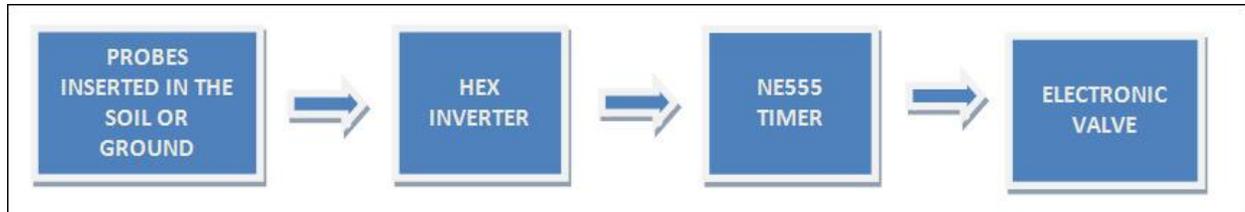


# Automatic Plant Irrigation System

Here is a simple project more useful in watering plants automatically without any human interference. We may call it as Automatic plant irrigation system. We know that people do not pour the water on to the plants in their gardens when they go to vacation or often forget to water plants. As a result, there is a chance to get the plants damaged. This project is an excellent solution for such kind of problems.

## ***Block Diagram of Automatic Plant Irrigation System:***

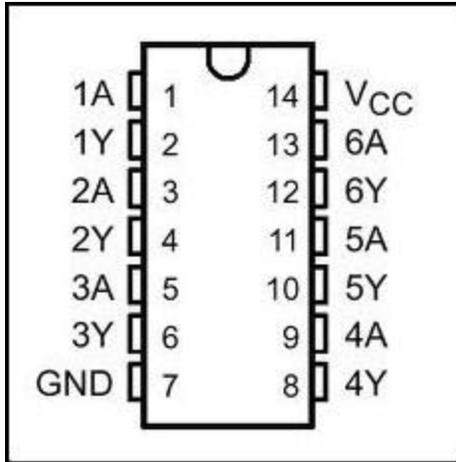


### **Explanation:**

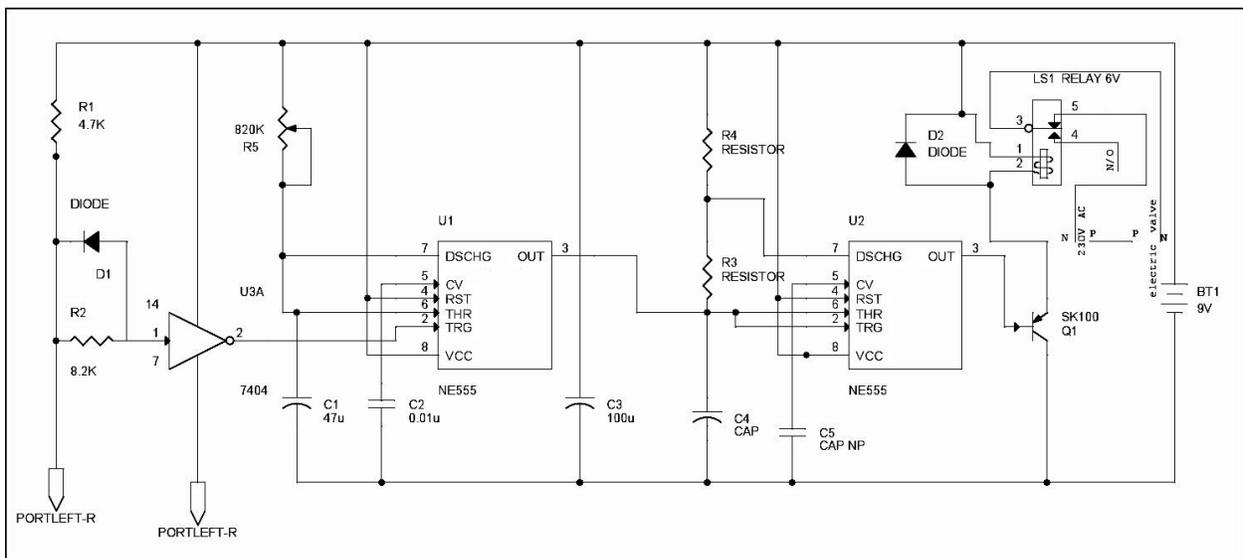
- Circuit is not that much complicated. We use the basic concept in this circuit i.e. soil has high resistance when it is dry and has very low resistance when it is wet.
- By using this concept we will make the system work. We insert two probes in the soil in such a way that they will conduct when the soil is wet and they will not conduct when the soil is dry. So, when the probes do not conduct, the system will automatically detect this condition with the help of the HEX inverter which will become high when the input is low.
- The HEX inverter will trigger the NE555 Timer and this NE555 timer will trigger another [NE555](#) which is connected to the output of the first NE555. Now the second NE555, which is configured as an astable multivibrator, will help to switch on the electric valve and as a result, it will allow the water to flow to the soil.
- When the water wets the soil, the probes will again conduct and make the output of the 7404 low, which will make the first NE555 low and also drive the remaining circuit to low. So, automatically it will switch off the valve.

