

Review Article

Review of “Irrigation System and Water Lifting” using Wind Mill Energy

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Abstract

This Paper proposes atomized system for efficient use of water in Agriculture. India seems to be significantly behind in terms of automation and sophistication in agriculture. We are not able to cultivate faster and maximize our yields through automation. We therefore thought of applying the field of electronics to our main occupation i.e. agriculture. Efficient irrigation is the process of developing a technique which supplies precise amount of water and nutrients directly to the root zone of the plant, offering adequate irrigation and sufficient quantity of water. It discourages the growth of weeds and helps to prevent from fungal diseases which often grow in moist environment. Since today, world water resources are diminishing at a higher rate, therefore we have involved “Drip Irrigation System”. This saves water and delivers water using mainlines, sub-mains and lateral lines with emission points along their lengths. Each dripper/emitter, orifice supplies a precisely controlled uniform application of water, nutrients and other substances required by the plants in proper amount. Thus, this system ensures that plants never suffer from water stress, enhancing quality, its ability to achieve optimum growth and high yields. The proposed system deals with both automatic and manual parts. When automatic system fails, it is indicated by system failure circuit.

Keywords: Wind Mill, Microcontroller, Wind Energy, Water Pump

1. Introduction

Water is the primary source of life for mankind and one of the most basic necessities for rural & urban development. The rural demand for water for crop irrigation and domestic water supplies is increasing. At the same time, rainfall is decreasing in many arid countries, so surface water is becoming scarce. Ground water seems to be the only alternative to this dilemma, but the groundwater level is also decreasing, which makes traditional hand Pumping and bucketing difficult. Diesel, gasoline, and kerosene pumps (including windmills) have traditionally been used to pump water.

In the irrigation systems, the most significant advantage is that when proper amount of water gets by roots of the plant that time the water supply section automatically OFF due to which a large quantity of water is saved. At the present era, the farmers have been using irrigation technique in India through the manual control in which the farmers irrigate the land at the regular intervals. This process sometimes consumes more water or sometimes the water reaches late due to which the crops get dried. Water deficiency can be detrimental to plants before visible wilting occurs.

Slowed growth rate, lighter weight fruit follows slight water deficiency. This problem can be easily perfectly rectified if we use automated irrigation in which the

irrigation will take place only when there will be intense requirement of water.

1.1 Objective of Project

The objectives of this project is,

- To design, implement and provide a simple and economic solution for water lifting and irrigation.
- The Electromechanical system should be developed for rural area as it suffers from power supply failure by using non- conventional energy sources.
- This system should operate on 12 volt DC, which is less hazardous than present high voltage system.
- The system should monitor water content in soil and should regulate water release.
- The system should generate sufficient power for operation of additional gadgets.
- The system should be easily configurable by minor changes in hardware and software.
- To make the system more user friendly and greater reliability.

1.2 Necessity of Project

If we look at current scenario of water irrigation for agriculture sector various problems are facing by the Farmers due to following reasons.

- Lack of sufficient electricity to run the electrical water pumps.

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- More man power requirement for better utilization of recourses.
- High electricity charges.
- CO2 Emission from power by diesel pumps or generators.
- Lack of power supply in remote areas.
- Risk involved in handling high voltage for irrigation pump.

2. System Development

2.1 Block Diagram

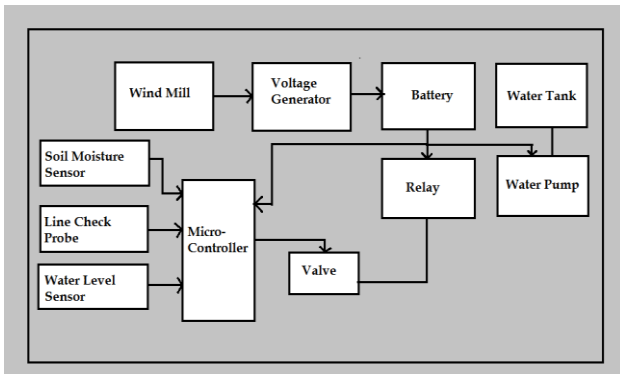


Figure 2.1: Block diagram of system

The basic block diagram of the wind mill based irrigation system is given below. The system contain windmill, battery, microcontroller, sensor ,valve , water pump, water tank etc. The function of each block is given below

2.2 Windmill

It is the main part of this system which convert the wind energy into a electrical energy. Basically the windmill convert the wind energy into a mechanical energy and then mechanical energy is converted into a electrical energy. After that this electricity is used in the farm to run water pump, controller , and other part of this system.

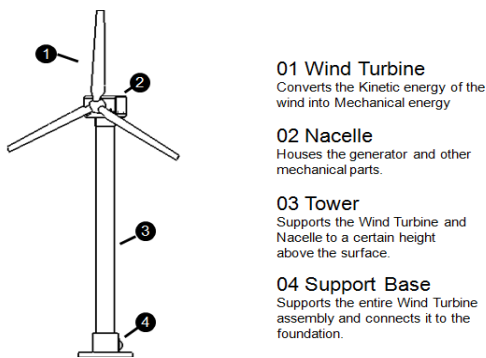


Figure2.2: Wind Turbine Assembly

2.3 Micro Controller

This is an electronic circuit which as the intelligent feature to sense the various parameters like Pressure, Water level in the well, Soil conductivity and take the necessary action

.It is the brain of my system and takes all course of action required to make the efficient use of water for irrigation. In this project the controller is the main part which controls the input and output of the system. In this system the ATMEGA328 controller is used. The following are the features of controller ATMEGA328.

