



Research Report

of

Smart Garden

conducted by

Mr. Krittanat Siriket	No.1
Mr. Chayanin Napia	No.2
Mr. Punyawat Jumchat	No.8
Mr. Panuwit Boonnark	No.12
Mr. Phumipat Jongrungruangwattana	No.14
Mr. Thanakorn Thummasaeng	No.15

of class. 5/14

Research advisor:

Mr. Pongwit Maronee.

Chapter 1

Background and importance of the research question

Can our Smart farm fulfill the requirements of customers that do not have time to take care of the garden?

In an age that is full of competition all the time, In those who grow plants as a supplementary career. But still, have to spend a lot of time on the main profession. Therefore, do not have time to look after their vegetable gardens, so instead of hiring labor to take care of the vegetable garden and to reduce the take care costs, we have invented a "Smart Vegetable Garden" to solve these problems.

The purpose of project construction

- **To study the work and create an intelligent vegetable plot.**
- **To get quality products.**
- **Save labor costs.**
- **To take care of the garden conveniently.**

Project scope

- **Apple cider/Vinegar**

Mix apple cider with soil before planting plants. Will cause no weeds to in the garden

- **Ventilation fan**

The ventilation system is the system using fans to take air in and outside of the dome. The fans are used differently, the first one is installed on top and the other one is installed at the bottom. The top fan turns on during the day and turns off at night for the air to circulate normally. And the fan below will turn on at night instead because at night, mostly plants emit CO₂, excessive CO₂ may be accumulated, and CO₂ is heavier than O₂, so the fan below is responsible for taking out CO₂ to avoid excessive CO₂ in the dome.

- **Water**

Use sensors to measure soil moisture. If the humidity is low, watering the plants automatically.

Expected Benefits

To save time, convenience and some sort of this intelligent garden plot results in better and more comprehensive care. Also expecting the intelligent garden plot to have better performance than the normal kind of garden plot.

Chapter 2

Related documents

The preparation of a Smart Garden. The project organizer can study documents and from various websites. Related as follows.

2.1) Importance of Smart Garden Project

2.2)Documents related to equipment and technology systems used in the operation of Smart Garden.

2.3)Documents related to plants that are studied for growing in the Smart Garden.

2.1 Importance of Smart Garden Project

In this age, those who work in various fields and may pursue an additional career as a farmer, still spend a lot of time on their main occupation causing no time to take care of the vegetable all the time, which the Smart Garden can be used to solve this problem with various systems to facilitate the user and can maintain the vegetable plots to achieve the desired quality.

2.2 Documents related to equipment and technology systems used in the operation of Smart Garden.

1. Vegetable Dome

1.1) Good protection against vegetable pests in greenhouses, can prevent insects that are larger than the net.

1.2) Able to grow vegetable off-season, most off-season vegetables are destroyed by nearly 60% of pests, causing farmers to use pesticides until plants are grown enough to be harvested. But growing these vegetables in the dome, crops can be grown out of the season.

1.3) Easy to care. Greenhouse-vegetables are easier to care more than those grown in open ground. Easy to control the occurrence of insects, weeds, and bugs.

https://cities.trueid.net/article/ข้อดีของการปลูกผักในโรงเรือน-trueidintrend_100081

1. Apply Cider

Place the apple cider into the equipment, spray it around, or inject it directly on the weed. Apple Cider is used to overlay the roots to prevent the weed.

<https://www.sanook.com/home/22157/>

2. Soil Moisture Sensor

After knowing the moisture content of different types of soils, the smart watering system is designed by building a watering kit containing a sensor, a flammable board, a solar panel to collect solar energy. Soil moisture reads the moisture content, forwarded to the central assessor, then sending a command to the water valve to keep the water on and off the valve at all times.

<https://www.thairath.co.th/news/local/north/1046215>

2.1 Documents related to plants that are studied for growing in the Smart Garden.

The plant that will be planted in Smart Garden is a homegrown vegetable. Because it can be grown easily, fast, no need to use space in planting a lot, and the product can be transformed into additional income because these homegrown vegetables are essential to the current economy, but planting vegetables in this Smart Garden must grow the same type of vegetable to be able to take care of vegetables thoroughly and appropriately.

