Automatic Irrigation Control System based on Lab-VIEW Arduino Interfacing

P. S. Aswale[1], Sonal Sali[2], Shruti Zarole[3], Pranali Patil[4]

[1]*Assistant Professor Department of E & TC, SITRC, Nashik-400101, India*

[2,3,4]*Student, Department of E & TC, SITRC, Nashik-400101, India*

Abstract— **The paper proposed the measuring and monitoring the soil moiture and the level of the tank using Lab-VIEW arduino Interface. The Hardware is interfaced with Arduino board and software is developed in the Lab-VIEW software. The key goal of our paper is to examine the soils moisture content at some stage in its dry and wet conditions with the aid of a moisture sensor circuit, estimate the equivalent Humidity and irrigate it based on its nature. The proposed system uses the Lab-VIEW and Arduino board. It is programmed in such a way that it will sense the moisture level of the plants and supply the water if required. The output of Water level sensor is fed to the controller accordingly the level of water in the tank is displayed. The GUI is developed in LAB-VIEW. The various conditions will be indicated on the front panel such as wet and dry condition of soil with the level of water in the tank. The main objective of the proposed system is to examine the humidity content in the soil in refining field. Based on soil humidity, motor will be automatically switched on or off. System helps to save the water as well as time and optimum level of water is given to plant.**

Index Terms— **arduino UNO,LabVIEW, LIFA, Soil moisture sensor**

I. INTRODUCTION

Valuable crop treatment and water management is the major obligatory in most of the cultivating area in semi-arid regions. Monitoring the soils moisture, calculating its relative humidity and controlling pumping motor in accor- dance with its predictability. It is very difficult to examine and controlling the switching action of pumping motor according to the level of water in tanks. So a water level controller and automatic irrigation controller prevents dry running of pumping motor, thus saves electricity, water & manpower.

In this project, As block diagram shows, we assembled automatic water planting circuit using Lab-VIEW and Arduino interfacing. A humidity sensing device monitor the humidity of soil and water level sensing device sense the water level thus turning pump on and off according to different condition according to soil moisture and level of water in tank. When the humidity of soil is low that is soil is dry the water pump is on and if humidity is high that is soil is wet the water pump is off. At same time the sensor used to sense the water level is also consider. When the water level is below the low level the pump is off at any soil condition which prevents the dry running of water pump. Also water level is indicated.

As Arduino uno is open source it is used to interface sensing devices with Lab-VIEW on personal computer. Lab- VIEW is workbench with a graphical programming language for instrumentation, data-acquisition & analysis, automation & control and communication
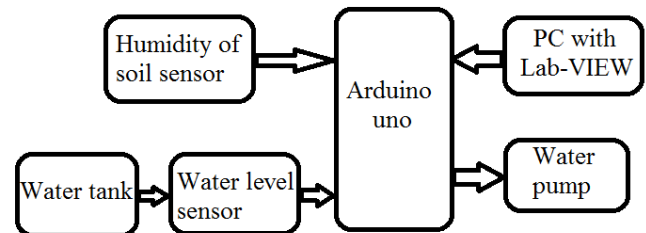

Fig. 1: block diagram

The water level sensor senses the level of water and humidity sensor sense the humidity of soil weather it is dry or wet. The reference voltage from both sensors is fed to arduino board and according to the programming done in Lab-VIEW the control signal will be given to the motor. The arduino signal is fed to the Lab-VIEW as a input, this signal is compared with minimum or maximum level of water and

threshold level of soil humidity voltage. The output of Lab-VIEW is fed to the digital write of Arduino as a input signal. According to digital write output signal, motor in water tank will be turn ON or OFF. The motor turn ON when the water is sufficient i.e water is at low level or above the low level and when soil is dry. The motor will turn OFF when soil is wet and water is sufficient. When the water is insufficient i.e. water level goes below low level either soil is dry or wet,the motor will remain OFF

