1. **Report No. 1 Introduction**
   1. **Project Information**
      1. Project name: **Design and implement the model of smart garden**
      2. Abbreviation: **DIMOSG**
      3. Product Type: **Device**
      4. Start Date: **May 9th 2016**
      5. End Date: **September 2016**
   2. **Introduction**

Nowadays, farming is absolutely vital for every society. However, land costs too much and farming make too little, its depend on spread of land. Besides that, people don’t have enough time to take care the plant and easy to forget the schedule about gardening. The actual situation is people don’t know when the most convenient time to watering or fertilize the plants, it is easy make the plants to die or waste the resource. This project can help farmer increase productivity even in a small land, reduce the water or fertilizer, helps plants to have a better life.

* 1. **Current Situation**

As you know, we should give a hoot the specification of weather such as temperature, humidity, light and PH degree to find the suitable way to take care each plant. That helps controlling water and fertilize for plants. In manually and separately, gardeners have to measure indexes above. After that, they also have to calculate and make plans base on those indexes.

* 1. **Problem Definition**

With the current system in the market, we must have paid so much for using the smart garden and it is not suitable for Viet Nam environment. And some kind of control application is hard for Vietnamese people.

Measuring equipment, for temperature, humidity, light and PH degree in the market, have many different types and individual. Gardener will spend lots of time to get indexes from these devices. It is also difficult to combine these indexes together to find a solution for taking care of plants.

Besides that, plants are usually influenced by extreme weather events and by gradual climate changes. With the current system, the garden has many things to do if it is rain too much or drought in a long time.

Improving soil is also a big problem. The plants’ productivity will be decrease; soil, water or fertilize resources will be wasted if improving soil is not regularly or ignored. Each plant is suitable only for certain types of land, and the time to improving soil is different. It is difficult to make plan and track it for improving soil if they many types of land in garden.

* 1. **Proposed Solution**

The proposed solution is building a garden monitoring system. This system can not only use measuring devices automatically but also combines their indexes to make a better plan for controlling water, fertilize, reminding improving soil, tracking life cycle of plants. This system has some backup solution when the weather change. The gardener has less thing to do, they can manage garden from anywhere outside the home.

* 1. **Feature functions**
     + This system has a microcontroller (such as Arduino, ARM Cortex…) hooked up to sensors (temperature, humidity, soil moisture, PH degree and light) and actuators (like water pump, nebulizer…).
     + Gardener will control this system through a mobile application where they can be monitoring, tracking and get some advisers, reminder for their plants. This solution can be flexible with small or large garden via Wi-Fi or RF waves.
     + A web server will be built not only communicate with mobile application, but also receive parameters from the sensors and controlling actuators through microcontroller via Wi-Fi or RF waves.
  2. **Advantages and disadvantages**

Advantages:

* + - Spend less time for gardening but increase productivity of plants.
    - Waste reduction of resources such as water, fertilize.
    - Simply collect data and monitor the conditions of land and plants.
    - Plant disease, forecasting, make a better criteria conditions for each plant.

Disadvantages:

* + - The lack of technology knowledge from Vietnam gardener
    - Accuracy and durability of sensors or electric devices in a long time with hard weather.
  1. **Functional Requirements**
  2. **Sensors Management**
     + Setting range of allowed indexes
     + Tracking report of indexes
     + Setting period time for each sensors
  3. **Actuators Management**
     + Add new a device
     + Setting levels, volumes of resources
  4. **Plant Management**
     + Add new plant.
     + Add criteria conditions for each plant.
     + Getting report of plants’ indexes.
     + Suggestion plan for gardener
     + Setting time, life cycle for each plant.
  5. **Web server** 
     + Provide API for managing on mobile via internet.
     + Receive indexes from sensors and transmit signal to control actuators through microcontroller via Wi-Fi or RF.
     + Chart and report conditions of land and plant.
  6. **Mobile App**
     + Tracking report, chart for gardener.
     + Reminder plan.
  7. **Role and Responsibility**

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| --- | --- | --- | --- | --- |
| **No** | **Full Name** | **Role** | **Position** | **Contact** |
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***Table 1 : Roles and Responsibilities***