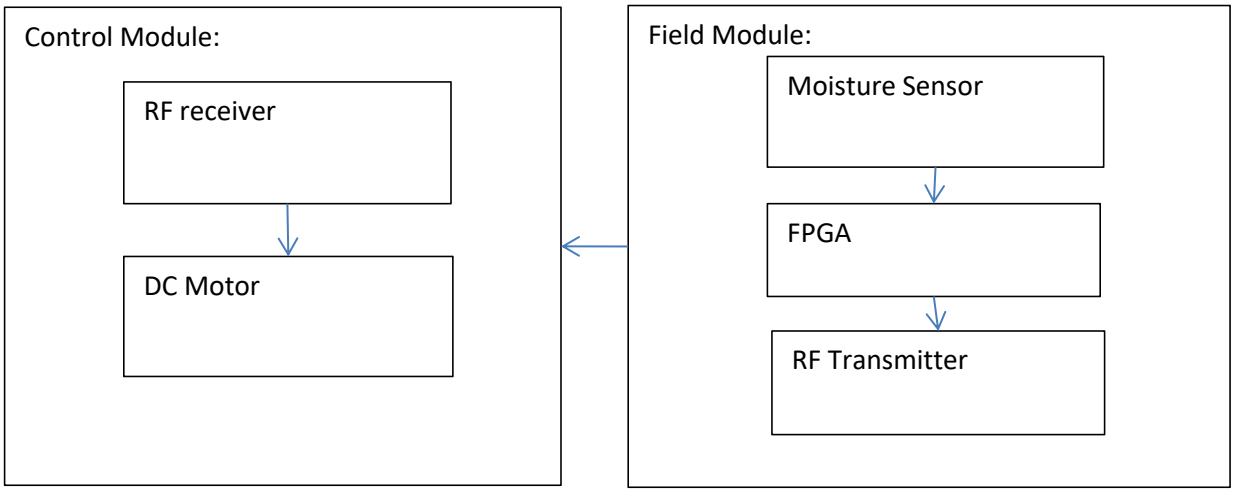
Abstract :

For efficient water management in agricultural area proposed work develops sensor-based irrigation system that offers a potential solution to support irrigation management in field. Field's moisture conditions will monitored by in-field sensor node distributed across the field interfaced with FPGA, these nodes send data to fpga. This data is then used to turn on or off the wireless valve.

Introduction:

In our system mainly two modules are designed one is field module and other is control module. The Field module has a Spartan3A FPGA board as control unit. This board has inbuilt analog to digital converter (ADC) and digital to analog converter (DAC) as well as onboard LCD. The analog moisture sensors are interfaced with Spartan3A board through onboard ADC these sensors are used to collect moisture data from agricultural field. In control module motor interfaced with RF receiver. The FPGA based irrigation system provides system to sense and monitor real time agricultural environment.

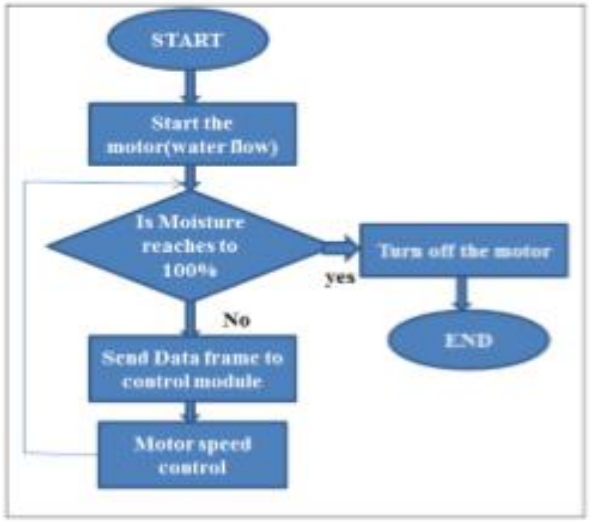
Circuit diagram :



Components :

- Moisture Sensor-FC-28.
- FPGA - Spartan 3 kit.
- RF transmitter and receiver.
- Motor and Valve.
- L293D motor driver.
- IC 7404.

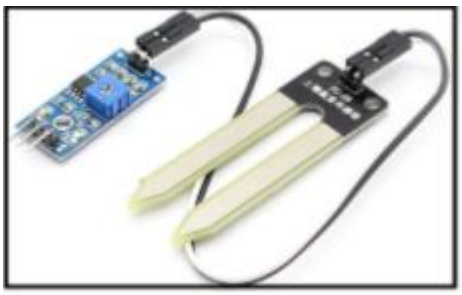
Flow Diagram:



Component description:

Field module:

The field module is sensor based system distributed over agricultural field. Here the moisture sensor interfaced with FPGA board to collect information of moisture of agricultural field. The Fig below gives pin diagram of moisture sensor FC-28. This sensor give output in two format digital as well as analog, In both mode in case of absence of moisture in soil output of sensor is highest i.e. 3.4V,but in analog mode moisture of soil determined accurately. Hence in our system to get exact percentage of moisture in soil we use analog output of moisture sensor.



Pin diagram of soil moisture sensor (FC-28)

Here control unit is FPGA Spartan 3A board where all processing is took place on digital data. Hence the analog data pin of FC-28 is interfaced with channel 4 of inbuilt ADC i.e. MCP3004 device with 10 bit resolution means sensor value is converted to 10bit equivalent digital output. SPI protocol is used in this communication with device.

Control module:

The control module is developed to control irrigation over field based on moisture data received from field module. Here the control information from the Field module is received using RF receiver and then the valve is turned ON or OFF.

Conclusion :

Hence this system is simpler and provides efficient water distribution. Further we can form database of moisture percent in soil from display and use this information to know quality and requirement of field.