Mobile Monitoring Of Flow Control Unit Using Hall-Effect Sensor in the Smart Farm Management System

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Abstract—

This paper summarizes the monitoring of controlled irrigation system in the Indian agriculture segment using mobile. The idea suggested here is based on deep percolation, where water moves below the root zone, can occur if a drip system is operated for too long or if the delivery rate is too high. Drip irrigation methods range from very high-tech and computerized to low-tech and labour-intensive. Lower water pressures are usually needed than for most other types of systems, with the exception of low energy centre pivot systems and surface irrigation systems, and the system can be designed for uniformity throughout a field or for precise water delivery to individual plants in a landscape containing a mix of plant species. Although it is very difficult to regulate, blockage due to mud, leakage due to the animal's presence. Because of these lots of water gets waste or the problem of irregular water supply to the plant. To avoid this kind of problem we can interpret the technique due to that the problem stated above can be solved easily before.

Now days voice IC's are available using these IC we can monitor the status of flow control valve at any time anywhere. And accordingly we can minimize the problems.

Keywords— OR in telecommunications; Flow Control; Smart Farms; Hall Effect Sensor; Drip irrigation;

I. INTRODUCTION

Flow Control unit Using Hall-Effect Sensor in smart farm management system, since the droughts of the 1970s, strategies involving the control of water have been developed to secure and improve agricultural production. A National Policy for Development of Irrigation and recently a National Strategy for Sustainable Development of Irrigated Agriculture have been developed to boost irrigated agriculture. The control of water has become a national priority and justifies the development of large schemes such as the scheme of Bagre. Drip irrigation, also known as trickle irrigation or micro irrigation or localized irrigation, is an irrigation method that saves water and fertilizer by allowing water to drip slowly to the roots of plants, either onto the soil surface or directly onto the root zone, through a network of valves, pipes, tubing, and emitters. It is done through narrow tubes that deliver water directly to the base of the plant [1].

The monitoring is the major part in the smart farming, now days it very difficult to use the labour-intensive to handle the farming. As per the expenditure is concerns the monitoring system is very essential.

II. LITERATURE REVIEW

Smart technology, smart farming is yet to be a big buzz in the Indian agriculture segment. Though agriculture in India plays a vital role in the overall socio-economic framework, current agricultural practices followed are neither economically nor environmentally sustainable. Lack of the use of hi-tech irrigation systems, crop failures due to lack of monsoon, poor seed quality, inefficient farming practices, undue output costs – the list of problems in most regions goes on. Suicides by farmers still hit the headlines; 17,368 Indian farmers killed themselves in 2009 [2].

Use of smart automation technology in farming is the need of the hour. Awareness about managing of irrigation systems should be spread on a large scale. Automation in farming can increase agricultural productivity while ensuring that dependent resources are not depleted. Using the latest technology solutions and agricultural practices, farmers can enjoy smart farming.

Today, our farmers lack behind on the knowledge of better farming techniques. They are unaware of how today's high technology can be used to get rid of their day-to-day farming problems. They should be made aware of advantages of Smart solutions available today, so that they can blend them as per their needs to get maximum benefit. Use of better field watering techniques, reducing manpower by deploying Smart machines yields more output. D. Wang et al [3] demonstrated, A Windows-based graphical user interface program (Drip Fume) was developed in MS Visual Basic (VB) to utilize a two dimensional,

multi-phase finite element pesticide transport model to simulate distribution and emission of volatile fumigant chemicals when applied through drip irrigation or shank injection.

LIU Hai-Sheng et al [4] worked on, the energy dissipation mechanism and anti clogging properties of drip irrigation emitters are closely related to flow characteristics of the fluid in its flow paths, and flow field tests using modern flow visual technologies were carried out by a large number of designers. The Digital Particle Image Velocimetry (DPIV) system was built for un-disturbed flow tests in the labyrinth path.

Emitter clogging will affect greatly the irrigation efficiency and the running cost of a drip irrigation system. If there is an effective method to predict the emitter clogging, the lost will be reduced to a minimum. A solid–liquid two-phase turbulent model describing the flow within drip emitters was studied [5].

Irrigation combined with fertigation has produced unquestionable results for the last few decades. It is a rather complicated process as many factors must be controlled in order to produce good and environmentally safe fertigation practices. The efficiency and uniformity of irrigation, as well as the balance of the nutritive solution used to irrigate are highly ruled by the complex and diverse information (weather, soil, water, and crop data) investigated by J.M. Moreira Barradas et al [6]

III. OBJECTIVES

The long term objectives of this research work are,

- To check the feasibility of implementing smart farm water management technology for automatic flow control in irrigation system.
- To investigate efficiency of water management system in agriculture area.
- To reduce the manpower and efforts of farmers.
- To know the status of the valve.
- To water the roots of crops for better yields.
- To avoid unnecessary watering of the fields.
- To monitor the pump house and its access control using mobile.

