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Smart Irrigation System

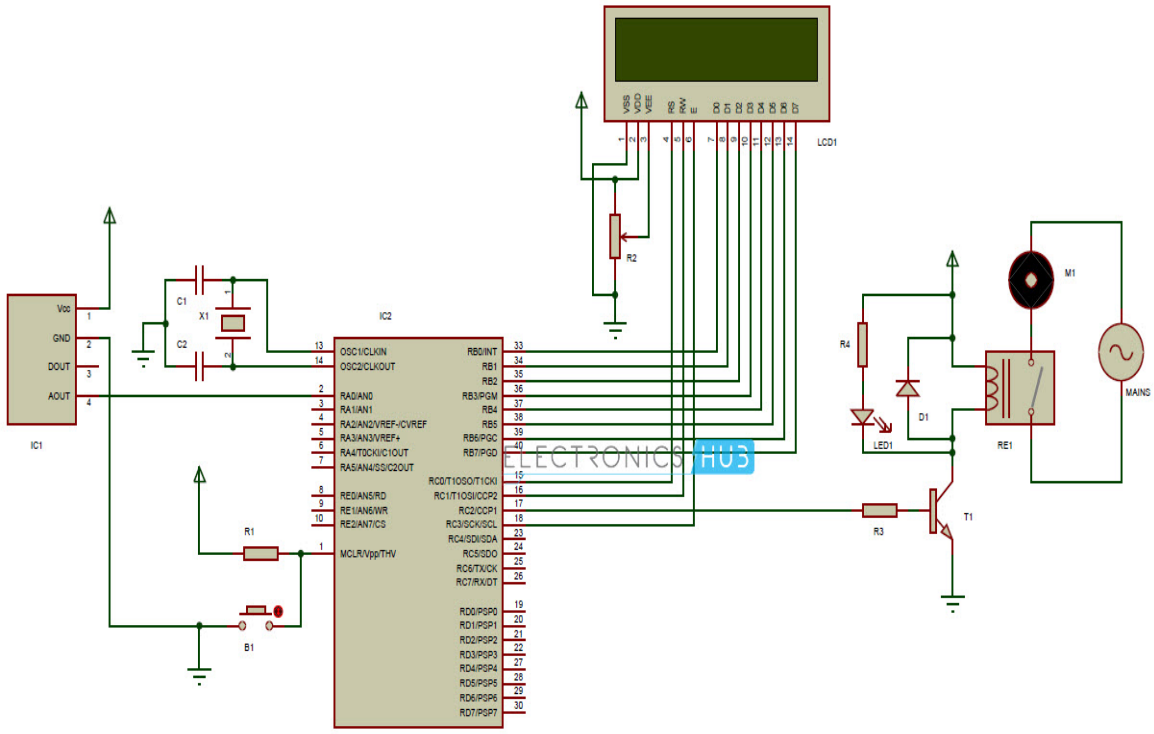
Introduction:

The project is designed to develop an automatic irrigation system which switches the pump motor ON/OFF on sensing the moisture content of the soil. In the field of agriculture, use of proper method of irrigation is important. The advantage of using this method is to reduce human intervention and still ensure proper irrigation.

The project uses an 8051 series microcontroller which is programmed to receive the input signal of varying moisture condition of the soil through the sensing arrangement. This is achieved by using an op-amp as comparator which acts as interface between the sensing arrangement and the microcontroller.

Irrigation is the artificial application of water to the land or soil. It is used to assist in the growing of agricultural crops, maintenance of landscapes, and vegetation of disturbed soils in dry areas and during periods of inadequate rainfall.

Block Diagram:

