Smart Irrigation System

(Domain: Embedded Systems and IoT)

Introduction:

- Irrigation is the artificial application of water to land or soil to assist in production of crops.
- In the case of traditional irrigation system, it is a challenge for farmers to check proper soil conditions and manage watering of plants.
- IoT is changing the agriculture domain and empowering farmers to fight with huge difficulties they face.
- Hence, we have made ‘Smart Irrigation System’ for the overall development of farming system in India.

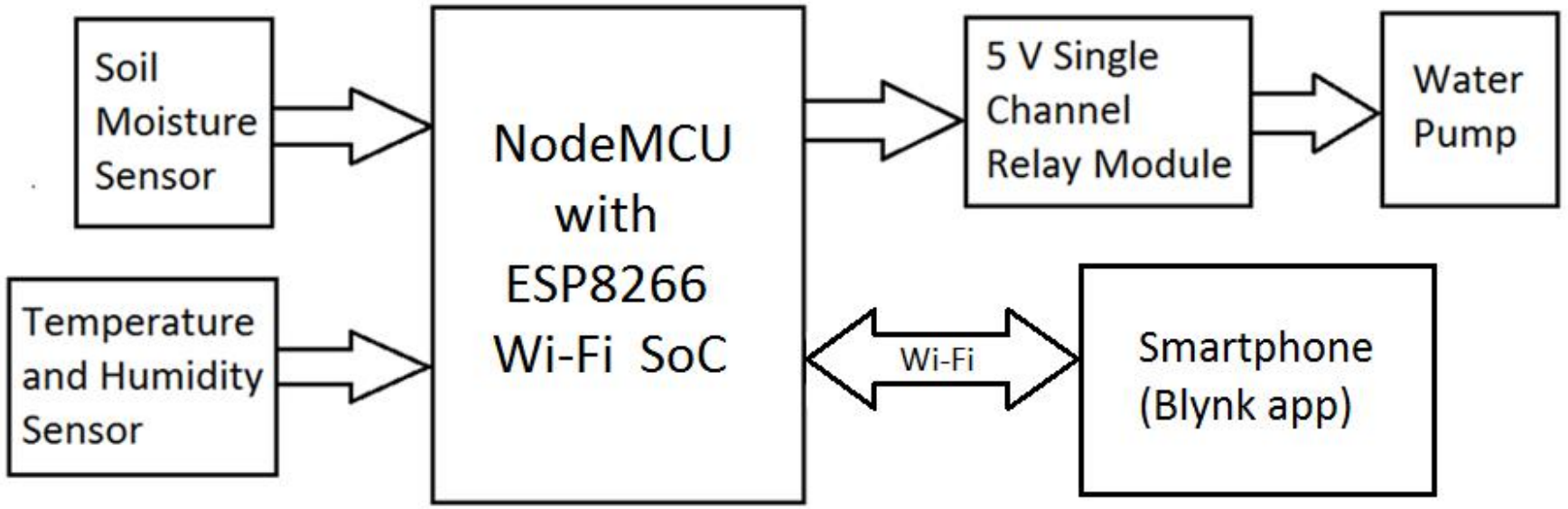
Objective:

- To create a communication between the user and the irrigation system over the internet.
- To provide complete control over the agricultural fields in the hands of our farmers.
- To get a significant saving in the consumption of water to irrigate the crops.
- To continuously monitor the status of the soil and weather through sensors and start/stop the irrigation as needed.

Components Required:

- NodeMCU with ESP8266 SoC
- Soil Moisture Sensor
- Temperature and Humidity Sensor
- 5 V Single Channel Relay Module
- Water pump with pipe
- Breadboard
- Breadboard power supply
- Jumper wires
- 9 V battery with battery cap (2 pieces)

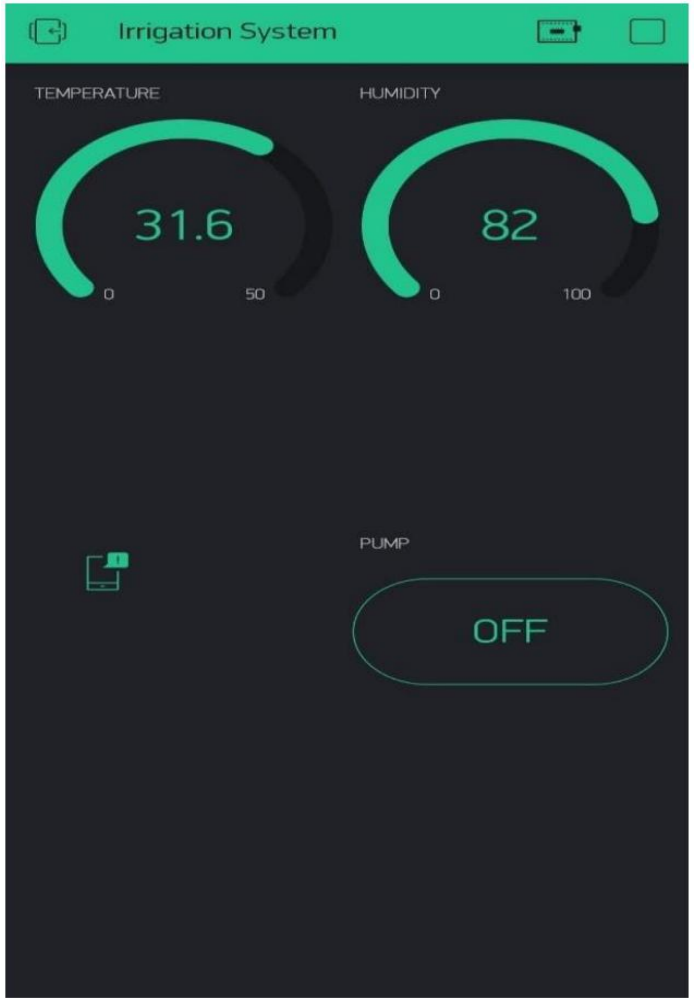
Block Diagram:



Working Methodology:

- The smart irrigation system is based on NodeMCU Development board which runs on ESP8266 Wi-fi SoC.
- The NodeMCU board is programmed using Arduino IDE software.
- Blynk app is used as the platform for controlling the NodeMCU over the Internet.
- The temperature and humidity sensor measures the relative humidity and temperature of the surrounding area and sends the data to the Blynk app through NodeMCU.
- The soil moisture sensor measures the moisture content of the soil and sends notification in our smartphone when the soil gets dry.
- The water pump can be controlled from the Blynk app by pressing a button which sends HIGH/LOW signal to the Relay Module to control the pump.

Blynk Interface



Test Results:

Sl. No.	Time	Soil condition	Temperature (°C)	Humidity (%)	Notification
1	8:00 am	Dry	30.7	87	Notification received to water the plants
2	9:45 am	Wet	32.2	81	————
3	11:45 am	Dry	34.5	71	Notification received to water the plants
4	1:15 pm	Wet	34.4	71	————
5	2:15 pm	Wet	34.4	72	————
6	3:15 pm	Dry	34.5	71	Notification received to water the plants
7	4:30 pm	Wet	33.6	75	————
8	6:00 pm	Wet	31.5	82	————
9	7:30 pm	Dry	31.6	82	Notification received to water the plants
10	11:00 pm	Wet	29.8	88	————

Future Scope:

- A water meter can be installed to estimate the amount of water used for irrigation.
- The sensor data that is uploaded to the IoT servers can be used for analysing the farming procedures of each and every crops to improve the irrigation practices of each crop.
- The idea of using IoT for irrigation can be extended further to other activities in farming such as cattle management, fire detection and climate control.


Thank you!