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DEPARTMENT: MECHANICAL ENGINEERING

COURSE: SRTUCTURED COMPUTER PROGRAMMING

NUMBER 1– Discuss the application development following the software development cycle

In the modern challenge of improving the growth of plants and reducing costs justifies that the development of an irrigation system that will minimize the waste of water and reduce workers and monitor overhead is crucial. This system is to help and provide an irrigation system that will ease the burden of the users to take care of plants. Soil moistures are difficult to measure and their target levels cannot be maintained efficiently. That is the reason an automated irrigation system would be the best solution for this problem. The soil moisture sensor will refer to the level of soil moisture and the system will start automatically when the level of moisture is below the sufficient level for the plants to grow healthily. The system will automatically stop when it reached the moisture soil level for such particular time such as we set the time during morning and evening. The brain for this system is microcontroller. Besides that, it made up of reliable parts and relatively low cost.

Water is required for the basic growth of plant. When there is insufficient of water, the plants will in a big trouble because stress can occur and the quality of plants will decrease or plants will dead. This is when an automated irrigation system is needed to overcome this problem. An automatic irrigation system is responsible to water the plant efficiently and also providing a system that can reduce the amount of manpower needed for watering plant.

- a) To design and develop an automatic irrigation system controlled by using microcontroller.
- b) To implement the automatic watering system based on soil moisture sensor.
- c) To provide a system that help the plant grow with the least of manual monitoring.

An automatic irrigation system is developed to make watering process in agriculture more convenient, by helping to reduce the amount of manpower needed for watering process, and ultimately save time as well. Irrigation systems are also used for dust suppression, disposal of sewage, and in mining. There are two main types of irrigation system, sprinkler irrigation and drip irrigation.

Drip irrigation is water-saving system in which it supplies water by slowly dripping the water into the soil or the root of the plant while sprinkler irrigation supplies water by sprinkling the water around the crop.

MICROCONTROLLER

A microcontroller also known as MCU and μC is a functional computer system on a chip. Microcontroller is integrated chip that performs controlling function. It also referred as one-chip microcomputer is used to control a wide range of electrical and mechanical appliance. Since they were first introduced, microcontrollers have evolved to the point where they can use for increasing complex applications. Some microcontrollers in use today are programmable, expanding the number of application in which they can be used.

SOIL MOISTURE SENSOR

Irrigation is the most important cultural practice and most labour intensive task in planting operation. Knowing when and how much to water is two important aspects of irrigation. To do this automatically, sensors and methods are available to determine when plants may need water. It is suggested to use soil moisture sensor to do irrigation. The moisture sensor will be an important element for this project.

SOLENOID VALVE

Solenoid valves are electromechanical valves that are controlled by stopping or running an electrical current through a solenoid, in order to change the state of the valve. A solenoid is a coil of wire that is magnetized when electricity runs through it. The solenoid valve makes use of this solenoid in order to activate a valve thus controlling the water flow, airflow and other things with. There are three types of solenoid valves which are general-purpose type, low pressure steam type and high pressure steam pipe. Valve is one of the components that need maintenance. The solenoid valve can get damaged after some period. Thus, a replacement of solenoid valve may be needed.

DESIGN OF EXPERIMENT

The model of irrigation system is design by using Solid work software. The design is improving from the current design which is the frame are applied control system, it make the frame can move forward and backward. Besides, the control such as moisture sensor, time and others are applied in this system.

NUMBER 2 - Critically discuss the hardware and software features.

