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Automatic Herb Watering and Irrigation System Using Global System for Mobile with Photovoltaic Cell

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Abstract:- Automatic herb watering system, which is considered as one of the most commonly required and the most beneficial automated systems nowadays, reduces or completely replaces manual efforts in herb watering. Medicinal herbs have been used virtually in all cultures as a source of medicine. Assurance of the safety, quality, and efficacy of medicines and herbal products has now become a key issue in industrialized and in developing countries. Medicinal herbs have been used for thousands of years in Ayurveda to treat health disorders, to preserve food and to prevent diseases. The main goal of our project is to optimize water use for agricultural crops and to minimize the wastage of water and to meet the ever-increasing demand for quality medicinal herbs. This project eliminates the manual switching mechanism used for herb watering. Because of its energy autonomy and lower price, the system has the ability to be useful in water limited geographically isolated areas.

Keywords:- *PIC16F877A Microcontroller, LM358, Solar Panel, SIM 800L GSM, Sensors.*

I. INTRODUCTION

There is a abundant range of possibility of implementing automatic herb watering systems as a long-life solution for many agricultural and medicinal problems, some of which are Lack of mechanization, soil erosion, inadequate storage facility and air pollution as most outstanding, important and hazardous ones. One of the possible agricultural solution is, this system can be very helpful in keeping track of the herbs in the fields in order to maintain the required atmosphere and moisture content in the soil. As most of the herbs are sensitive to moisture level of soil for quality growth, mainly medicinal and aromatic plants like Lemongrass, Ajwain, Mint, Calendula. Fruits like Blue Grapes, Strawberries. Vegetables like Potato and Beans, Asparagus and grains like Wheat and Rice. The proposed system provides efficient water to such herbs and helps the herbs to grow nutritionally. The project proposes an embedded system using a distributed wireless network of soil moisture, temperature, rain, light, water level sensor and water flow sensors placed in the root zone of the plants, whenever there is the need for water which is recognized by the sensor, microcontroller sends a signal to the motor which starts watering the herbs until enough quantity of water is delivered to the roots of the herbs during all the seasons. Solar module converts the intensity of sunlight into power which is fed to battery of the system.

II. RELATED WORK

First, In paper "GSM based Automated Irrigation Control using Raingun Irrigation System" by, R. Suresh, S. Gopinath, K. Govindaraju, T. Devika, N. Suthanthira Vanitha [1], using rain gun irrigation system saves more than 50% of the water used by flood irrigation system and electricity. Rain Gun Irrigation plays the role of Nitrogen fixation. One of the major nutrient plant requires is Nitrogen. Atmospheric air contains 78% of nitrogen. As our Rain Gun resembles Rain, the water dissolves the nitrogen from air and gives it to soil, thereby adding nutritive value to soil. This is one of the reasons for increase in yield. Clogging problem and less maintenance.

In S. Harishankar, Sudharsan K.P, R. Satish Kumar, U. Vignesh, T. Viveknath[2], "Solar Powered Smart Irrigation System" the system uses a single stage energy consumption where the water is pumped into a ground level tank which has a simple valve mechanism controls the flow of water into the field. This saves substantial amount of energy and provides efficient use of renewable energy. A valve is controlled using intelligent algorithm which regulates the flow of water into the field depending upon the moisture requirement of the field.

In paper "Web Based Intelligent Irrigation System Using Wireless Sensor Network" by Shubham Kadam, Namrata Kalyankar, Unnatee Rao, Prof. Soumitra Das[3], An intelligent irrigation system consists of a wireless sensor network that monitors the weather and soil

conditions. Wireless sensor network is used for the monitoring purpose. The monitored data is analyzed using the Raspberry Pi and the controlling action is taken, also the data is provided to the farmers through the cloud on their Web.

In paper "Remote sensing and control of an irrigation system using a distributed wireless sensor network" by Yunseop Kim, Robert G. Evans, William M. Iversen[4], An irrigation machine was converted to be electronically controlled by a programming logic controller that updates georeferenced location of sprinklers from a differential Global Positioning System (GPS) and wirelessly communicates with a computer at the base station. Communication signals from the sensor network and irrigation controller to the base station were successfully interfaced using low-cost Bluetooth wireless radio communication. Graphic user interface-based software developed in this paper offered stable remote access to field conditions and real-time control and monitoring of the variable-rate irrigation controller.

In "Smart Irrigation System Autonomous Monitoring and Controlling of Water Pump by Using Photovoltaic Energy" by Dhana Lakshmi. N, Gomathi K.S [5], this research paper main intention is to improve the yielding of crops by controlling the above parameters using Sensors, Global System for Mobile (GSM) module and with the help of an 8-bit ATMEL microcontroller AT89s52. The implementation of the PVC, GSM and control of pumping motor or shunt motor to entire irrigation system is done using embedded C programming and Keil Software in real time.

