Automated Hydroponic System

by youseffayyas

What is a NFT hydroponic system?

•N.F.T. stands for Nutrient Film Technique. It uses a constant flow of water/nutrient solution that flows constantly in a loop from a reservoir through a growing tray, where plant roots are suspended in air and absorb nutrients as the solution flows by.

•*Advantages*

•Low water and nutrient consumption

•No soil needed

•Easy to disinfect roots and setup

•Easy to see root quality and health

•Consistent flow prevents salt buildup in root area

•Recirculating, so minimal groundwater contamination

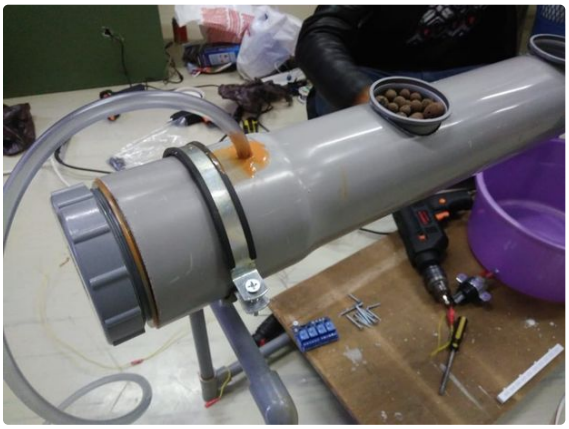
•Fewer pesticides use / less disease &bug infestation

•Less labour / faster growth rate

•Disadvantages

•Does not work well with plants that have large tap-root systems

•Doesn't do too well with plants that need a lot of support



Step 1: Specifications of the Design

I used PVC pipes to build a stand to hold the main pipe in this project.

Main pipe diameter : 4 inch

Main pipe slope : 1:40 ratio

Main water tank volume :8L

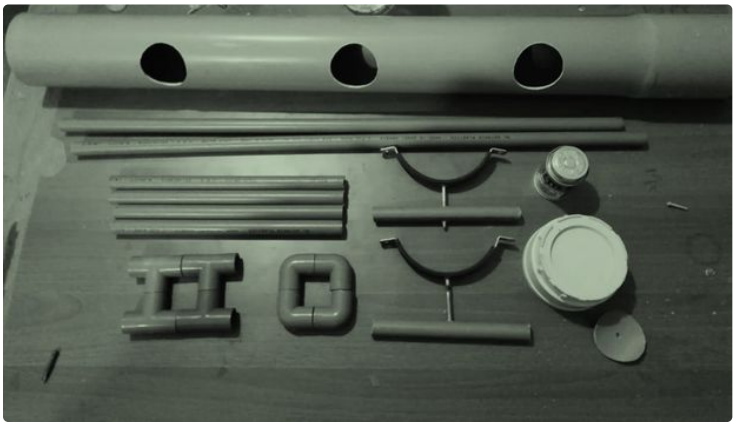
water pump : 3 pumps

Air pump : 1

Distance between each plant : 20-25 cm

the recommended slope for a N.F.T. system is typically a 1:30 to 1:40 ratio. That is for every 30

to 40 inches of horizontal length, one inch of drop (slope) is recommended. I recommend when designing your N.F.T. systems, that the slope should never be less than 1% (one in 100inch) or greater than 2% (one in 50inch). Consequently, many users of NFT systems in temperate regions worldwide use a 2% slope



Step 2: System Automation Using Arduino

these are the parts I used :

Channel relay module

I want to control pumps with different voltage values (110 AC or 220V) connected to their own power source. The best way to control it is by using relay.

liquid
within a pipe, the switch activate the pump

This float switch is a simple structure, easy installation liquid level controller. It does not have a complex circuit

MEASURE TEMPERATURE AND HUMIDITY USING DHT22

DHT11 is a cheap and
good sensor for measuring temperature and humidity.

Before you can use the DHT11 on the
Arduino, you'll need to install the DHTLib library. It has all the functions needed to get the humidity and temperature readings from the sensor. It's easy to install, just download the DHTLib.zip file below and open up the Arduino IDE.

Then go to Sketch>Include Library>Add .ZIP Library and select the DHTLib.zip file.

