# Event No-03

# e-Yantra Farm Setup Initiative (efsi)

## (Project)

SVKM's Institute of Technology , Dhule has taken initiative for e-Yantra Farm Setup Initiative(eFSI) along with IIT-Bombay. Our Principal Dr. Nilesh Salunke and our Co-ordinator Prof. Khalid Alfatami are supporting all the activity inside our campus. Our initiative is mainly focusing on the development of smart and automated systems which can be used to solve modern day agricultural problems. Moreover, it emphasizes on the application of normal concepts of electronics towards day to day problems and implementation of real time solutions for such problems. The students are provided with a dedicated area for implementing their own embedded systems and prototypes and develop new agricultural solutions. The setup includes a miniature farm which acts as a seed bed and where students can grow plants and do their studies on different agricultural aspects as well as gain brief knowledge about this field also. This provides them real time exposure in the area and give them a chance for real time analysis for both the problem and their proposed solution.

**We have completed 2 Tasks till date**

**Task 1**

In task 1, we have allocated 150 sq. ft. space for placing trough and start sowing seeds.

After allocation of space we have started by sowing seeds on farm bed, and also started the process of creating Amrit Mitti and Amrit Jal.

After this the maintenance of the farm is taken by providing proper water.

**Task 2**

In task 2, to get the farm bed fed and watered we get our water valve and esp8266 and configured

eFSI Team Registered at IIT Bombay

Faculty Coordinator: Mr. Tukaram Gawali (Assistant Professor)

Student Names:

Mr. Ansari Ali Arsalan (SYIT)

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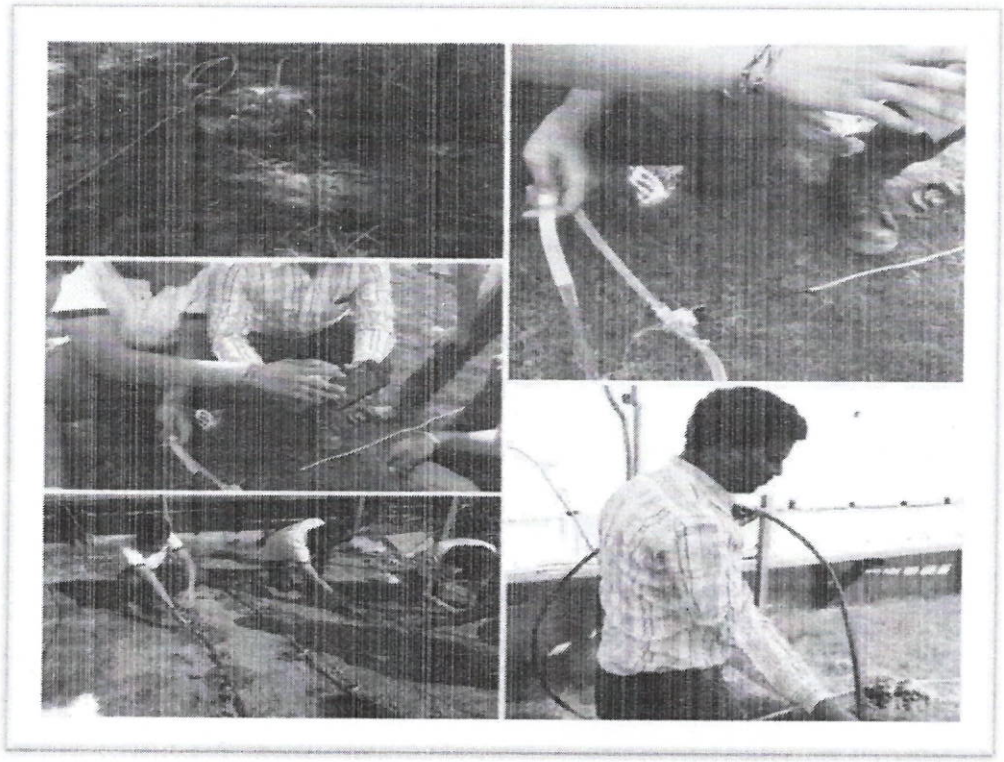
Mr. Sanket Chaudhary (SYCO)

Mr. Krushnna Baviskar (SYCO)