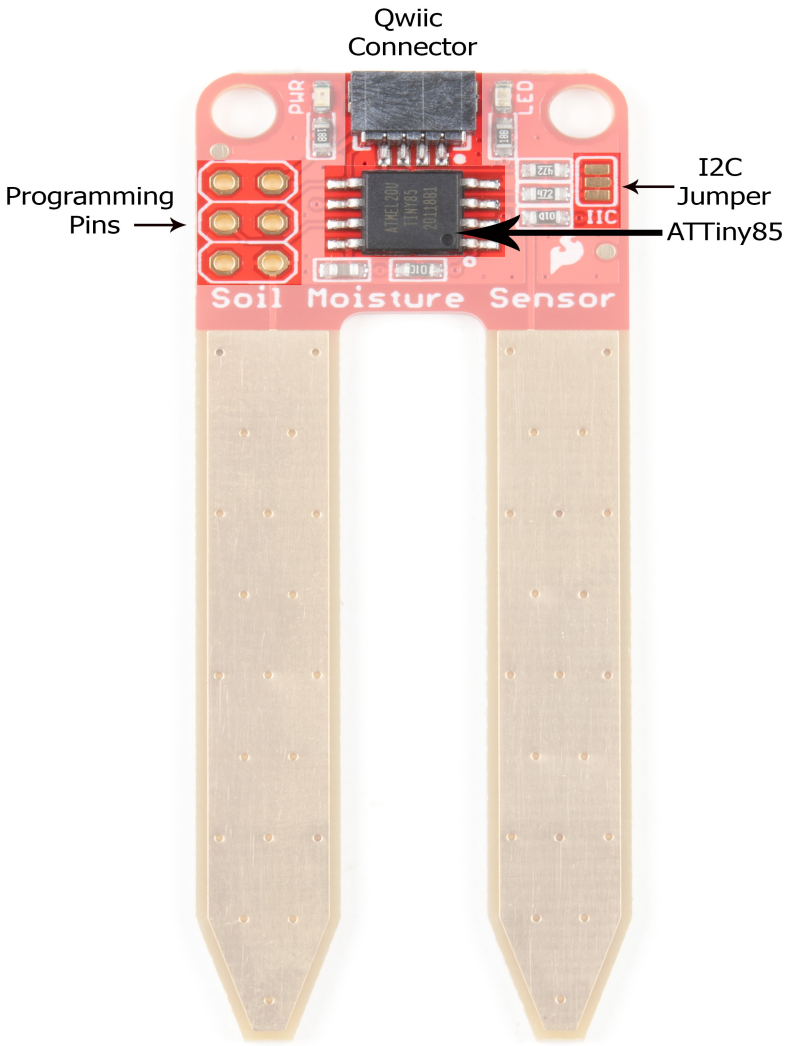


Moisture Sensor:

For conversion of change in resistance to change in voltage, the sensor is connected with a 200 k resistor in series to form a potential divider Arrangement

It gives a voltage output corresponding to the conductivity of the soil. The conductivity of soil varies depending upon the amount of moisture present in it. It increases with increase in the water content of the soil. The higher the water content in the soil, the lower the electrical resistance.

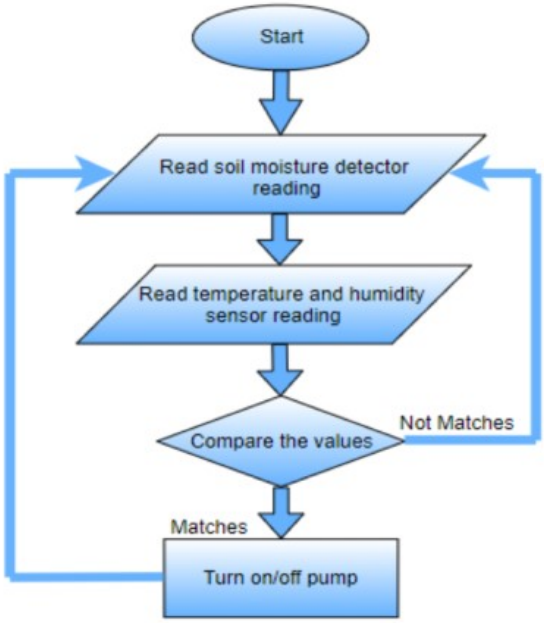
The voltage output is taken from the output terminal of this circuit. The moisture sensor is immersed into the specimen soil whose moisture content is under test.



Working:

The circuit is quite simple. Potentiometer is used to set the level where the pump should start pumping. In dry soil the resistance of the spikes is high and the voltage on the inverting pin of the op-amp is low. If that is lower than the voltage on the non-inverting pin (set by Potentiometer) the output will go high. This will activate the solid state relay. The value of R1 is depending on your humidity sensor and the type of soil you use. The submersible pump pumps water from a container into a drip line in veggie bed. Submersible pumps do not like to run dry, so we need some way to measure the water level and to stop the pump when the level is too low. That is where S1 and R5 come in. S1 is a simple Normally Open float switch. When the level in the container goes too low, the float switch closes. The float switch is connected via a very small resistor (10-100 R) to the same terminals that the moisture sensor is attached to. So, if the water level is too low, and the switch closes, there suddenly is a very low resistance over the humidity spikes and the 741 Op amp is 'tricked' into 'thinking' that the soil is wet enough and will switch off the pump**.**