## **Main Components in Automatic Plant Irrigation System:**

**Hex Inverter 7404:** The main function of the inverter is to give the complemented output for its input i.e. it will give an output which is opposite to the input. For example, if the input is low to the inverter, then the output will be high. Just like the normal inverter which gives high output when the input is low and gives low output when the input is high. The 7404 IC will be having six independent inverters; the operating supply voltage is around 4.75V minimum to 5.5V maximum, and the normal supply voltage is 5V. They are used in different applications like inverting buffers, drivers, hex inverters, etc. The 7404 IC will be available in different packages like DIP (dual in-line package), QFP (Quad Flat Package), etc. The pin configuration of the Hex Inverter 7404 is shown below.



## Circuit Diagram of Automatic Plant Irrigation System:



### Circuit Explanation:

- We are all well aware that the plants will die due to lack of water in the soil. Soil will have high resistance when it is dry and it will have very low resistance when soil is wet. We use this simple logic to water the plants and make the circuit work.
- Two probes which are connected to the circuit are placed into the soil. The two probes will conduct only when soil is wet (resistance is low) and they cannot conduct when soil is dry due to high resistance. The voltage is given to the probes to conduct is given from the battery connected to the circuit.
- When the soil is dry it will produce large voltage drop due to high resistance. This is sensed by 7404 hex inverter and makes the first NE555 timer trigger which is configured as monostable multivibrator with the help of a electrical signal.
- When the first NE555 is triggered at pin 2, it will generate the output at pin 3 which is given to the input of second NE555 timer. The second 555 timer is configured as astable multivibrator which got triggered by the first 555 timer and will generate the output and drive the relay which is connected to the electrically operated valve through the transistor SK100. You can use a heat sink for SK100 transistor if it is dissipating more heat.

- The output of second NE555 timer will switch on the transistor SK100 which will drive the relay. Relay which is connected to the input of electrical valve and output of valve is given to the plant plots through the pipe.
- When transistor has turned on relay, it will open the valve and water is poured on to the plants pot. When the water content in the soil is increased, the resistance in the soil will get decreased and conduction of the probes will get started which will make the 7404 Inverter to stop the triggering of first 555 timer. Ultimately it will stop the electrical valve which is connected to the relay. Variable resistor (R5) and capacitor (C1) are used to adjust the valve when to we want to conduct the probes.
- The capacitor C5 (0.01uf) is used to ground, the CV pin of second NE555 timer. C3 will remove the AC noise and allow only DC to the remaining circuit. C4 and R3 will constitute to configure the NE555 in astable multivibrator.

#### **Values of the Components in the Circuit:**

- Capacitor (C4) = 10u 16V.
- Capacitor (C5) = 0.01u.
- Resistor (R3) = 27K
- Resistor (R4) = 27K
- Diode (D1 and D2) = IN4148
- Relay = 6V, 150 ohms

#### **Note:**

- Battery should be continuously monitored from power outage or simply you can use 9V DC supply adaptor.
- Probes must be inserted into the soil. They should not be kept on the soil.
- Electric valve should be used for best result.

**Source:** <http://www.electronicshub.org/automatic-plant-irrigation-system/>