to Support Agricultural Parameters"- The 6th International Symposium on Emerging Inter-networks, Communication and Mobility. pp 648-653.
[2] Emmanuel Abiodun Abioye, Mohammad Shukri Zainal Abidin, Mohd Saiful AzimiMahmud(2020), "IoT-based monitoring and data-driven modelling ofdrip irrigation system for mustard leaf cultivation experiment"- science direct- a Control and Mechatronics Engineering Department, School of Electrical Engineering.
[3] J.ArumaiRuban, Research Scholar , Dr.C.Balakrishnan, Dr.S.Santhoshkumar , G.Jagan(2020) "Study of Smart Farming Techniques in Drip Irrigation using IoT", International journal of advanced science and technology, volume-29, pp 4595-4613.
[4] K.Prathyusha, M. Chaitanya Suman (2012) "Design of Embedded systems for the automation of drip irrigation"- International Journal of Application or Innovation in Engineering & Management, Volume 1, Issue 2
[5] Kajol R, Akshay Kashyap K (2018) "Automated agricultural field analysis and monitoring system using IOT" –International Journal of Information Engineering, pp. 17-24.
[6] Karan Kansara, Vishal Zaveri, Shreyans Shah (2015) "Sensor based Automated Irrigation System with IOT" - International Journal of Computer Science and Information Technologies, Volume-06, pp. 5331-5333.
[7] Khan Nadeem, Syed Akhlaque (2017) "Automatic Drip Irrigation Through Soil Moisture Sensors" - International Journal of Emerging Technologies and Innovation Research - Volume-04, Issue-2, pp. 249-252.
[8] M. S. Mirjat, M. M. Jiskani, A. A. Siyal and M.U. Mirjat (2011), "Mango production and fruit quality under properly managed Drip irrigation system"- research gate ISSN 1023-1072, pp. 1-12.
[9] Mehamed Ahmed Abdurrahman, Gebremedhn Mehari Gebru and TsigabuTeameBezabih(2015) "Sensor based Automatic irrigation management system"-International Journal of Computer and Information Technology, Volume 04 – Issue 03, pp. 532-535.
[10] Mr. Rahul Ganpat Ghodake, Mr. A.O. Mulani (2016) "Sensor Based Automatic Drip Irrigation System" -Journal for Research-Volume-2 Issue-2
[11] Nandan N, Dr. K. Thippeswamy (2018) "A Secure intelligent Drip Irrigation System – Using IoT, Cloud and Mobile Application"- International Research Journal of Engineering and Technology, Volume-05 Issue-03.
[12] P.Ashok and K.Ashok(2011) "Microcontroller based Drip irrigation system" International Journal &Magazine of Engineering, Technology, Management and Research.
[13] S.Munaf , Sathish K "Intelligent Transport Monitoring System for School Children", International Journal for Research Trends and Innovation,Vo4 issue 1, January 2019, ISSN: 2456 – 3315 .IF 4.87.
[14] P. Chandramohan, P.Balamurugan and S.Dinesh(2019), "Effect of fluid flow diversion and venturi size on Drip irrigation Fertilizer Feeding System", -Elsevier, Science direct, pp. 250-256.

ISSN: 2277-9655
Impact Factor: 5.164
CODEN: IJESS7

[15] Pavankumar Naik, Arun Kumbi, KirthishreeKatti, KirthishreeKatti (2018), "Automation of irrigation system using IOT"- International Journal of Engineering and Manufacturing Science. Volume 8, pp. 77-88.
[16] S. Munaf, S. Monika, G. Monika, V. Gopika & S. Arthi "Auto Honking Control System For Vehicles" international journal of Engineering Sciences & Research Technology, Vo9 issue 6, June 2020, ISSN: 2277-9655.IF 5.16. doi.org/10.29121/ijesrt.v9.i6.2020.13. Indexed: Thomson Reuters, Google scholar, Research Gate.
[17] Prathibha S R, Anupama Hongal, , Jyothi M P (2017) "IOT based monitoring system in smart agriculture" -International Conference on Recent Advances in Electronics and Communication Technology.