

SMART IRRIGATION PUMP

Activity Overview

Water is as essential element for every living being including plants. Due to uncertain weather conditions crops need to be watered using irrigation to grow better yields.

Through irrigation we can :

Supply water to plants even during summers when there is no rainfall.

Grow plants in areas where there is no rainfall.

But the problem is many times farmers turn on water taps for irrigation of plants and forget to turn off the taps hence leading to wastage of a lot of water or do not know the exact amount of water to supply for the plants.

The project initiative is to create a Smart Irrigation Pump which can be controlled using a mobile app so the farmer doesn't need to close the tap manually. The smart irrigation pump will be connected with Genuino 101 which will allow the farmer to close the water supply from his mobile phone.

SUBJECTS



Science



Computing



IoT

TIME REQUIRED

2 Hours

AGE LEVEL



11 - 18 Years



What Shall We Learn?

- How to control a pump using a relay switch.
- How to integrate Genuino 101 with a mobile app.
- How to perform real time functions using a mobile app.

Activity Objective

The problem right now is farmers forget to close water supply after irrigation which results into loss of water.

We have to come up with a method to control the loss of water.



Components Needed

To create our smart irrigation pump we shall need below mentioned components:

Genuino 101

This is the brain of your device. It will be connected with the relay switch which will turn on and off the water supply.

Water Pump

The water pump will supply water to the plants. It will be connected to the relay switch which will control water flow as per the direction in the mobile app.

Relay

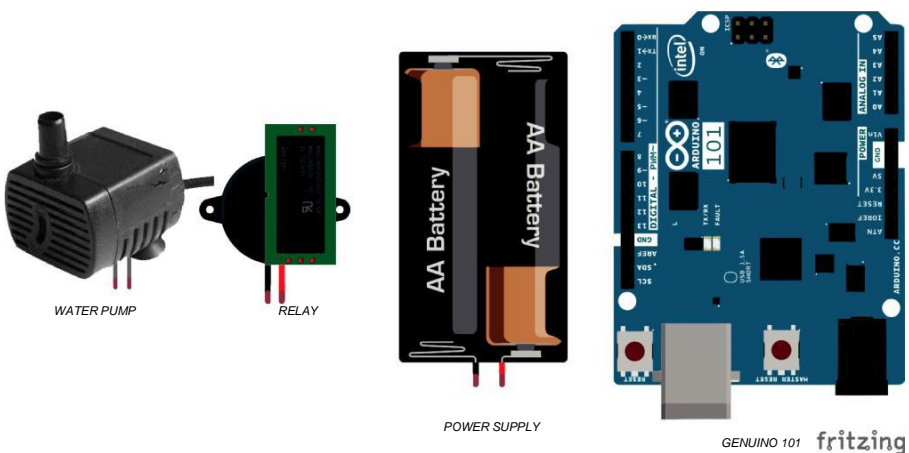
It is a switch which is connected to the water pump and Genuino 101. The relay will control the flow of water from the pump based on actions given to Genuino 101.

Waterpot

The water pump will be inside the water pump connected with a pipe. When the pump is turned on it will supply water from the pot through the connected pipe.

Power Supply

So much computing needs energy to work upon, right ? So this power supply would power up the entire system.



Understanding Sensors

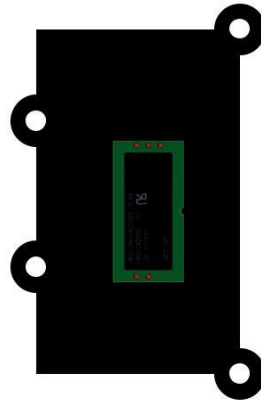
The prime component that will control the water flow of our irrigation pump is a relay. In simpler terms, a relay is a switch it performs the actions of turning off and on the water supply by connecting and disconnecting the power to the pump.

Read more about the relay from the sensor book

The pump is an electric water pump that flows the water through the pipe. When the pump receives power it turns on and water flows from the waterpot. Now pump needs much more voltage which is not sufficient to generate using our Genuino 101. Solution is to use relay which act as Genuino controlled switch. We are controlling the actions of the relay using Genuino 101 which is connected via bluetooth to our mobile phones.