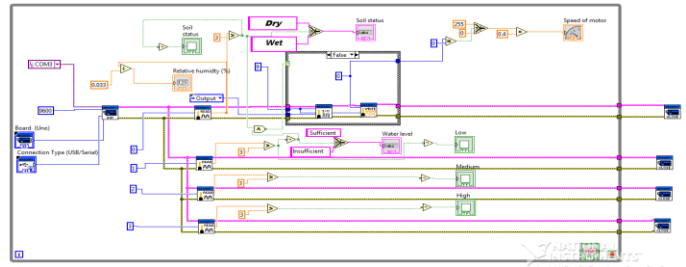## II. LAB-VIEW ARDUINO INTERFACE

For interfacing Lab-VIEW and an Arduino, the NI LAB- VIEW toolkit [6] provides easy interface. LIFA (Lab-VIEW Interface for Arduino) was developed and tested using an Arduino Uno but should work with most Arduino compatible hardware. It includes not only the opens source firmware for the Arduino but also 100 VIs to access the Arduino functionality from within Lab-VIEW. LIFA is a tethered key and it requires a data connection between Lab-VIEW and the Arduino at all time. This is typically proficient through USB but can also using Xbees or bluetooth. LIFA does not allow the user to deploy Lab-VIEW code the Arduino. Once the data is acquire in LABVIEW, we can analyze it with the help of built in libraries functions supported by LABVIEW, design the algorithms which will control the arduino hardware and we can display the finding on user interface. Using the built in library such as common Open, Read/Write, Close convention in LabVIEW, you can access the digital, analog, pulse-width-modulated, I2C, and SPI signals of the Arduino microcontroller [6,7].

III. SOFTWARE IMPLEMENTATION

The software module that is integrated in developing the graphical program structure is Lab-VIEW 2013. It include the block diagram which is the sequence of icons that are connected with wires in the manner of flow of operation. The front panel is in which the acquired and generated parameters are shown in numerical, graphical waveform or as a control. The required block code is as shown in figure 2. for acquisition data , so it is needed to define Init that includes the VISA resource (COM port, type of arduino board, type of connection (USB/serial), bate rate and at the end define close session. The Design of the software using LABVIEW is based on the user graphical programming which helps to communicate with real world data. [5].

Fig. 2: VI in LABVIEW

IV. HARDWARE IMPLEMENTATION

The hardware consist of the data Acquisition card that is used as a mean between PC and sensors circuit , ATmega32 (Arduino prototyping) platform is used here for this purpose. To exhibit the potential applications of the Arduino based Data Acquisition and Control using LabVIEW a simple hardware setup is built as shown in the fig 3.

A. Soil Sensor

The humidity sensor circuit mainly requires an operating voltage of about (5-12 volts). The BC 548 transistor used in this circuit works to switch electronic signals and amplifies them. With the combination of various other resistors con- structed as per the circuit diagram shown in fig 4., During the soils damp conditions, the two probes behave as electrodes and therefore current flows in a closed circuit due to the presence of water (which is a good conductor of electricity) content,
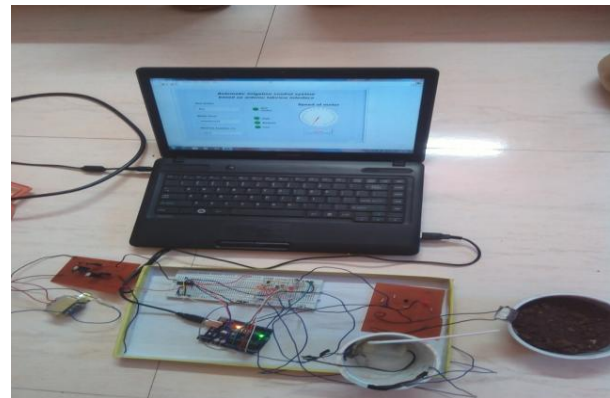

