

AUTOMATED IRRIGATION SYSTEM

The aim is to develop an automated irrigation concept that will regulate the operation of the irrigation **system** with no or just a minimum of manual intervention beside the surveillance. Almost every **system** (drip, **sprinkler**, surface) can be **automated** with help of timers, sensors or computers or mechanical appliances.

- 1- Moisture sensor
- 2- Pipes
- 3- Valve
- 4- Flowmeter
- 5- Controller box
- 6- Water level sensor
- 7- Pump

Hardware platforms

Arduino :

Arduino is "an open-source electronics platform based totally on clean-to-use hardware and software". The Arduino control panel programmed by Arduino c and is based on C and C ++

Arduino LCD Liquid Crystal Library:

This library permits an Arduino board to control Liquid Crystal Display (LCD) that is on the Hitachi HD44780 chipset, which is on most text-based LCDs. [16].

Bluetooth device HC 05/06 :

This tool works on serial connections and information is sent via Bluetooth when a particular button is pressed. Data is sent to the ARDWINO via TX, the signal is transmitted from the ARDWINO and the RX receives the signal from ARDWINO. The data is verified if gotten information is 1 the Driven turns on turns OFF when gotten information is 0 [17].

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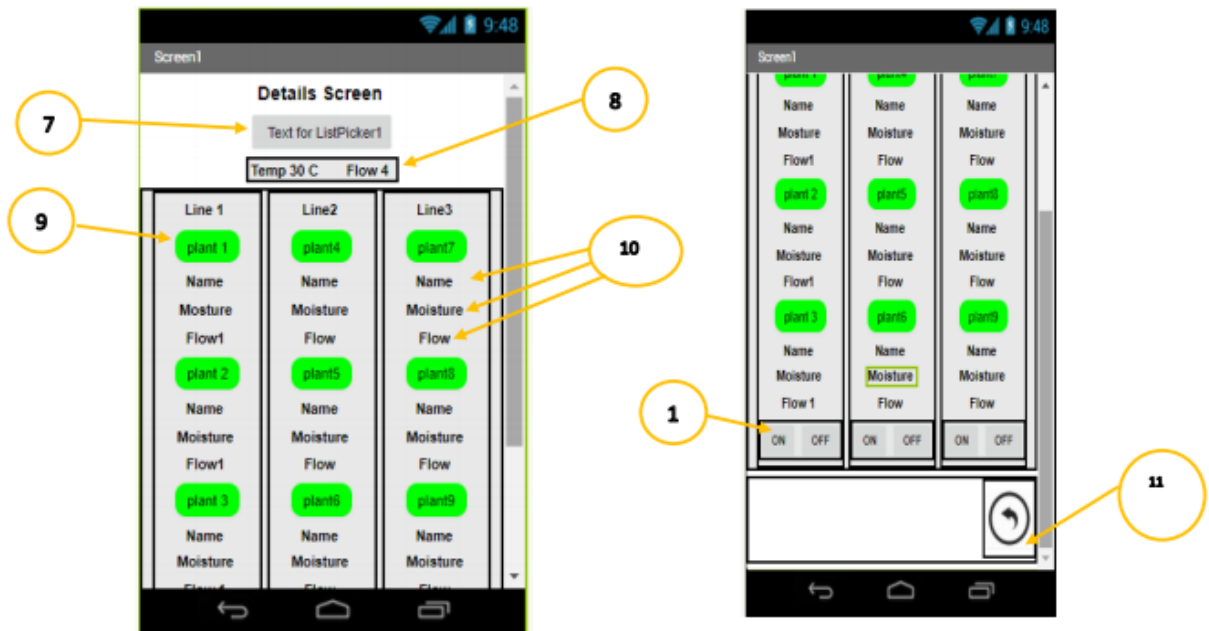
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Hardware tools