III. METHODOLOGY

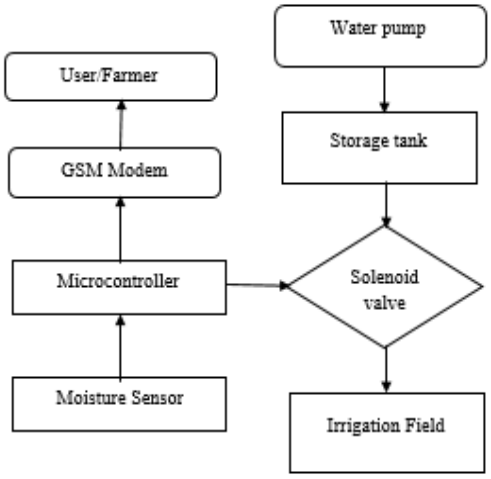

Fig 1:- Layout of smart irrigation unit

The layout of smart irrigation system in fig 1 shows the algorithm in which the availability of the water for field in the storage tank will be checked frequently to insure whether enough quantity of water is preservation to water the herbs. The pumping valve (solenoid valve), watering valve (irrigating fields) and yield control can be controlled whenever required by applications developed on the android mobile phone of the owner through which the control signals can be sent to the microcontroller unit through SIM 800L GSM module.

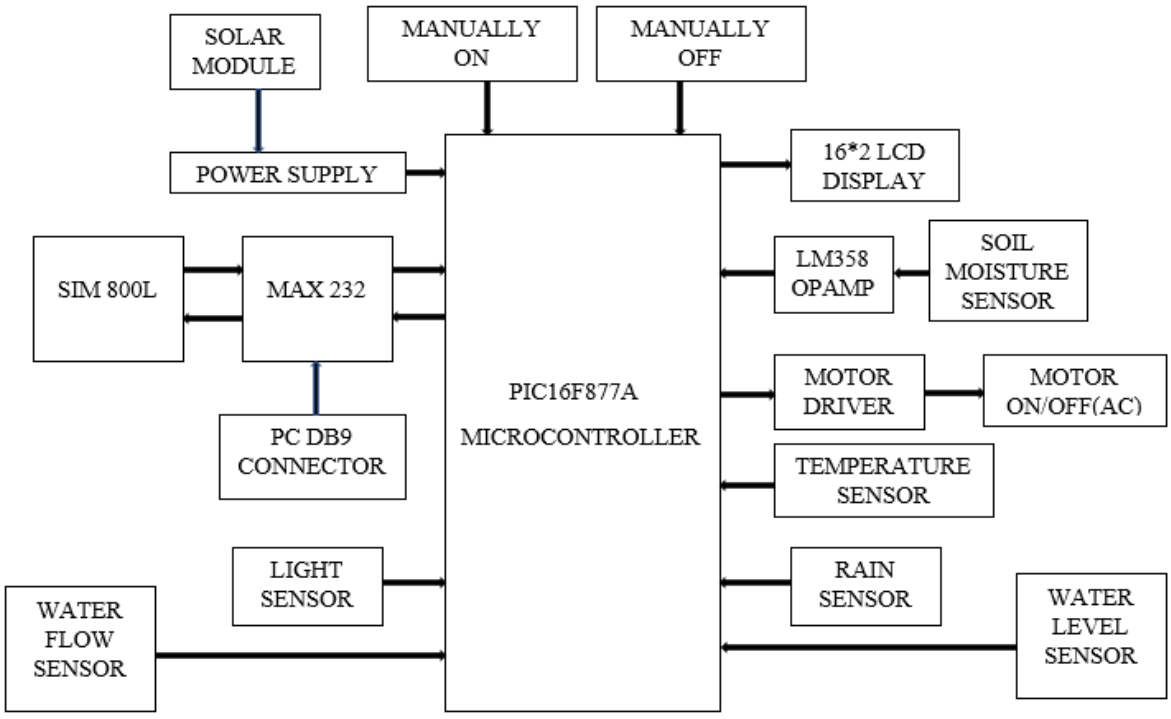

Fig 2:- System Architecture

The PIC16F877A microcontroller and GSM module are connected by IC MAX232. The water level sensor senses whether the water level in storage tank is sufficient for watering the herbs or not. If water level falls below the threshold value then a message is sent to the owner on his registered mobile number reading as, "watering not complete" otherwise the text will be sent as "watering is complete". The owner can send the response to the GSM module depending on which GSM module will perform operations automatically and it can also be performed manually through switches.