Temperature Sensor DS18B20

Waterproof temperature very helpful to measure water temperature .to Know the exact temperature

GRAVITY ANALOG TDS SENSOR/METER

TDS (TotalDissolved Solids) indicates that how many milligrams of soluble solids dissolved in one liter of water. In general, the higher the TDS value(ppm

LOW signal will turn relay ON and HIGH signal will turn relay OFF.

Air pump(compressor)

Vertical Stainless Steel Liquid Level Sensor Horizontal Float Switch

float switch is a device used to sense the level of

value) , the more soluble solids dissolved in water

The probe can not be left too close to the edge of the container,
otherwise it will affect the reading.

HC-06 Bluetooth Module

The HC-06 acts as a serial port through which you can send and receive data. So using a serial terminal or a Bluetooth customized application on your computer or phone, you can control and monitor your project.

Before, uploading the code to the Arduino, disconnect the HC-06 module, since it shares the tx/rx pins and will interfere with the upload. Connect it back once the code has been uploaded successfully.

Here is how you should connect the Bluetooth module to your Arduino.

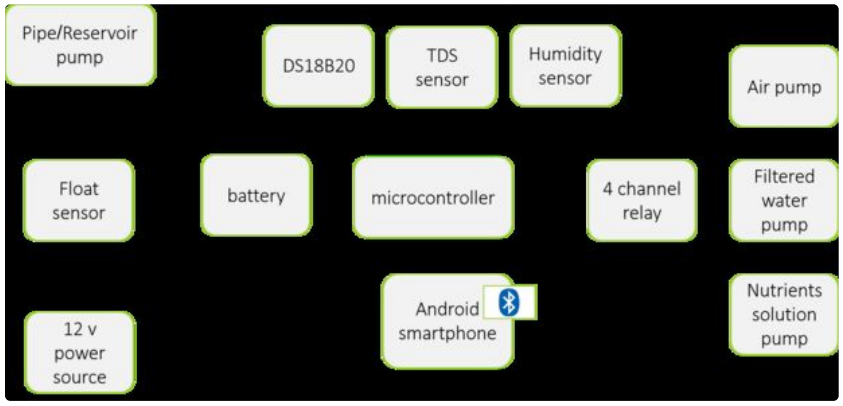
HC-06>>>Arduino

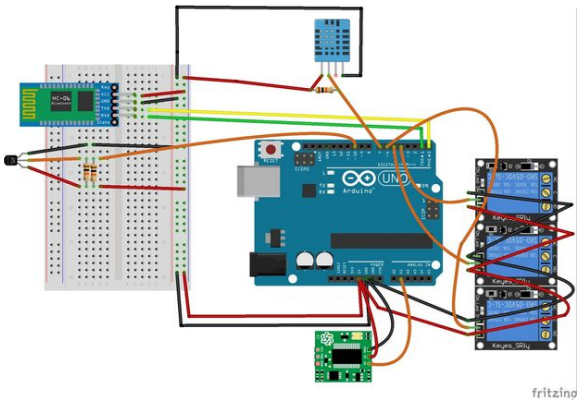
VCC>>>>3.3v

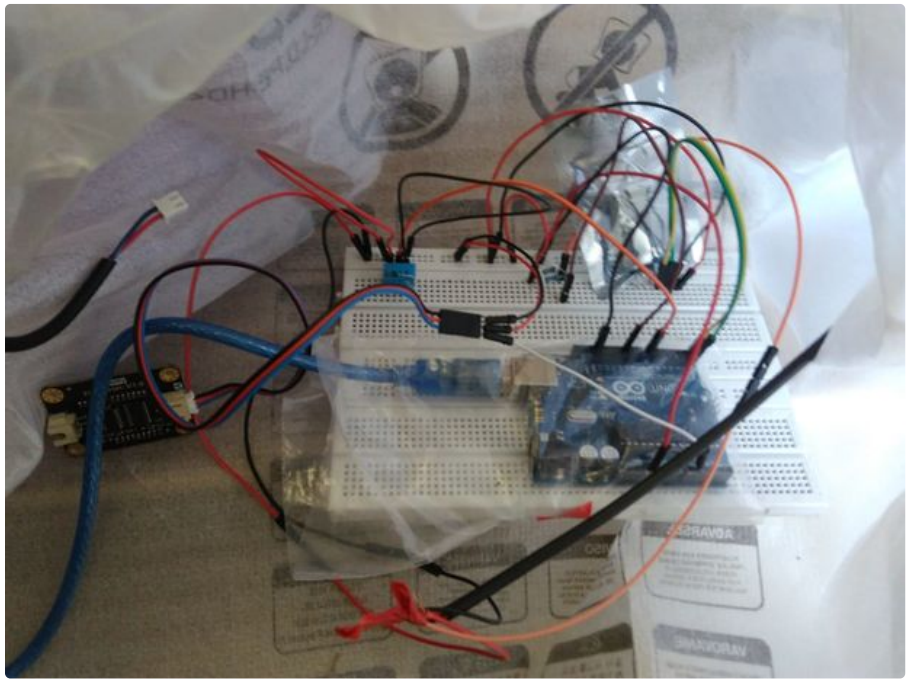
GND>>>>GND

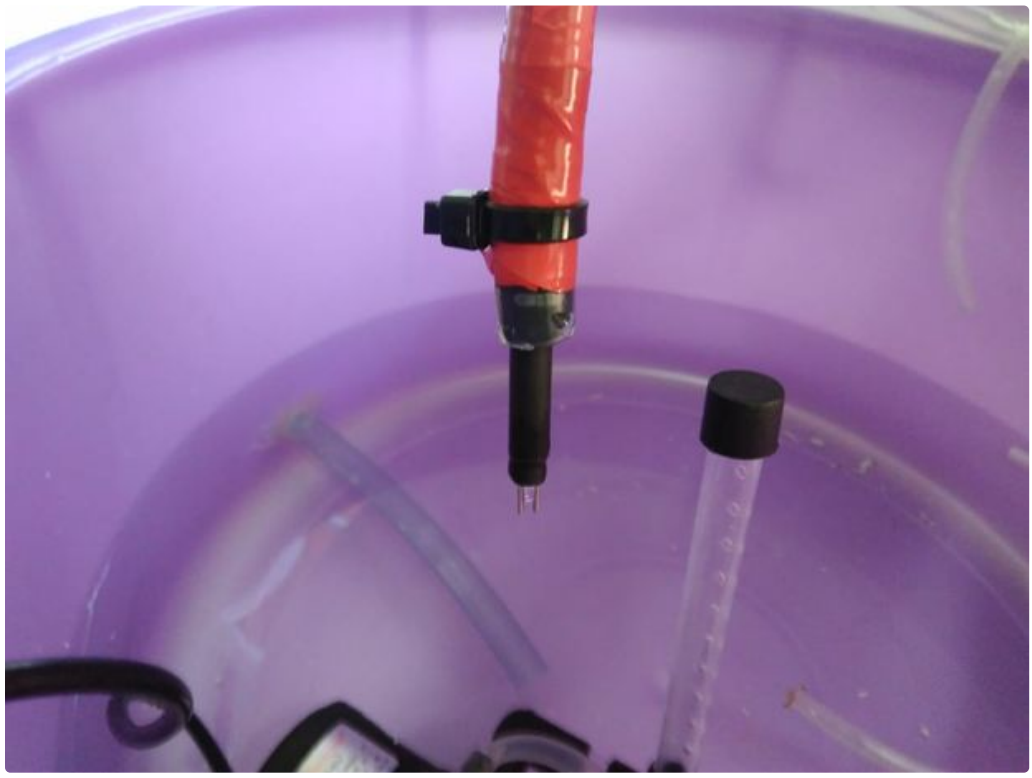