- **Arduino** Arduino is an open-source operating system that relies on easy-to-use hardware. Arduino can read the ratio of light input to the sensor and convert it to output. For example, using Arduino we can control the room by turning on or off the light or air conditioner. This is done by sending a set of instructions to the control unit on the Arduino board .
- **Breadboard Definition** Breadboard is a plastic board for holding wires and electronic segments such as transistors and resistors
- **Moisture Sensor** The soil moisture sensor comprises of two tests that are utilized to the degree the volumetric substance of water. The two tests permit the current to pass through the soil, which gives the resistance esteem to the degree the dampness esteem. When there is water in the soil there will be less resistance and the soil will handle more power. But if the soil is dry it conduct power weekly and needs less power and more resistance.
- **Temperature Sensor** A temperature sensor is sensor to measure the ambient temperature. This sensor has three pins – a positive, a ground, and a flag.
- **Light Sensor** A Light Sensor is a gadget that recognizes light. It creates a yield flag that is corresponding to the escalated of light. A light sensor measures the brilliant vitality display in the wide run of frequencies in the light range. A few of the common frequencies are infrared, obvious and bright .
- **Plastic Water Solenoid Valve** Is to control the flow of fluid, a valve is ordinarily closed and has a 1/2" non-taped outlets on each conclusion. On the off chance that 12V is connected through the two terminals of the valve the solenoid will open the valve.
- **Level Sensor** The water-level pointer is utilized to demonstrate the water level in the tank, by using this sensor we can control the flood of the water as well know the level of the water in the tank , and at any time we can know the water level in the tank, it has a basic circuit .
- **Water pump** It is used in this project to pump the water needed for irrigation from the main water tank through pipes. This pump can be used for different applications, in household include cleaning, bathing, space heating and flower of water. This pump is selected for this project because it has good advantages. Such as, it has a lightweight. Also, it has a small size, so it is easy to install and replace it. Furthermore, it has an enough efficiency to pump water for irrigation. Since it operates in 12 volts, so it consumes lower power. In addition, this pump has a very Low of noise. Finally, the cost of this pump is very cheap.
- **Rechargeable Battery** When selecting the appropriate battery for this project, some important points must be considered. Firstly, it should be environmentally friendly it should be sealed construction. Secondly, it should be stable quality and high reliability. Also, it must be rechargeable type, so it will not contribute to pollution of the environment. This battery is a high-quality battery that is designed in order to give top performance, strength and long life.

Software platforms

App inventor is an open source tool provided by google. This program allows beginners to create programs that can run on Android. It uses graphical interface such as Scratch



- 1- Button. If it is clicked, it goes to the user to About Page, which have information about the app.
- 2- Button. If it is clicked, it goes to Help Page, which have information about the app.
- 3- List Picker. When it is clicked, it shows a list of all connected Bluetooth devices When a Bluetooth device is clicked.
- 4- Connection. If the device is connected, the text color change to green for feedback and says 'Connected'.
- 5- ON /OFF buttons allow the user to switch on or off the system. \
- 6- Details button. When clicked take the user to a details page which shows all the information and let user control system line by line.
- 7- List Picker. When it is clicked, it shows a list of all connected Bluetooth devices When a Bluetooth device is clicked.
- 8- These two labels, shows the temperature and amount of water go from tank flow4 is the main one.
- 9- Plant button. When clicked it shows user list of details about plant such as (Name of the plant, humidity and amount of water).
- 10- These three labels, it is not visible unless the user clicks on plant button, when user click on plant1 all these labels become visible.
- 11- Responsive button, when it is clicked, it takes a user to the Home page.
- 12- ON/OFF button in each line allow a user to switch on or off each line individually

Software tools

I used App Inventor to develop the mobile application to control the system from the far distance.

- Bluetooth client

If the Bluetooth is open in the mobile this method will show a list of all device connected.

if the device is selected it will call the selection device and send Bluetooth client to connect.

- Clock and connection label

This method shows, when the device is connected, the text turns green for feedback and familiarity and says 'Connected'.