**Evidence of Program**



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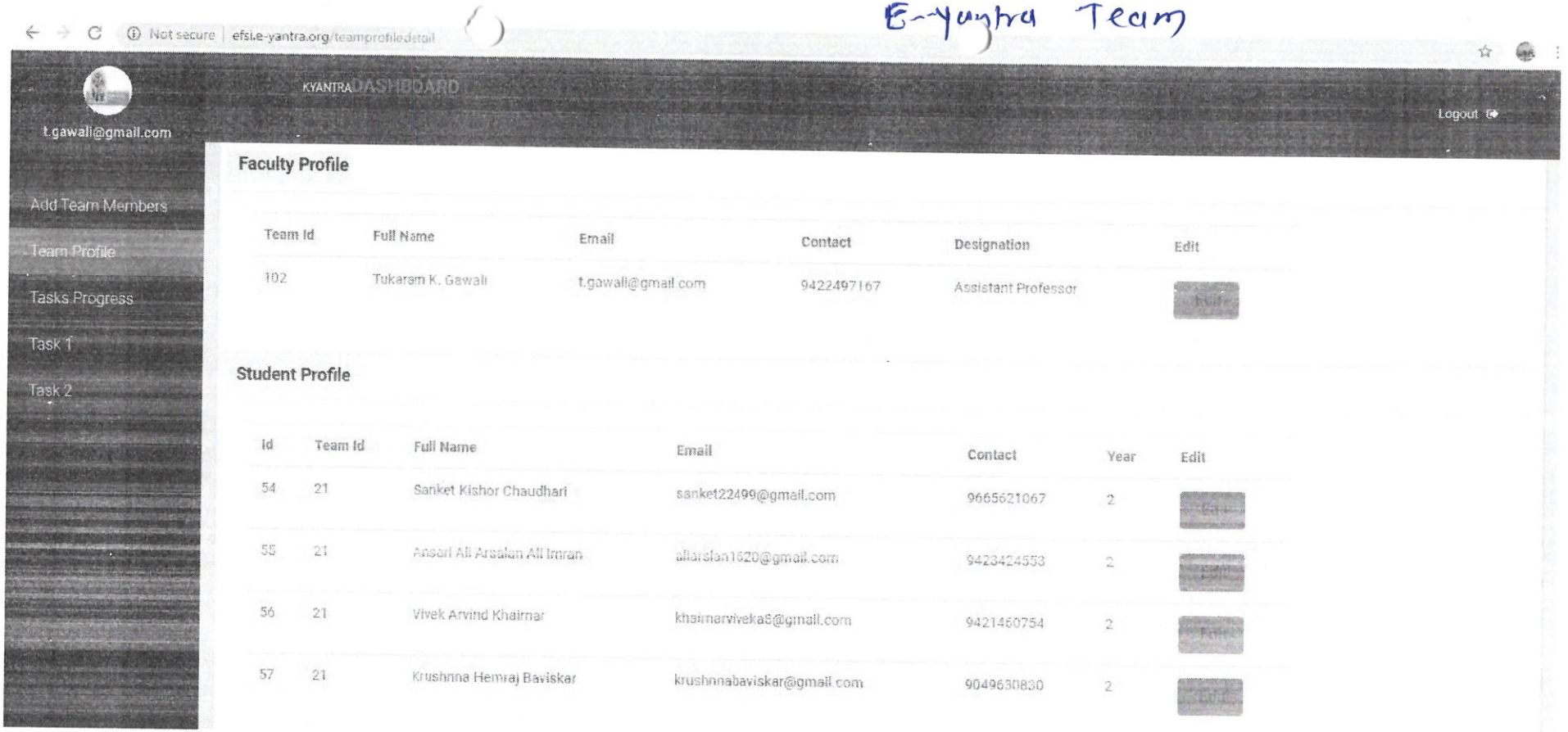
E-Yantra Team




E-Yantra Team.