IV. METHODOLOGY

A. What is Hall-Effect Sensor

A Hall Effect sensor is a transducer that varies its output voltage in response to a magnetic field. Hall Effect sensors are used for proximity switching, positioning, speed detection, and current sensing applications.

In its simplest form, the sensor operates as an analog transducer, directly returning a voltage. With a known magnetic field, its distance from the Hall plate can be determined. Using groups of sensors, the relative position of the magnet can be deduced.

Electricity carried through a conductor will produce a magnetic field that varies with current, and a Hall sensor can be used to measure the current without interrupting the circuit. Typically, the sensor is integrated with a wound core or permanent magnet that surrounds the conductor to be measured.

Frequently, a Hall sensor is combined with circuitry that allows the device to act in a digital (on/off) mode, and may be called a switch in this configuration. Commonly seen in industrial applications such as the pictured pneumatic cylinder, they are also used in consumer equipment; for example, some computer printers use them to detect missing paper and open covers. When high reliability is required, they are used in keyboards [1].

B. Flow Measure by Using Hall-Effect Sensor

Hall-Effect Sensor can be used to create a flow meter or calculating the amount of liquid passing. Measure liquid/water flow for your solar, computer cooling, or gardening project using this handy basic flow sensor. This sensor sits in line with your water line, and uses a pinwheel sensor to measure how much liquid has moved through it. The pinwheel has a little magnet attached, and there's a Hall Effect magnetic sensor on the other side of the plastic tube that can measure how many spins the pinwheel has made through the plastic wall.

This method allows the sensor to stay safe and dry. Water flow sensors consist of a plastic valve body, a water rotor, and a hall-effect sensor. When water flows through the rotor, rotor rolls. Its speed changes with different rate of flow. The hall-effect sensor outputs the corresponding pulse Signal.

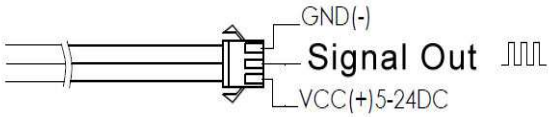

Fig. 1 Sensor Schematic [1]

The sensor comes with three wires: red (5-24VDC power), black (ground) and yellow (Hall Effect pulse output). By counting the pulses from the output of the sensor, you can easily track fluid movement: each pulse is approximately 2.25 millilitres. Note this isn't a precision sensor, and the pulse rate does vary a bit depending on the flow rate, fluid pressure and sensor orientation. It will need careful calibration if better than 10% precision is required. However, it's great for basic measurement tasks [1].

C. Flow Monitor by Using Mobile and Voice IC

Flow monitor by using mobile can be possible by using mobile and voice IC APR 33A3.flow can be monitored by using microcontroller 89C52 and which can be displayed on the LCD. Whenever a farmer required to know the status of the flow measured sensor, he just has to call the mobile number which is kept with this electronics Kit. The status of the valve can listen by farmer from anywhere by using the voice IC and microcontroller. Due to this farmer can save the time also labour incentive.

D. Voice IC

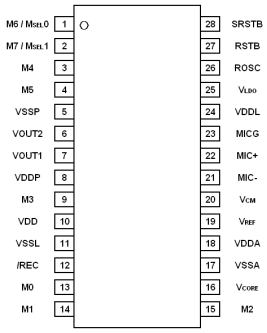

Fig2.Pin out Of IC aPR33A3

The aPR33A3 series are powerful audio processor along with high performance audio analog-to-digital converters (ADCs) and digital-to-analog converters (DACs). The aPR33A series are a fully integrated solution offering high performance and unparalleled integration with analog input, digital processing and analog output functionality. The aPR33A series incorporates all the functionality required to perform demanding audio/voice applications. High quality audio/voice systems with lower bill-of-material costs can be implemented with the aPR33A series because of its integrated analog data converters and full suite of quality-enhancing features such as sample-rate conversion.

The aPR33A series C2.0 is specially designed for simple key trigger, user can record and playback the message averagely for 1, 2, 4 or 8 voice message(s) by switch, It is suitable in simple interface or need to limit the length of single message, e.g. toys, leave messages system, answering machine etc. Meanwhile, this mode provides the power-management system. Users can let the chip enter power-down mode when unused. It can effectively reduce electric current consuming to 15uA and increase the using time in any projects powered by batteries.