Examples of vegetables that are appropriate to be planted, including

- | | |
|------------------|------------------|
| 1. Coriander | 5. Pepper |
| 2. Cucumber | 6. Salad |
| 3. Morning Glory | 7. Sprouts |
| 4. Celery | 8. Spring Onions |

Chapter 3

Materials and Equipment

1. Soil moisture sensor



2. Apple Cider



3. Dome



4. Plot



5. Soil



6. Rubber strap



7. Fan



8. Sprinkler



9. Water pump



10. Water tank



11. Steel mesh



Project Implementation

1. Thinking of project topics to present to the project mentor.
2. Study and research the information related to the interest matters. Study from various websites about farming and data collection to create content.
3. Learn how to create an automatic water release system by measuring soil moisture with humidity sensors and ventilation systems in the dome from various websites that offer techniques on how to make Smart Garden, creating an automatic watering discharge system, and air ventilation system.
4. Create a Smart Garden project layout and create a Smart Garden structure model with various intelligent systems and the work of various systems automatically.
5. Present a progress report periodically by informing the project advisor to check the progress of the project through the “Powerpoint” where the teacher advisor will provide various suggestions to make the content and presentation more interesting, when receiving advice, it will be revised to make it more interesting and allow friends to help make suggestions.
6. Evaluate the work by presenting it through the presentation, and have the teacher assess the work.
7. Presented by “Powerpoint”.

Chapter 4

Experiments and criticism of the results of the experiment

Experiments and criticism of the results of the experiment is an experiment by using a sensor connected to the system to measure moisture using a tissue. Therefore getting the changed moisture value

When the soil moisture content is less than the percentage that the plant needs, the water will be released and when the humidity is higher than the percentage that the plant needs, stop releasing the water after that, write down the results of the experiment.

4.1 Preparation of soil moisture determination experiment

4.1.1 ** Equipment

The experimental equipment consisted of

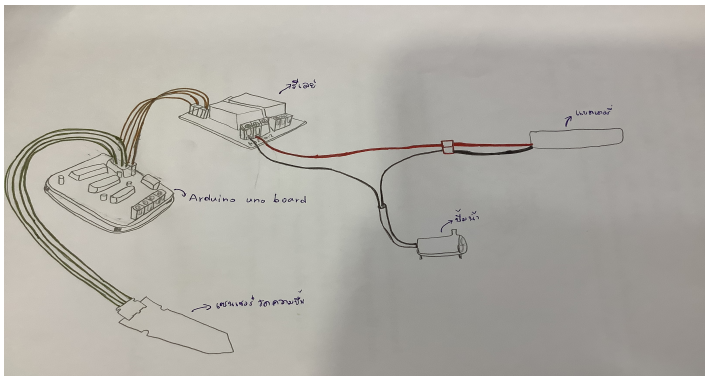
- 1) ** Soil moisture sensor
- 2) ** Water glass
- 3) ** Hose
- 4) ** tissue
- 5) ** Notebook or computer to write code.
- 6) ** Water pump
- 7) ** Arduino

4.1.2 ** Environment and location

- 1) ** area
- 2) ** Performance assessors 6 persons

4.2 Experimental procedure

4.2.1 ** Install the device as shown in the picture.



4.2.2 ** Test the sensor connected to the system to measure moisture using tissue instead of soil. Therefore getting the changed moisture value.

4.2.3 * Calculates the humidity obtained from the experiment. And write When the soil moisture content is less than the percentage that the plant needs, the water is released. And when the humidity is greater than the percentage that the plant needs, stop releasing the water.

Result

From the experiment about measuring the moisture in the soil can be recorded as follows. The results showed that the problem of this experiment is to fix the wires directly to the Arduino, then connect to the water pump and the system will be working normally.

Chapter 5

Conclusions and recommendations

Summary of study results

The results of the experiment are as expected. When the soil has low humidity, the system will release the water and when the moisture is back at the right point where water is not needed then the water will stop and also help us not to look after our vegetables all the time. Lastly, do not have to hire workers and have quality products.

Suggestions

The water system should be designed to have more watering capabilities and should grow a variety of vegetables by increasing vegetable plots, adding sensors, writing code, and ordering the system to read the moisture value of many plants more.

Problem and obstacles

1. Research time leads to inadequate compiling some of the data.
2. Lack of acquiring equipment, resulting in a slow process of experimenting and modeling processes.
3. The time to complete the project is not enough.