FLOW CHART



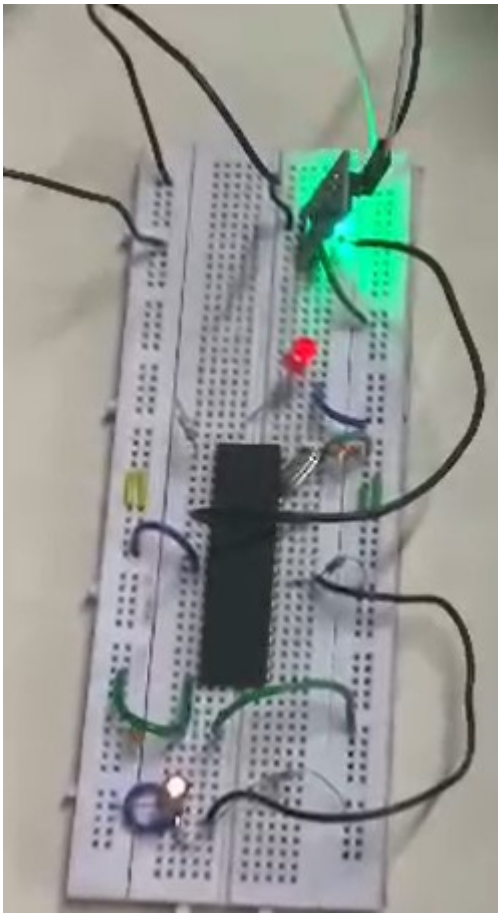
Code:

```
RS EQU P2.7
RW EQU P2.6
E EQU P2.5
ORG 00H
SETB P3.5
MOV TMOD,#00000001B
MAIN:ACALL DINT
ACALL TEXT1
JB P3.5, NEXT
```

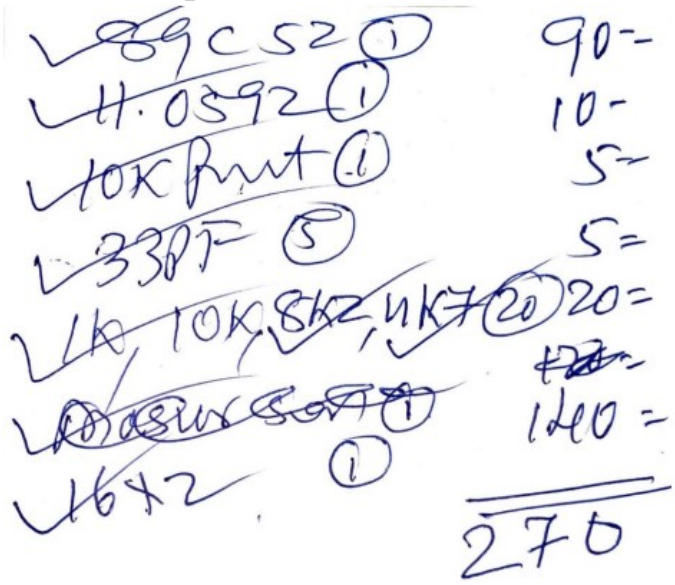
```
ACALL LINE2
ACALL TEXT2
CLR P2.0
SJMP EXIT
NEXT:ACALL LINE
ACALL TEXT3
SETB P2.0
EXIT:ACALL DELAY1
SJMP MAIN
DELAY1:MOV R0,#15D
BACK1: MOV TH0,#00000000B
MOV TL0,#00000000B
SETB TR0
HERE2: JNB TF0,HERE2
CLR TR0
CLR TF0
DJNZ R0,BACK1
RET
DINT:MOV A,#0CH
ACALL CMD
MOV A,#01H
ACALL CMD
MOV A,#06H
ACALL CMD
MOV A,#80H
ACALL CMD
MOV A,#3CH
ACALL CMD
RET
LINE2:MOV A,#0C0H
ACALL CMD
RET
CMD: MOV P0,A
CLR RS
CLR RW
SETB E
CLR E
ACALL DELAY
RET
DISPLAY:MOV P0,A
SETB RS
CLR RW
SETB E
CLR E
ACALL DELAY
```

```
RET
DELAY: CLR E
CLR RS
SETB RW
MOV P0,#0FFH
SETB E
MOV A,P0
JB ACC.7,DELAY
CLR E
CLR RW
RET
END
```

PHOTOGRAPH



Bill of Component:



Application:

- Precision Agriculture
- Parks and public spaces
- Residential irrigation
- Roof Gardens Lawns
- Agriculture Lands

Advantage:

1. Highly sensitive.
2. Works according to the soil condition.
3. Low cost .
4. Complete elimination of manpower .
5. Reliable circuit .
6. System can be switched into manual mode whenever required.

Summarize:

The Microcontroller based drip irrigation system proves to be a real time feedback control system which monitors and controls all the activities of drip irrigation system efficiently. The present proposal is a model to modernize the agriculture industries at a mass scale with optimum expenditure. Using this system, one can save manpower, water to improve production and ultimately profit.