WATER PUMP



RELAY



Proof Of Concept

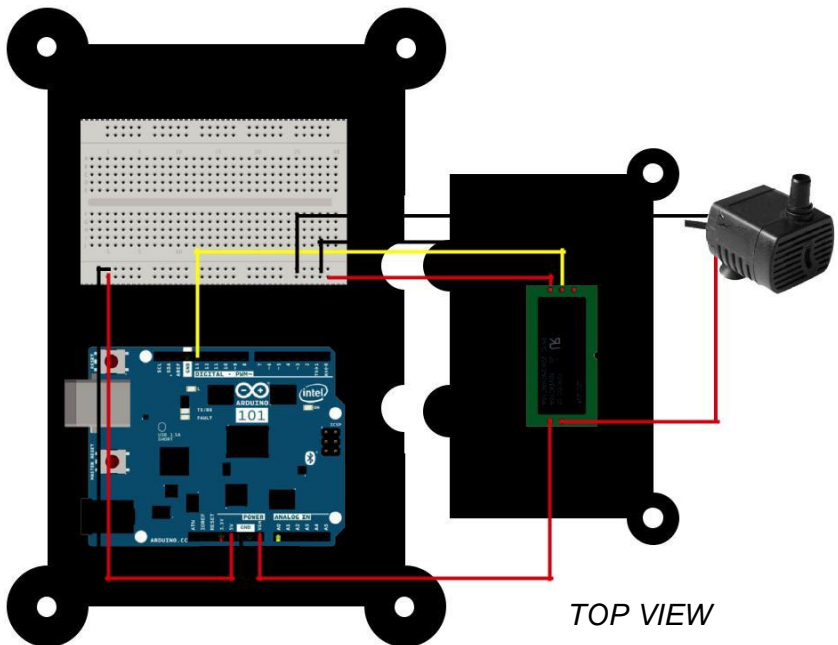
As we cannot create a large irrigation pump inside the classroom we have created a proof of concept of how the smart irrigation pump will work. A proof of concept, short termed as POC, is a demonstration or a sample of the actual working product, it is usually small in size and made to bring more clarity about large projects which will be executed in the future.



Connecting Your Components

Let us start connecting our components:

1. Fill the water pot with water.
2. Connect the water pump with the relay switch as shown in the diagram below.
3. Attach the pipe to the water pump and put it inside an empty bowl.
(We are pouring the water in the empty bowl to avoid wastage of water. We can reuse it when we repeat the activity)
4. Gently plug the relay switch to the Genuino 101.
5. Place the water pump inside the Water.
6. Connect the Genuino 101 to the laptop to give power supply.



We have connected all the components now we shall program the smart irrigation pump.

Programming The Sensors

Download and open the code from bit.ly/SmartPump and now you will have to upload the code on your Genuino 101

Connecting The Genuino 101 With Mobile App

1. Turn on the Bluetooth of your mobile phone.
2. Download the nRF Control toolbox app from the play store(Android) or app store (iOS).
3. Select control relay in the app as shown below

Output

We have created our smart irrigation pump. Now turn on the relay from the mobile app and water will start pumping from the water pot and ow through the pipe. If the water ows it means your smart irrigation pump is working amazingly.

DID YOU KNOW? In India, approximately one-third of the nation's total electricity consumption goes toward pumping groundwater for irrigation.



Upload Button
(Top Left)



Model Cretation

Before we begin with the model creation make sure you have:

6 Spacers

12 Screws

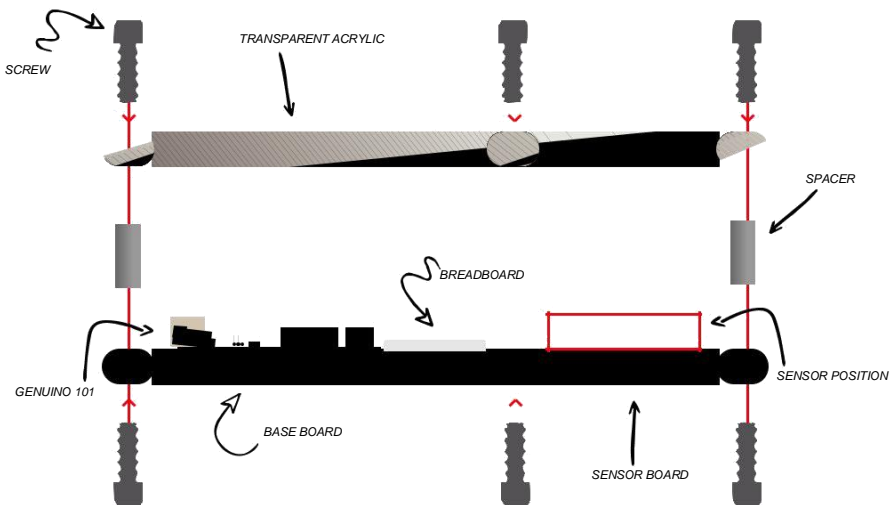
Transparent acrylic board.

We will now arrange all the components in a case and make it look cool and easy to use.

We will begin by connecting the relay module to the base module. The breadboard and Arduino 101 are on the base module while your relay is on the relay module. Now insert the spacers on the cutouts which are given in the activity kit and tighten them using the screws provided to you.

We have our modules attached and spacers set up, now gently place the transparent acrylic board on the spacers and tighten it using the screw.

Once everything is ready, ensure all your screws are tightened and your modules are connected properly. It should look something like this:



SIDE VIEW

Impact Analysis

The earth is covered 70% by water but only 2.75% out of it is freshwater which can be used for plants and animals. Imagine if a farmer forgets to close the irrigation pump the water loss caused due to it.

Using a smart irrigation pump even if a farmer forgets to close the pump he can immediately turn it off when he sees it in his mobile app.

Future Scope

We can advance to smart irrigation pump into a smart crop watering station. We can connect a soil moisture sensor with the relay switch which will alert the relay switch to turn off when there is sufficient moisture in the water.