TXD>>>>RXD

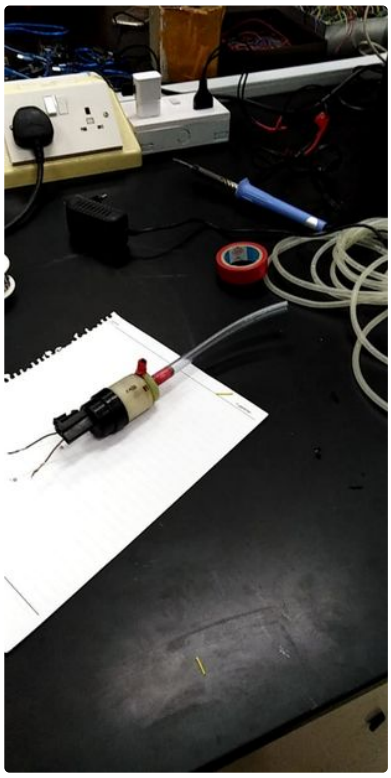
RXD>>>>TXD

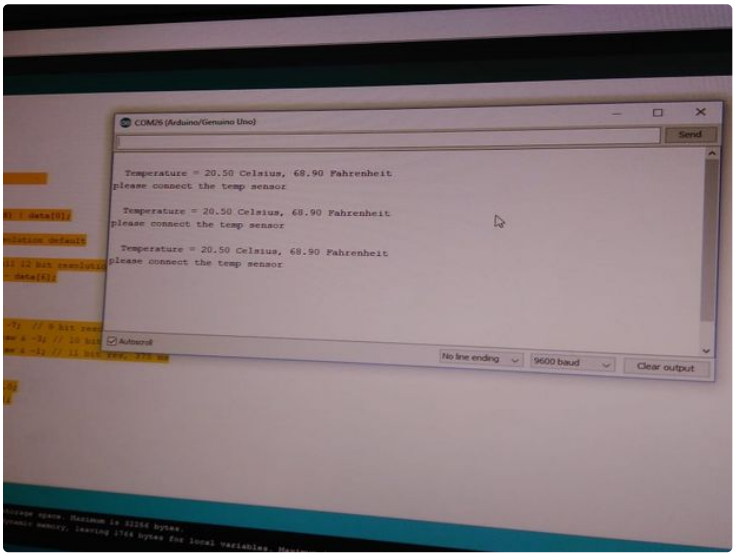

Pipe/Reservoir pump
DS18B20
TDS sensor
Humidity sensor
Air pump
Float sensor
battery
microcontroller
4 channel relay
Filtered water pump
Android smartphone
Nutrients solution pump
12 v power source


fritzing









Step 3: Project Functionality

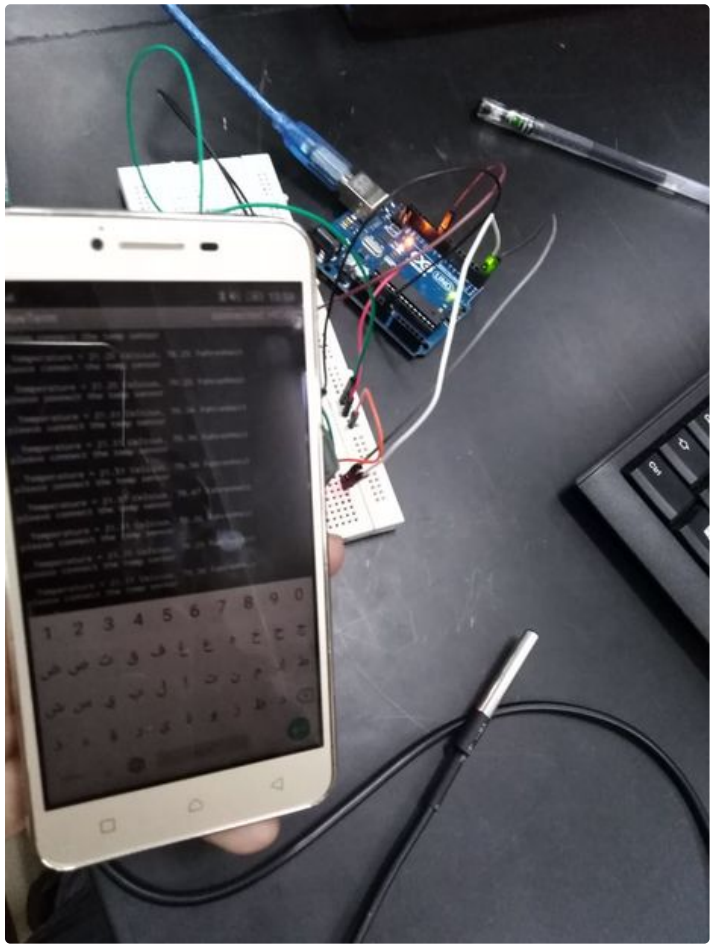
The principle of this project that we have three tanks : main tank, nutrients solution tank, fresh water tank.TDS and temperature sensor are used to monitor the value of nutrients in the main tank otherwise pumps will pump fresh water or nutrition solution to the main tank if needed.