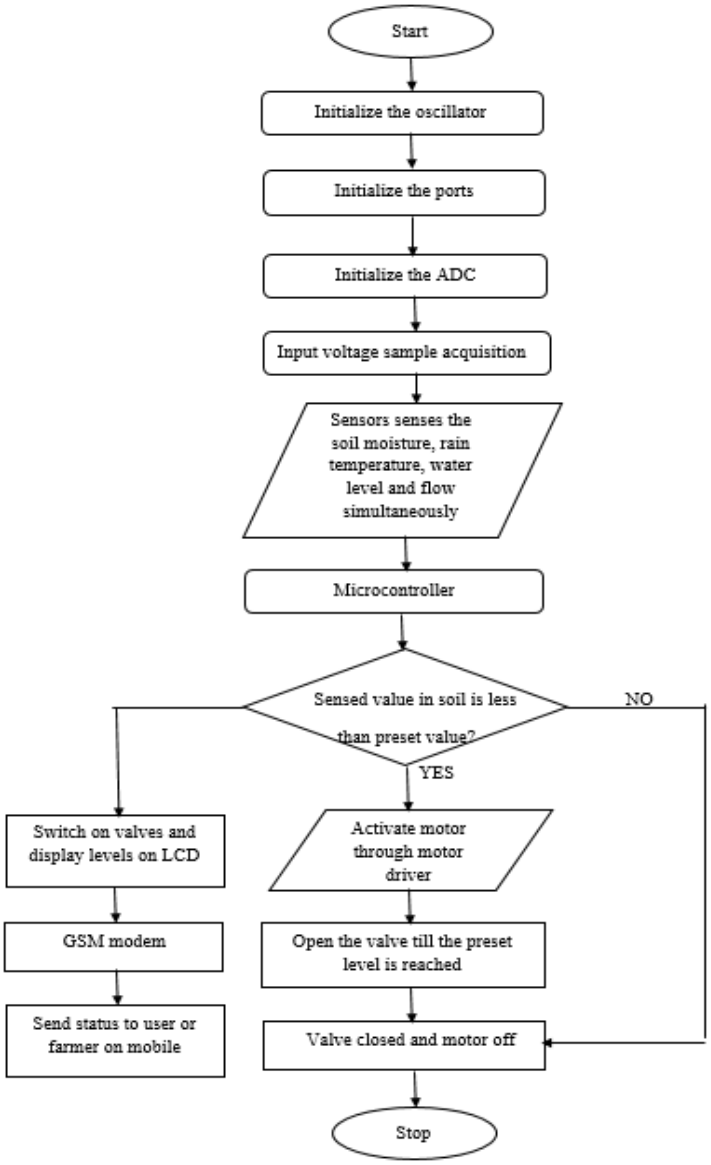

Fig 3:- Data flow diagram

IV. WORKING

This project basically identifies the moisture level in the soil and responds appropriately as required. The proposed system consists of subsystems such as Solar panel, Power supply, PIC16F877A Microcontroller, Soil moisture sensor, Temperature sensor, Rain sensor, Water flow sensor, Light sensors, water level sensor, Manually or Automatically on and off switches, Motor driver, GSM module and LCD. The Soil Moisture Sensor is used to keep track of the moisture level in the surrounding environment through which it supplies water to the roots of the plants for healthy crop growth. A Temperature Sensor measures the ambient temperature around the field. The Rain Sensor is used to detect whether the field is not watered during rainfall. The major application of rain sensor is, it conserves the water connected to the automatic irrigation system unit that initiates the system to be turned off during rainfall. Light sensor is a passive device that converts the intensity of light into an electrical output signal. The Water level sensor Works based on principle of buoyancy. The Water Flow Sensor monitors the amount of water being supplied and used. This Water flow sensor consists of a plastic valve from which water can pass. All these sensing signals are received by the PIC16F877A microcontroller and generates the output signal that pumps water through motor to the roots of the plants.

V. CONCLUSION

The "Automated Herb Watering and Irrigation System Using GSM With Photovoltaic Cell" is a highly helping unit which recognizes the moisture level in the soil, identifies status of the water pump, senses the temperature that is rainy or sunny, senses flow of water through pipes, senses water level in tank and senses water supplied to roots or not. All these functionalities are displayed on LCD and simultaneously it will automatically provide the required quantity of water to the herbs in all the seasons and all this information is communicated to the farmers mobile through GSM Module. So, this proposed system eliminates the manual switching mechanism used for herbs watering. The necessity to minimize the wastage of water and the ever- increasing demand for the medicinal herbs is the major concern of the system.

REFERENCES

[1]. R. Suresh, S. Gopinath, K. Govindaraju, T. Devika, N. Suthanthira Vanitha, "GSM based Automated Irrigation Control using Raingun Irrigation System", International Journal of Advanced Research in Computer and Communication Engineering, Volume 3, Issue 2, February 2014.

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

[3]. Shubham Kadam, Namrata Kalyankar, Unnatee Rao, Prof. Soumitra Das, "Web Based Intelligent Irrigation System Using Wireless Sensor Network", Volume 5, Issue 4, April 2017.

[4]. Yunseop Kim, Robert G. Evans, William M. Iversen, "Remote sensing and control of an irrigation system using a distributed wireless sensor network" IEEE Transactions on Instrumentation and Measurement., Volume 57, pp. 1379–1387, July 2008.

[5]. Dhana Lakshmi.N, Gomathi K.S, "Smart Irrigation System Autonomous Monitoring and Controlling of Water Pump by Using Photovoltaic Energy", SSRG International Journal of Electronics and Communication Engineering, Volume 2, Issue 11, pp. 21-26, November 2015.