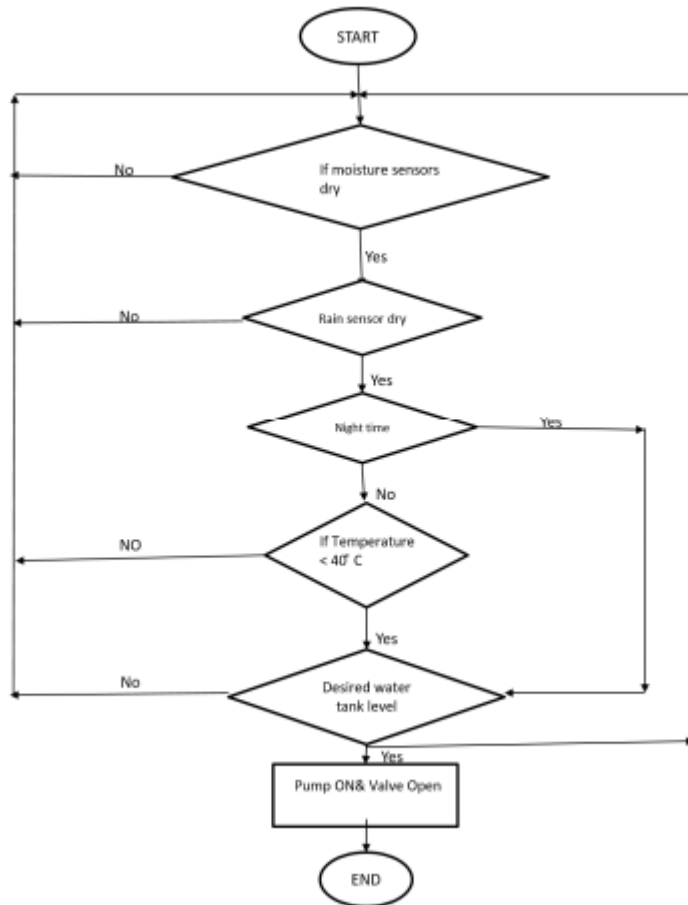
- System switch ON OFF buttons code blocks

If the device is connected to the Bluetooth send byte number to Arduino to do the command. The full Arduino code and code blocks will be in Appendix.

- Receive sensors data code blocks

Software tools

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FLOWCHART OF IMPLEMENTATION PROCESS

As it shows in the chart, it shows how the system works in one field if only one moisture sensor of Field B active the system will not work also temperature sensor and the light sensor works together. For example, when the temperature is more than 40 C and the light sensor is active then the system will switch OFF because the heat of the sun works to evaporate the water, this system had been configured to stop the process and schedule it. Moreover, the purpose of this system is to work in a smart way, so if there is rain the system will automatically be OFF. Please considered that main water tank will be monitored carefully so that it doesn't go below the level where the level where the pump cannot suck the water. The system will not work if the water level is low. To start the process, two or three moisture sensor of Field B must be activated to move to next step. Next, the rain sensor must be dry to continue the process and the weather temperature sensors should be less than 40 C to enable the process to move to next step. If the water tank level is not below, the pump will run, valve 2 and 4 will open and

flow meter of 2 and 4 have the same reading. If two or three moisture sensor of all fields(A, B, C) active at the same time and the rain sensor is dry, the temperature sensor should be less than 40 C and the light sensor is not active then the proceed to next step. If the water level sensor is not below then pump will be ON, valve (1,2,3) and 4 will open and flow meter (1,2,3,4) have the same readings.

Alternatively, there is the

Sensor-based Automatic Irrigation System

This system also depends on the measurement of soil humidity and temperature. The system works by sending a signal from farm controller to user phone and it phone must be in automatic reply in case that soil needs water. a signal from phone send to farm controller again to switch on or off the system.

Step 1: Start the process.

Step 2: Initialize power is supplied to GSM.

Step 3: Check the moisture level (less than or more than).

Step 4: If the level will be more than fixed criteria, no Need for irrigation.

Step 5: If the Moisture level is less than fixed criteria, start irrigation.

Step 6: Initialization of pump and rain gun.

Step 7: After the process completed, it moves to the original state.

Step 8: Stop the process.