International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 2 Issue 6, June - 2013

Wireless Drip Irrigation Controlled System

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Abstract

At remote location a moisture sensor is placed in soil at root zone of the crop. Location of the sensor from the surface varies as per the type of crop. Soil moisture and temperature is measured along with corresponding signal conditioning circuits. These data are sent to receiving station where those are acquiesced and control signal is sent to field station back. The main objective of this research is to use wireless technology and instrumentation techniques to use the available water optimally for growth of crops and get large area of land irrigated which in turn will lead for high yield of the product. Knowledge acquainted at one region and season is varying with the others, hence substantial loss of crop growth. Automation of irrigation system is needful to overcome such problems. So here is an attempt to achieve the same. The database in designed system is ever increasing, as it gets information of present condition. More optimization is possible by editing current software.

Keywords: Optimization, Wireless, Remote, Irrigation, Transceiver.

1. Introduction

In India, irrigation is practiced since ancient time. Where as in traditional irrigation, farmers irrigate the field based on previous knowledge acquired and present atmospheric condition. Knowledge acquainted at one region and season is varying with the others, hence substantial loss of crop growth.

Drip irrigation is the great aid to use water efficiently for deep percolation or evaporation. Providing continuous human intervention to conventionally controlled drip irrigation is detrimental to the crop. Lack of knowledge of soil moisture, cannot optimize the drip irrigation. Automation of drip irrigation is needful to overcome such problems. So here is an attempt to achieve the same.

2. Methodology

2.1 Hardware Section:

It consist of basic mechanical system i.e. piping, pump, valves etc. and instrumentation part i.e. sensor, signal conditioning circuit, relay and UHF transreceiver moduleCC1000. Instrumentation system is shown in Fig.1

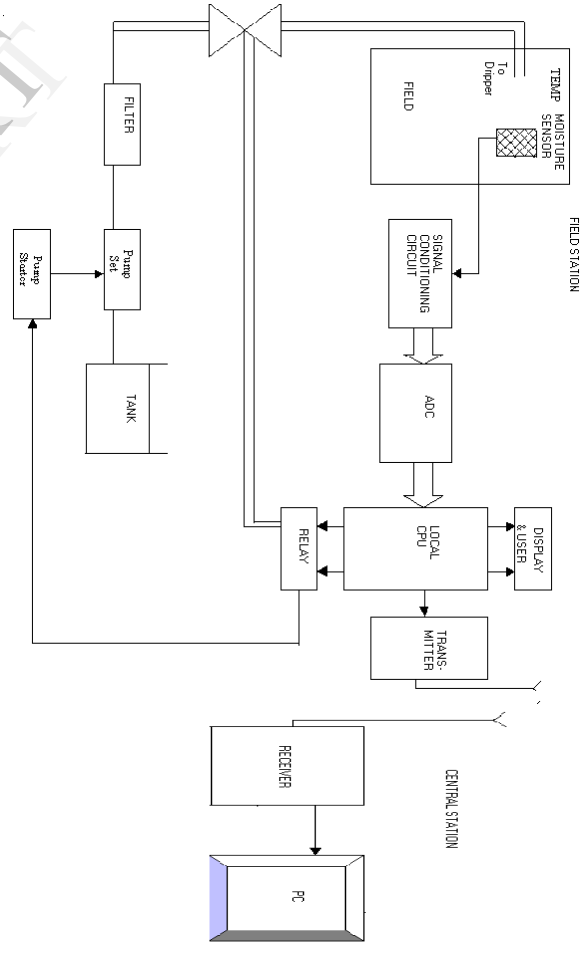
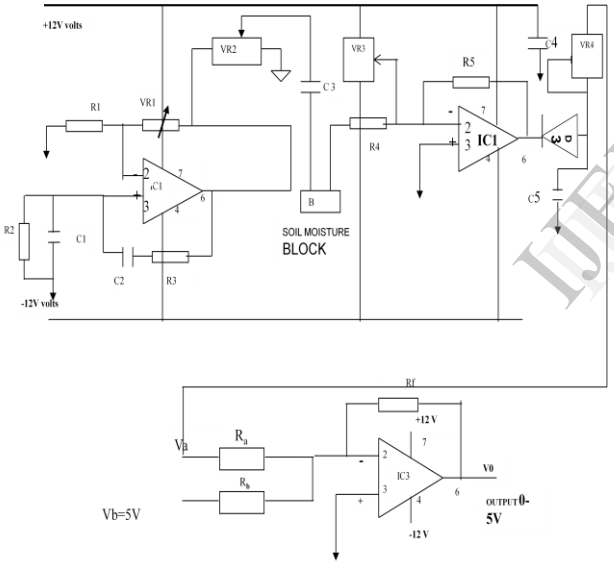


Fig.1 Instrumentation system of Irrigation control

Atmospheric temperature sensor: Standard semiconductor LM35 is used to sense the atmospheric temperature.

Soil moisture sensor: For soil moisture sensing gypsum block is used which has variable resistance characteristic with respect to variation in soil moisture. When block is wet conductivity is high and the resistance is low and vice-versa.

Analog output the sensor is conditioned by using operational amplifier circuit for range adjustment and calibration then converted to digital form to suit microcontroller and is shown in Fig.2. The microcontroller actuates the relay, depending on the type of control action. User interface is provided to control local action by displaying local parameter. This can override the control signal if required. Simultaneously data status is sent to centralized remote station with the help of advance blue tooth technology. The range can be enhancing by using proper amplifier at output or for more range required proper antenna is to be used.