E. Circuit Diagram of voice IC aPR33A3

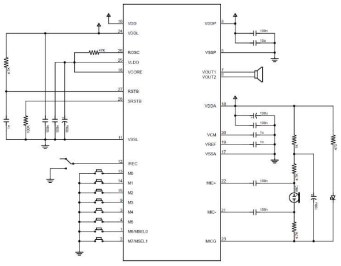

Fig3.IC Apr33a3 Audio Recording and Playback Circuit

F. Main Circuit Diagram

The actual work of project implementation with its design started with the real time simulation. Here are some results of different trials that taken while designing the PCB Shown in Fig.4 "Main Circuit Diagram of Monitoring of Flow Control Using Mobile" Simulation proved to be a very handy & easy-to-use tool for the PCB layout process. Many of its features were utilized

leading to an accurate & efficient design. It has Design Error Check & Electrical Rule Check tools which proved to be helpful in the design. It is loaded with a huge component list (Library) that is categorized in various libraries for giving simplicity. Placement of components is also very easy & they can be rotated in 3600 to customize the design.

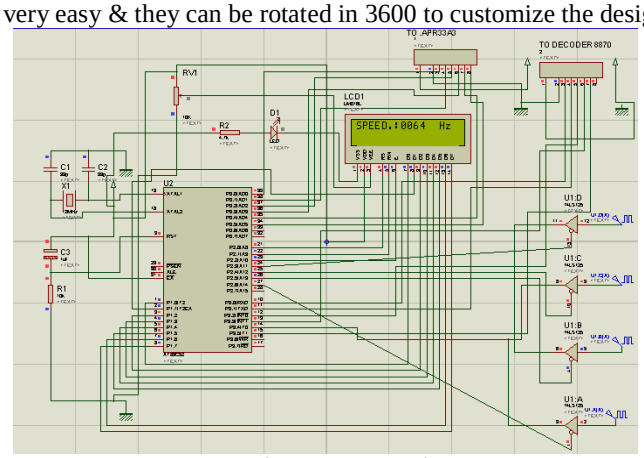

Fig4.Main Circuit Diagram of Monitoring Of Flow Control Using Mobile

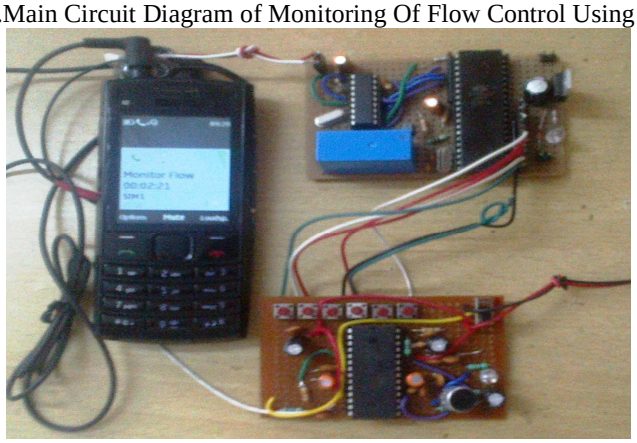

Fig5.Design of Main Circuit Diagram of Monitoring Of Flow Control Using Mobile

The circuit is made up of the decoder IC 8870 and aPR33A.because of the Fig 4 and fig 5 shows the design of mobile monitoring of flow control unit using hall-effect sensor in smart farm management system. The design work based on DTMF codes and voice IC.

Whenever a farmer wants known the status of flow sensor in the farm he just has to call to the specific number which is installed in the system. When farmer will call to the number the ring will listen to the farmer after k=listening the rings call will automatically receive by the mobile. The farmer will have to press a * key on the mobile to take system into the working mode. After pressing of * key the DTMF code will be received by decoder IC. The microcontroller will detect the key respond to the request. After that microcontroller will give instruction to farmer by using voice IC APR33A3 (APR33A3 is the eight voice message record/playback IC. The messages as per the requirements are stored in the voice IC. Whenever is request come from the microcontroller, voice IC will respond in terms of voice message). By this way a farmer can know the status of flow control valve by using mobile can be possible and accordingly decision can be taken by him. By this way water can be efficiently used without using the labour presence.

V. RESULT

The result of this circuit will give us the information of flow sensor in the farm to the farmer anytime anywhere within on call. He can hear the status of valves used on the farm and he can take the decision about not waste the water without using labour efficiently.

VI. CONCLUSION

In this way we can conclude that it is feasible to monitor the smart farm water management technology for automatic flow control in irrigation system using a mobile device. And it is efficient to use sound IC to monitor the valve conditions in the farm in agricultural areas, also advance capabilities of a monitoring system are checked to reduce the manpower and efforts of farmers in respect of knowing when to water the fields, to water the roots of crops for better yields, to avoid unnecessary watering of the fields and to monitor the pump house and its access control

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