2.4 Water pump

This water pump to lift the water from a well or bore which is gate varied as per the required application. In this system the submersible water pump is used to lift the water from the main source of water. Following are the uses of the submersible water pump

- Fountain
- Aquarium
- Garden and farm irrigation
- Small fish pond
- Water supply for remote area etc. all water feature system
- Varsity of handcraft a rockery, Fountain garden etc.



Figure 2.3: Submersible water pump

2.5 Water Level Sensor

Simple water level sensor is used in the system as shown in figure. The water level sensor give the information that whether the water tank is full or not .Sensor give the three level of the tank.

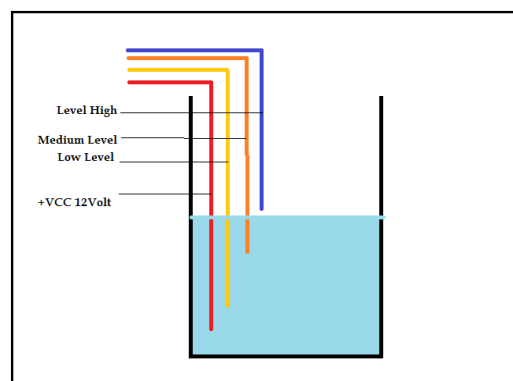


Figure 2.4: Water Level Sensor

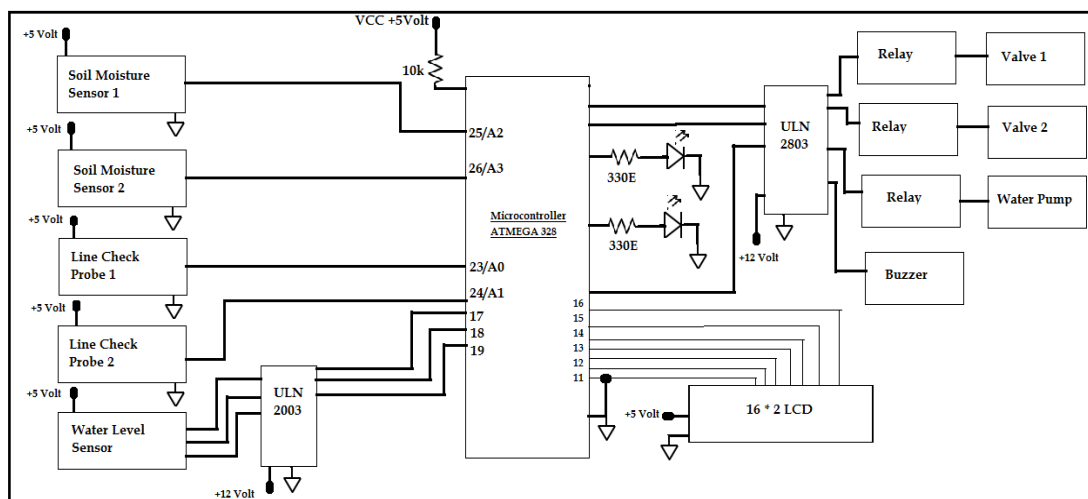


Figure 2.5: Circuit diagram

2.6 Circuit Diagram

It is shown in figure 2.5

Conclusions

The idea behind this project is to develop an inexpensive and user friendly system which will provide an additional sense to the Agriculture field so that the expenses toward the Electricity, Manpower, and water requirement can be minimized and more efficient water delivery can be made possible. This can be achieved while maintaining simplicity, ease of use, ease of implementation and ease of maintenance.

This project involves the evolution of watering manually to watering automatically. The controlling of the automatic watering system is use in a farm. On the basis of the analysis carried out in the present work, the following conclusions are drawn:

- I use wind energy for providing the proper voltage to the microcontroller and water lifting for efficient working.
- Over irrigation because of poor distribution uniformity or management wastes water, chemicals, and may lead to water pollution.
- Deep drainage (from over-irrigation) may result in rising water tables which in some instances will lead to problems of irrigation salinity.
- Cost of this project is less as compare to other system because we used the probes and mechanical pressure sensor for water level and soil conductivity.

Applications

The developed system is used for number of applications as mentioned as follows.

- In agricultural industry for proper irrigation.
- For irrigating the playgrounds like Cricket grounds, Golf courses etc.
- For irrigating the gardens.
- For the forest development.
- For live stoke and water distribution in villages.

Future Scope

Future Scope of Wind mill based Irrigation System

- The GSM or wireless sensor network can be implemented in the farm field to transfer the various parameters to the central control unit for better management and controlling.
- The mobile Irrigation system, we are developing is an alternative and efficient method for
- Irrigation. This system reduces water usage in any agriculture land.
- In the future, projects similar to the gigantic turbines in the Beatrice oil field in the North Sea could add to the number of wind farms, using existing facilities and thus reducing investment costs.
- We can use some modified version of sensor. Instead of Wire sensor, we can attach some sophisticated sensor so that it can read moisture content of soil continuously (in different range).
- Developing code further, we can able to control water pump using mobile. It also helps to avoid dry run of motor.
- In future, project can be improved more by adding, temperature sensor and ,light sensor also.

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