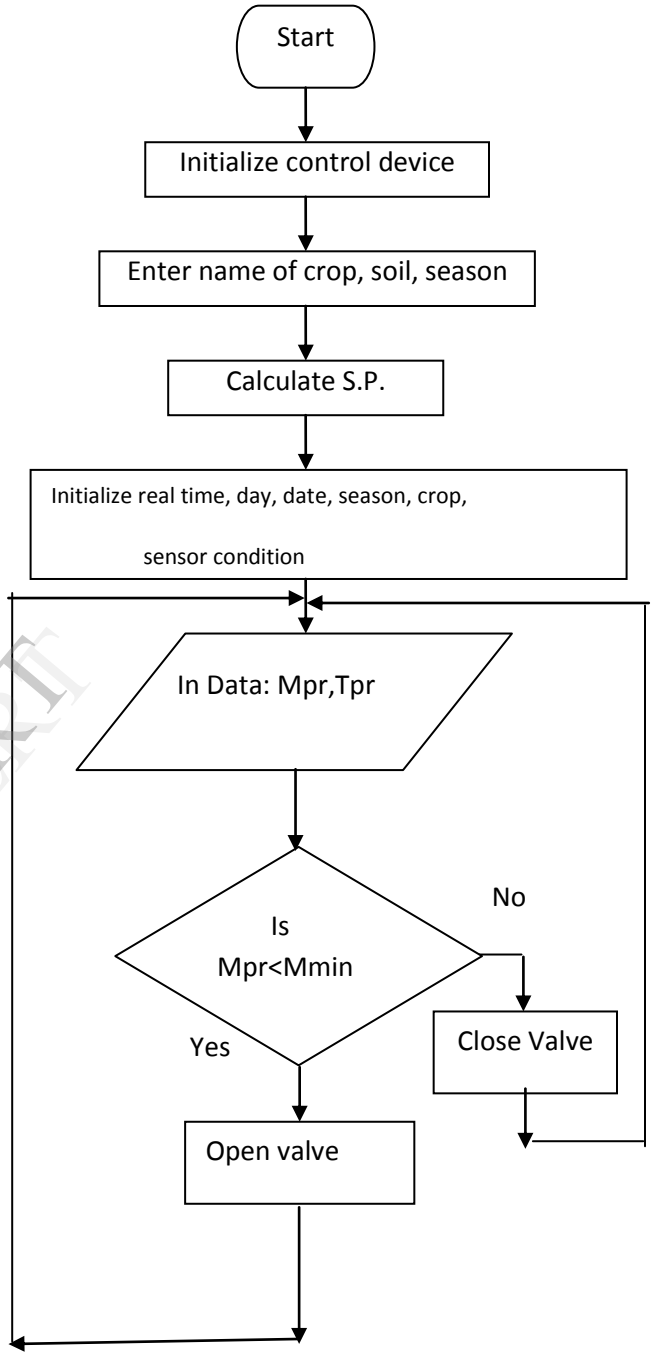


R1=10K; R2, R3, R4, Ra, Rb, Rf=1K; R5=100K
C1, C2, C3=0.15µF; C4=470µF; C5=1µF
VR1=100K; VR2=10K; VR3, VR4=50K
D1, D2, D3=1N4001
IC1, IC2, IC3=OP07 OP-AMP

Fig.2 Signal Conditioning Circuit

The pump set has individual starter and is controlled by local controller. The transceiver circuit interface to computer, handles over all controlling action remotely. The computer software takes care of 'n' no. of station and simultaneously gives the command to control it.

Flow Diagram Irrigation Control System:



2.2 Software Section:

- Running software: It takes care of present running conditions.
- Data accusation and control: It is a new and more important concept by which the parameters of

running software can be changed to achieve optimum results.

- Data collection: To improve the database for further improvement in the running software after analysis.

  The concept of the software is represented by the flow diagram.

In menu option there is facility to select no. of data station as well as intermittent stop facility available. It just calls the routine sequentially. The discharge depends on the number of station

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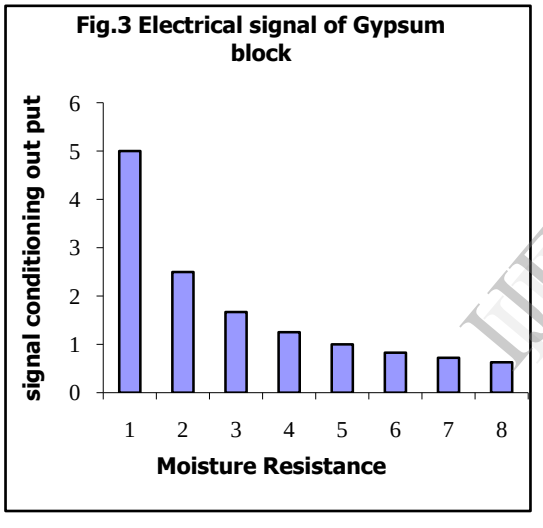
3. Results and Conclusion

The response of signal conditioning and sensing unit is obtained as shown in Fig.3



Here by controlling soil moisture of a field remotely and comparing it with the available data, effective utilization of water source is achieved through RF transceiver moduleCC1000.

Automation helps in optimum utilization of water for irrigation as per requirement of the crop result in better yield of crop compared to normal practices carried out by the farmers. The designed system with automation is working satisfactorily as per requirement. Supply of water to plants as per their need. It helps for reduction in human error and it saves energy. Due to availability of previous data we can optimize the total growth of plant. Initial investment is more but gives better yield.

4. References

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