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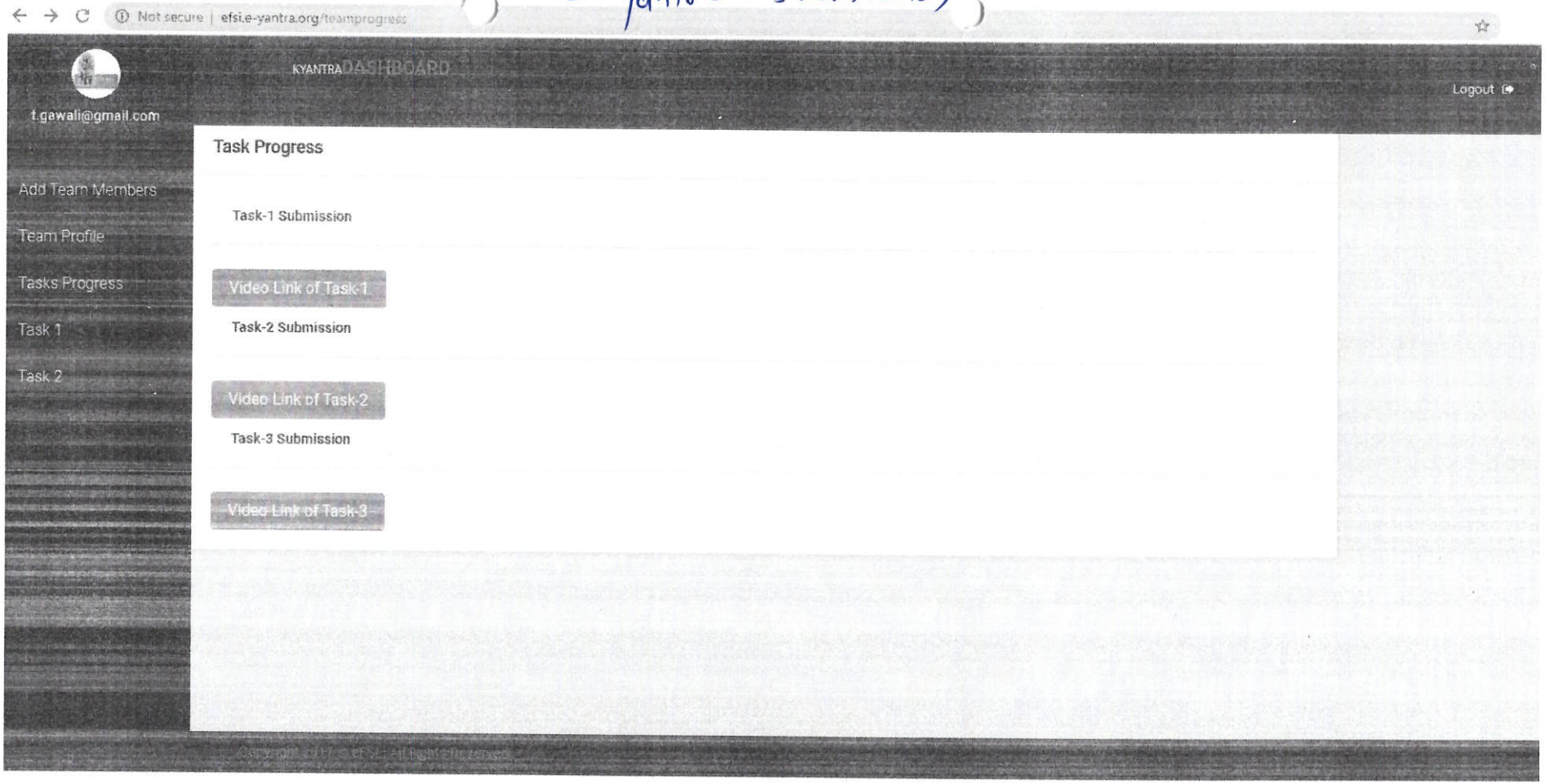
E-Yantra submission




E-Yantra Submission

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# Task - 1

Congratulations to your college on initiating an agriculture test bed through the e-Yantra Farm Setup Initiative (eFSI)

**Aim of eFSI:**
This initiative aims at assisting eLSI colleges in setting up an automated agriculture project testbed to address real world problem and hands-on learning for students to apply theory in a fun and productive manner.

e-Yantra transfers the requisite knowledge to setup this test bed and once setup, this testbed will serve as a base for interesting BE projects in the field of Embedded Systems and Robotics.

In order to start applying technology to the farm, we need to setup the 150 sq ft farm.

Depending on the type of space available, you may set up your experimental farm either

- In an open space in your college premises
- In a closed area such as Greenhouse facility - in case your college already has one (you will require troughs in this case
- On a terrace (you will require troughs in this case)

To help you in setting up the farm we have come up with different Checkpoints. They are as follows:

1. **Identifying 150 sq ft space for placing the troughs**
2. **Laying troughs and irrigation system**
3. **Preparing amrit mitthi and amrit jal**
4. **Sowing of seeds**

## Checkpoint 0 - Allocation of space

The first step is to identify a group consisting of one faculty and four students(Two - 2nd yr and Two 3rd yr student). You can have more than one group. Once the groups are ready you need to have 150 sq ft space for placing trough and start sowing seeds.

## Checkpoint evaluation

The evaluation of this checkpoint will be based on uploading photo/video on the portal, which will also have the group members.