Fig. 3: Experimental Setup

between the two electrodes. This turns the transistor Q1 to an ON state. The circuits working or conducting condition is indicated by the glowing of the LED due to the passage of current. When dry, it becomes an open circuit because there is no medium for the electricity to flow, the transistor is in the OFF state therefore the LED turns OFF. The output voltage is obtained from the leads that are connected across the collector and ground terminals. The voltage completely drops to zero during the wet condition and in the range of (2.9 V 3.9 V) for the soils dry condition. The output is acquired with the help of Arudino and is interfaced with the LabVIEW software. Two probes will always be in contact with the soil so that it senses the wetness and the dryness of the soil[1,8].
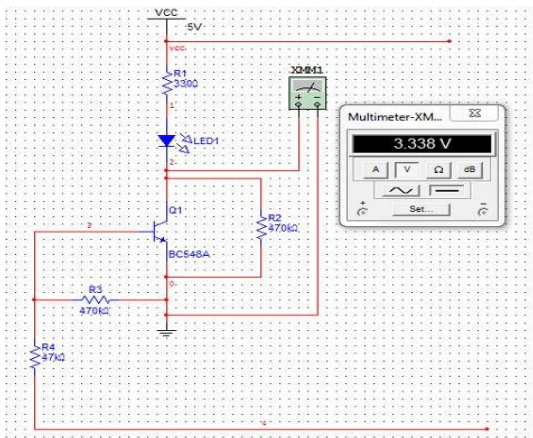

Fig. 4: Soil Sensor Circuit Diagram

V. RESULTS AND CONCLUSION

Fig 5 show the Front panel in Lab-VIEW when soil is dry and water is sufficient. Water pump is in ON state. The low, medium, high LED is glow indicate the water level. As motor speed is 100% means the motor is ON.
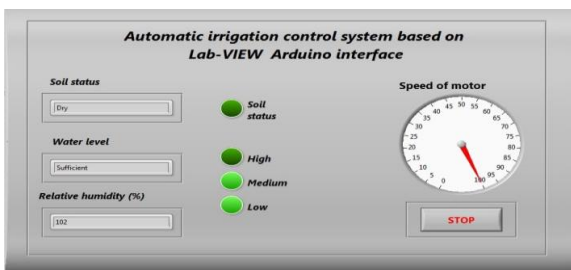

Fig. 5: Soil Sensor Circuit Diagram

Fig 6 show the Front panel in Lab-VIEW when soil is dry but water is insufficient. Water pump is in OFF state. As the all LED is off indicate the water level is below the low level i.e. insufficient. Motor at 0
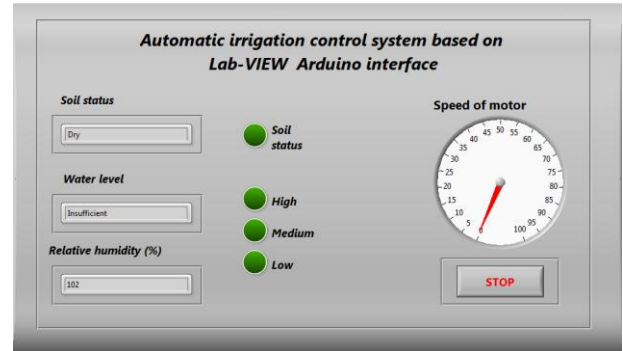

Fig. 6: Soil Sensor Circuit Diagram

Fig 7 show Front panel in Lab-VIEW when soil is wet but water is sufficient. Water pump is in OFF state. Soil LED is glow means soil is wet. Water level LEDs are glow indicate the water level. Speed of motor is 0
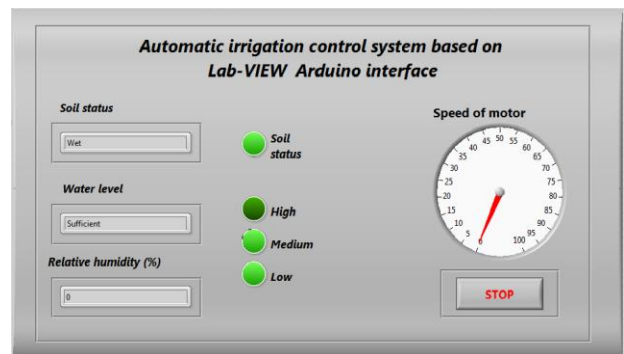

Fig. 7: Soil Sensor Circuit Diagram

This paper involves how to control the motor automatically by using Lab-VIEW and Arduino interface .It provide every- thing that is needed to build any monitor or control application in significantly in less time, The automatic irrigation system was developed and successfully implemented along with sen- sors. The system reduces human effort and wastage of water and increase electricity consumption. LabVIEW is best for any measurement and control system, with GUI that assist to build a wide range of applications in less time . In future revision, the code be modified to store all input and output data over a

long period which is useful to study pattern of water usage due to which we can improve the reduction in water consumption. We can also implement wireless system to avoids the long runs of cables in the field.

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