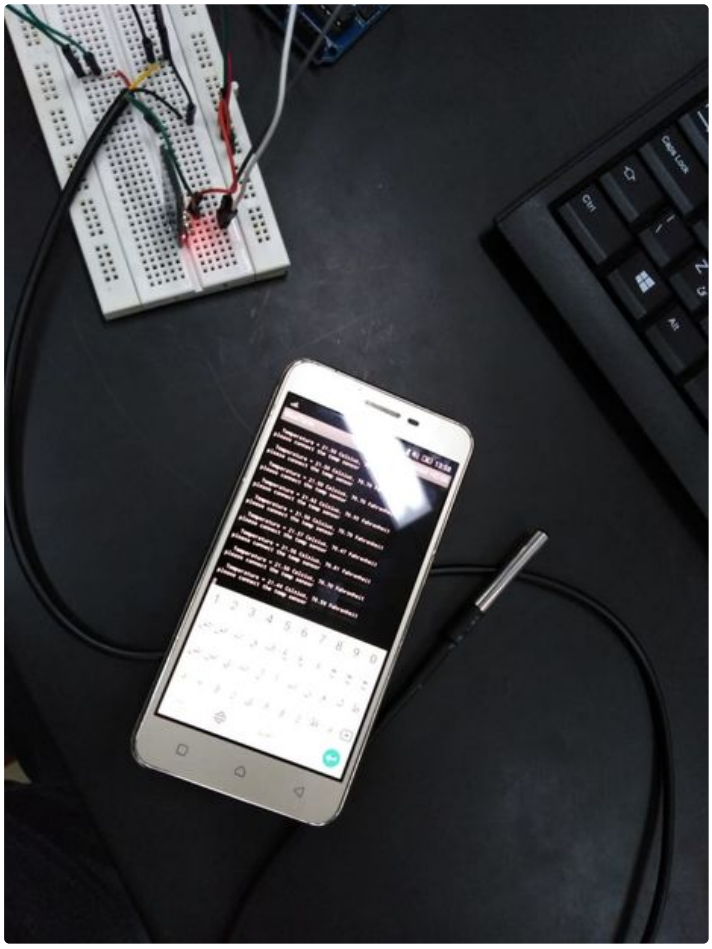
water level will reduce due to leakage , natural evaporation and plant usage. This is solved in this system