## Checkpoint 1 - Trough, Irrigation and Composting

On completion of checkpoint-0, you can now start preparing for sowing. The following steps needs to be followed to complete this Checkpoint

**Trough making and laying irrigation system**

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**Step 1:** Cut a sheet of length 100cm from the HDPE roll.
**Step 2:** There are two crease marks on either sides of the sheet along the length. These are used to fold the sheet along the its length. We will make two crease marks along its breadth at a distance of 20 cm each from the edges. These will be used to fold the sheet.
**Step 3:** Make four crease marks in each corner at an angle of 45 degrees.
**Step 4:** Make two 8mm holes using a drill machine at a distance of 10 cm from the center on either sides and at distance of 5cm from the edge of the sheet. Repeat this on the other side of the sheet.
**Step 5:** Fold the sheet along the crease marks to form a rectangular open box
**Step 6:** Staple the sheets on all four sides using a 26/6 stapler.
**Step 7:** Place the trough and fill with growing medium.
**Step 8:** Lay the drip irrigation pipe/tape.
**Step 9:** Connect all the irrigation pipes to main water supply pipe.

### Amrit Mitti

Steps of making is spread across different days,

**Day 1**

- → Create thick liquid slurry with 1 kg fresh cow dung, 1lt cow urine, 100gm jaggery
- → Add the mixed slurry into 10 liter of water
- → Stir the 11 liter slurry with a stick in clockwise direction (12 times), then in anti-clockwise direction (12 times). Follow the same process of stirring of the 10 L slurry 3 times a day for the next 3 days.

**Day 2**

- → Stir the 11 liter slurry with a stick in clockwise direction (12 times), then in anti-clockwise direction (12 times) 3 times a day.

**Day 3**

- → Stir the 11 liter slurry with a stick in clockwise direction (12 times), then in anti-clockwise direction (12 times) 3 times a day.

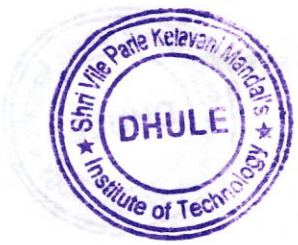
**Day 4**

- → Dilute 11 liters of slurry into 100 liters of water which will create 111 liters of Amrut Jal.
- → Mix 20 kg biomass into Amrut Jal and keep it standing for 24 hrs

**Day 5**

- → Create Heap: 3 feet wide and 1 feet high from wet biomass
- → Create the heap using layers of Biomass, soil and rock-dust (incase soil is less pores)
- → The layer are added as follows
  - ◆ Layer 1 - Biomass
  - ◆ Layer 2: Soil
  - ◆ Repeat layer 1 & 2 up till layer 11
  - ◆ Layer 12: Rockdust
  - ◆ Apply pressure across heap every 10th layer of biomass
  - ◆ Continue the above layering until you reach 1 feet
- → In all there will be approximately 60 layers.

**Day 12**



- ➔ Turn the heap twice a week and spray Amrut jal to maintain moisture inside the heap. It can be reduced to once in every 7 days in case of shortage of manpower or time add amrut jal and water to keep the heap moist.

**Day 19**

- ➔ Turn the heap add amrut jal and water to keep the heap moist.

**Day 26**

- ➔ Turn the heap add amrut jal and water to keep the heap moist.

**Day 31**

- ➔ Add one layer of soil - approximately 2 inches
- ➔ Sow the seeds
- ➔ Top the seeds with mulch heap with biomass to protect the seeds from birds.

**Day 55** (21 Days after germination)

- ➔ Pruning of 25% leaves

**Day 76** (42 Days after germination)

- ➔ Pruning of 25% leaves

**Day 97** (63 Days after germination)

- ➔ Some plants may start flowering, cut all plants 0.5inch from soil and cut stem into 3-4 inch and keep it on heap for 3-4 days for drying

**Day 101**

- ➔ Turn the heap and mix biomass
- ➔ Sprinkle Amrut Jal on heap, keep it for 30 days

**Day 108**

- ➔ Turn heap every 7 days for the next **ONE MONTH** and add amrut jal to keep the heap moist.

## Checkpoint evaluation

The checkpoint will be considered complete when the troughs with growing medium and irrigation system are laid, and amrit mitti process has started. You need to upload photos/video on the portal for evaluation.

## Checkpoint 2 - Sowing the seeds

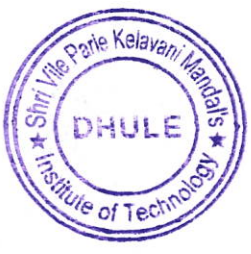
For this checkpoint we will sow spinach as an example

**Step 1:** Soak spinach seed in water/amrit jal for 3 to 4 hrs.
**Step 2:** Turn bed to loosen soil for aeration.
**Step 3:** Spread the soil evenly in trough.
**Step 4:** Sow the soaked seeds, such that they are 2 inches apart and 0.5 cm deep.
**Step 5:** Sprinkle water so that the soil remain moist to aid germination.
**Step 6:** Sprinkle water as and when needed.

