Hydroponics Report

Mentor – Mrs. Priyanka Bagul

Introduction:

All India Council for Technical Education (AICTE), Ministry of Human Resource Development, Govt. of India held a competition "AICTE-Vishwakarma Awards-2019" for the students and institutes of AICTE approved institutions. The aim of the competition is to encourage and motivate young students and institutions to raise their performance in their specific domains leading to significant contribution towards the growth and development of the nation as a whole. The Chhatra Vishwakarma Awards is divided into various sub-categories, in which each team has to define a problem statement and provide a solution for the same.

The competition was divided into various rounds. The first round was online submission of problem statement and proposed solution. The second round was online submission of Video of a working prototype of the proposed solution along with a PPT for the same. After screening, the selected teams had to demonstrate the prototype in the Regional Round. The regional round for Maharashtra was held in Bhopal. The top three teams from each category in each region had to give the final demonstration in Delhi at the AICTE Headquarters. The Theme for AICTE-Vishwakarma Awards-2019 was – "**How to Enhance Income of a Village**"

Category : Farm And Flock

Team Hydra:

Sr. No.	Name	Designation	Branch
1	Mrs. Priyanka Bagul	Mentor	E&Tc
2	Rohit Tondare	Team Leader	E&Tc
3	Barkha Chainani	Team Member	E&Tc
4	Mohd. Arbaaz Ahmed Shaikh	Team Member	Computer
5	Vishnuvardhan Chappidi	Team Member	Computer

Hydroponics:

Hydroponics is basically soilless farming. In hydroponics the plant roots are submerged into a container filled with water. All the necessary nutrients required by the plant are injected in the water with the help of a pump. There is also a separate reservoir to help maintain the pH value of the water. Additionally hydroponics is carried out in a closed environment where the temperature, light intensity, moisture, etc can be controlled with respect to each type of crop to boost the produce. In order to increase the yield, the pH value of the water has to be

maintained between 5.5 to 6 for most crops in hydroponics. With the help of automation, all of the controlling of pH value of water, Light intensity, temperature, moisture, etc. will be done with the help of sensors and actuators. Automation and IoT in farming will enable the farmer to access the controller and monitor the crops from his/her mobile phone from anywhere in the world in real time. In addition to that, with the help of automatic control of all the components, less electricity will be consumed and this will in turn increase the profit margin of the farmer. In hydroponics there is less chance of the crops being damaged by pests as no soil is being used.

Automation in Hydroponics can be achieved by implementing IoT based solutions in order to control and monitor all the different sensors and actuators in real time. A cloud based solution will be used to store the data received by the sensors and provide an overview of all the parameters of the system. An easy to use and user friendly app will help control and monitor the whole system remotely. Based on the previous data gathered by the sensors the system will also provide optimum control of the parameters for a particular crop. The system will provide built-in presets for individual crops based on research but also provide the farmer the option to change the values of the parameters. The system will be able to run without the intervention of the farmer but also provide the farmer full control of the system if need be.

Prototype 1:

The first prototype was the basic structure with one pipe housing five plants along with the electronics necessary for the working of the prototype. Figure 1 shows the prototype, in which the pipe along with five plants is seen. In order to provide artificial light to the plants, LEDs were used and can be seen in Figure 1. The Pumps required for the circulation of water and addition of various nutrients and pH increase or pH decrease solution is shown in Figure 2. Figure 2 also shows the different sensors used in the project. In order to align with the theme of the competition and make it affordable to the farmers in villages we developed a basic EC sensor. The Figure 3 shows the electronic components used for the basic prototype.

Figure 1 Prototype 1

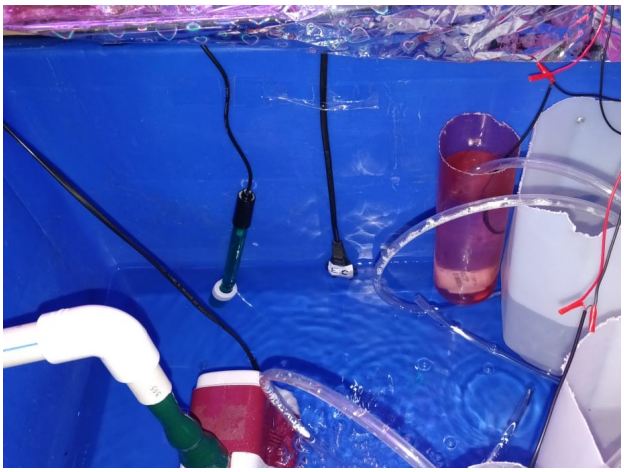

Figure 2 Tank and Pumps

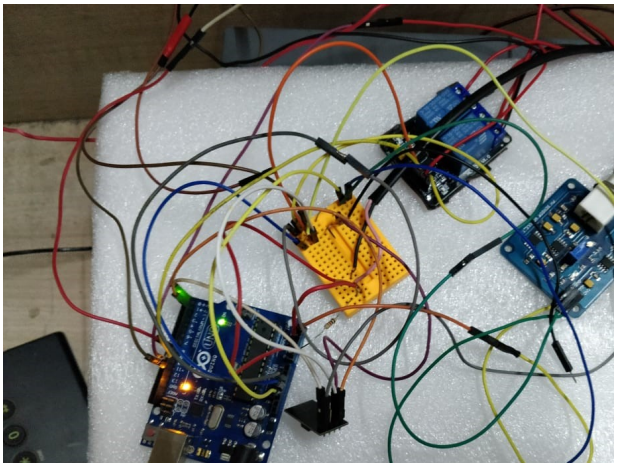

Figure 3 Electronics

Regional Round:

The Regional round for the western region was held at Oriental Institute of Science & Technology, Bhopal. All the teams selected after the two online rounds had to demonstrate their working prototype. Each team was given a stall to setup their prototype. Figure 4 shows our stall set up in Bhopal. The main structure was build with pipes to keep in strong as well as make sure it is easy to assemble and disassemble.

Figure 4 Stall in Bhopal

Outreach Program:

In order to get information about the current farming situation, we planned and executed various outreach programs in nearby villages. We spoke to various farmers and explained our project to them. The Figures 5, 6 and 7 show the team members talking to the farmers and getting their feedback. Figure 7 and 8 shows the large scale Outreach program organized on Republic day 2020 in a school in the village.

Figure 5 Outreach

Figure 6 Outreach

Figure 7 Outreach in Village

Figure 8 Farmers in the village

Final Round:

The final round was held at the AICTE Headquarters in Delhi. The top 3 teams from each category in each region had to demonstrate their final product to the Judges. Figure 9 shows the stall in the AICTE Headquarters. Figure 10 shows the main electronics used for the controlling of the entire system. The Box in has industry standard aviation connectors along with a custom PCB. Figure 11 shows the final product that was demonstrated in the Final round.

The product demonstrated fans which are used for air circulation and a humidifier used to maintain the humidity at the optimum level for particular plants. Figure 12 shows a screenshot of the Android App developed to control and monitor the whole system using IoT and Bluetooth. Figure 13 shows the Head of AICTE and Shri Temjen Imma Along, the Minster of Higher and Technical Education, Nagaland. Both of them acknowledged the project and had positive feedback for the same.

Figure 9 Stall for Final Round

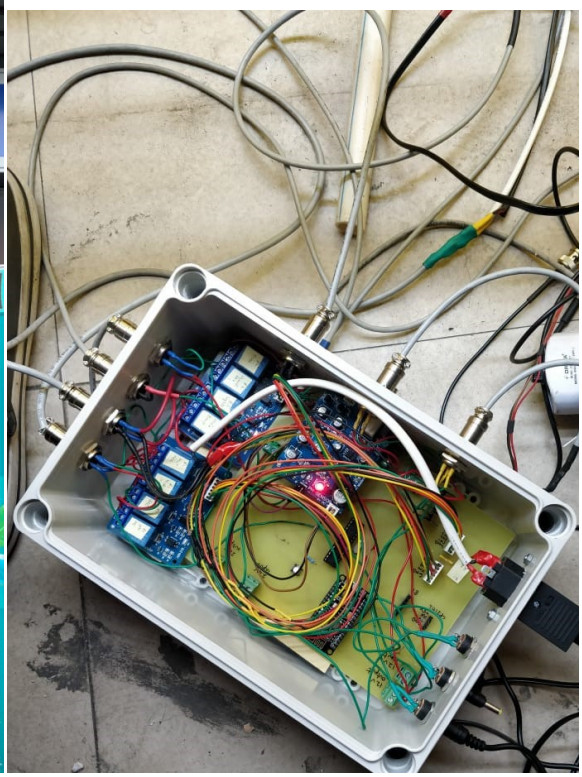

Figure 10 Electronics components

Figure 11 Screenshot of App

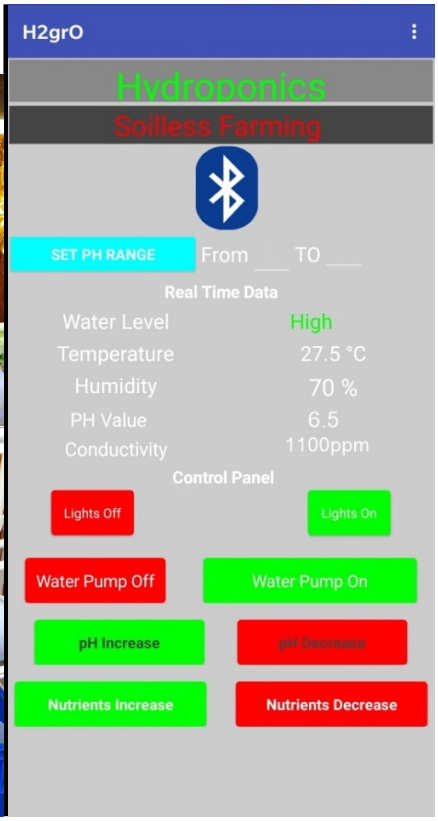

Figure 12 Final product

Figure 13 AICTE Head and Minister of Higher Education, Nagaland