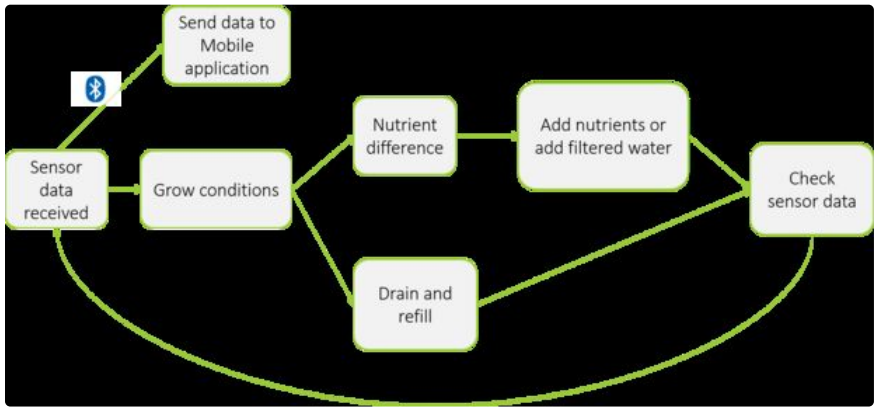
Air pump is always ON

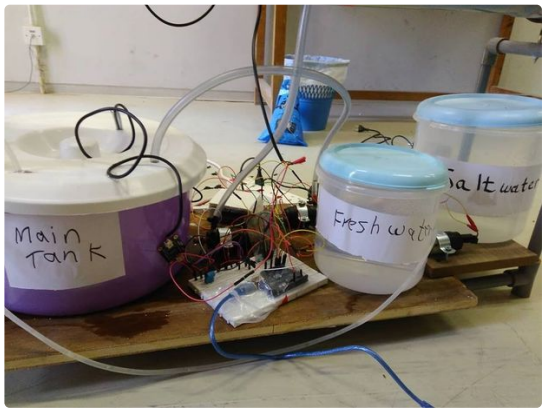
Data is displayed for the user on a mobile app , via a Bluetooth connection.

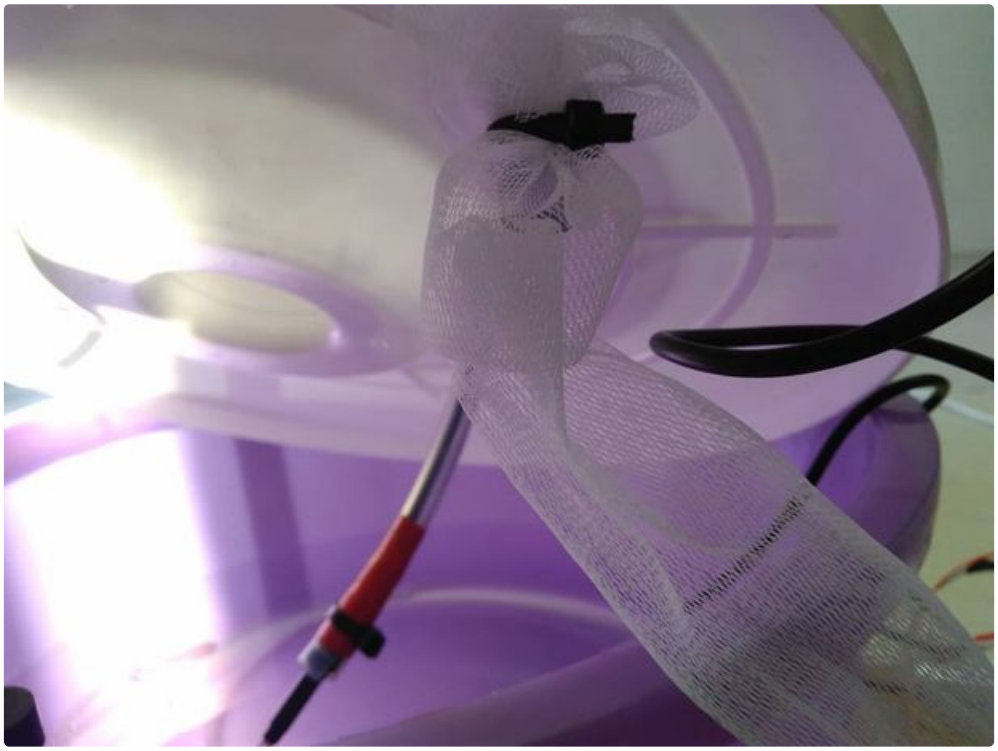
I used this trawl net to prevent impurities to come back to the tank. impurities can deposit and cause pipe clogging.






Send data to Mobile application
Sensor data received
Grow conditions
Nutrient difference
Add nutrients or add filtered water
Check sensor data
Drain and refill


Main Tank
Fresh wat
alt wate



Step 4: Cups and My Medium

I bought a fancy cups fro the shop then i used the solder to make holes through the cup. I used grow rock as my growing medium. unfortunately its very expensive here in Jordan. It's heavy enough to provide secure support for your plant's, but still light weight. Grow rocks are a non-degradable, sterile growing medium that holds moisture, has a neutral pH, and also will wick up nutrient solution to the root systems of your plants. this grow media is reusable, it can be cleaned, sterilized, then reused again. one of the most popular growing medium used for hydroponics.

Thank you , this is first project I share on instructables please support me. XD

Looks like a great setup! Thanks for sharing :)