## Checkpoint evaluation

The checkpoint will be considered complete when all the troughs in the 150 sq ft space has growing plants. You need to upload photos/video on the portal for evaluation.

**Note:** To help further, we will be providing video tutorials which will clearly demonstrate the complete process



# Setup for Task 2

**Outline**: This is a prerequisite for **Task 2 - Automating irrigation system.** In this task we get our Raspberry PI up and running to get started with Task-2. To complete this task the following components are required, and to aid in the completion of the task, step-by-step instructions are provided, along with necessary tutorials.

**Components required:**

- Raspberry Pi 3 (RPi)

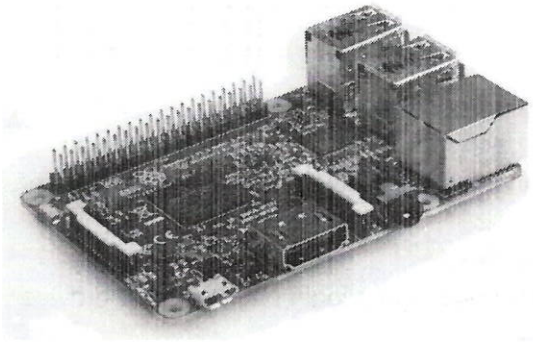


**Figure 1 : Raspberry Pi 3**

- SD card (image provided online)
- LAN cable
- Wireless Router (If wireless network is not available)

## 1. Setting up RPi Internet of things (IoT) Dashboard (Checkpoint 1)

- Burn provided Raspbian OS on SD card using this tutorial (Linux, Windows)
- Power on RPi and use the LAN cable to connect RPi with desktop/laptop
- RPi has two interfacing modes for accessing internet, one is through wired ethernet port and another one is through WiFi. Due to this RPi will have two addresses corresponding to two interfaces.
- By default, the wired LAN IP address of RPi is set to be **192.168.0.100**
- To communicate with RPi, we need to configure your desktop/laptop LAN settings
- SSH (Linux, Windows) into RPi using LAN IP to enable connection with WiFi network
- Set SSID and password of the WiFi router with which RPi connects
    - We need to navigate to ***/etc/wpa_supplicant*** on RPi
    - Here you will find ***wpa_supplicant.conf*** if the file does not exist type:
        - ***touch wpa_supplicant.conf***
    - Make changes to ***wpa_supplicant.conf*** using a suitable editor so that it looks like this:

```
ctrl_interface=DIR=/var/run/wpa_supplicant GROUP=netdev
update_config=1
country=GB

network1={
        ssid="Your first router SSID"
        psk="Password for first router"
        key_mgmt=WPA-PSK
}
```

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```
network2={
        ssid="Your second router SSID"
        psk="Password for second router"
        key_mgmt=WPA-PSK
}
```

- Restart RPi to apply changes

2. **Setting WiFi router**

- Find the IP address of RPi from the router web interface
- Reserve IP address of RPi for setting static IP (**If help required please contact your system admin**)
- Note down the wireless LAN IP address of the RPi, this will be used for your future reference.

3. **Launching RPi server**
   - There is already installed and running IoT dashboard on the RPi image provided to you.
   - **Important:** To access the dashboard you need to be on the same network as the RPi.
   - On your Desktop/Laptop on the same network, type on the browser, the IP address of RPi with port 9091
     - *eg: **rpi_ip_address:9091***
   - If everything went well you should see a login page on your browser, and use the following credentials to login:
     - Login: **efsi@e-yantra.org**
     - Password: **Efsi@2017**

**The task is considered complete when e-Yantra receives screenshots of the setup and the browser after your logging into the IoT dashboard.**

**On completion of this task the college receives *two valves*, to automate their irrigation system, the procedure to automate is issued as part of Task-2**

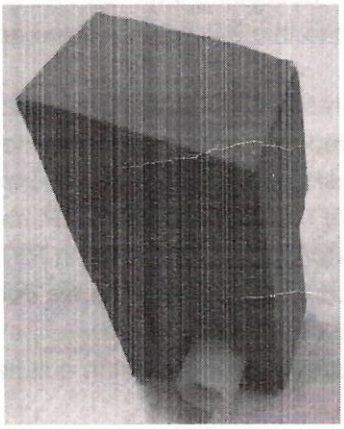

**Figure 2 : wireless valve**

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