1) HARDWARE FEATURES

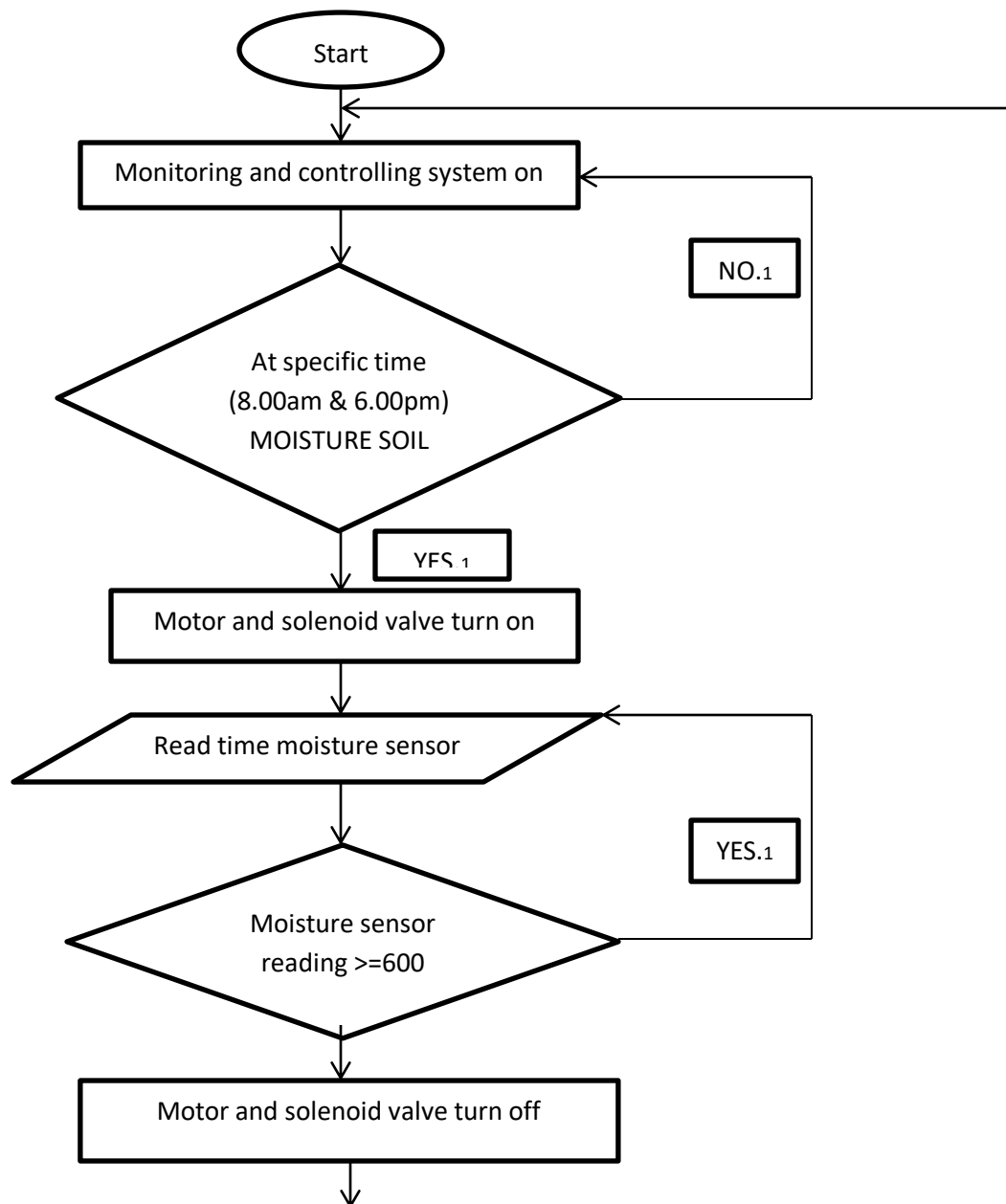
There are few steps to make the model of irrigation system. First, the material is cut into desired length by using grinder cutter the dimension of the structure is 1.5m X 1.5m X 1m. Then, the hollow square and hollow round join by L-shape steel using bolt and nut, the material is drill to make hole for bolt using driller with drill bit of M8 and also hole saw 28mm diameter. After the material cut and drilled, the part is join using bolt and nut. Besides, support is attached by using MIG welding so that the structure is strong enough. Furthermore, the roller part is drill using hole saw diameter 28mm, and then 61 inch pipe is inserted to the roller as the shaft. Finally, for piping system, sprinkler is attached by using silicon glue.

2) SOFTWARE FEATURES

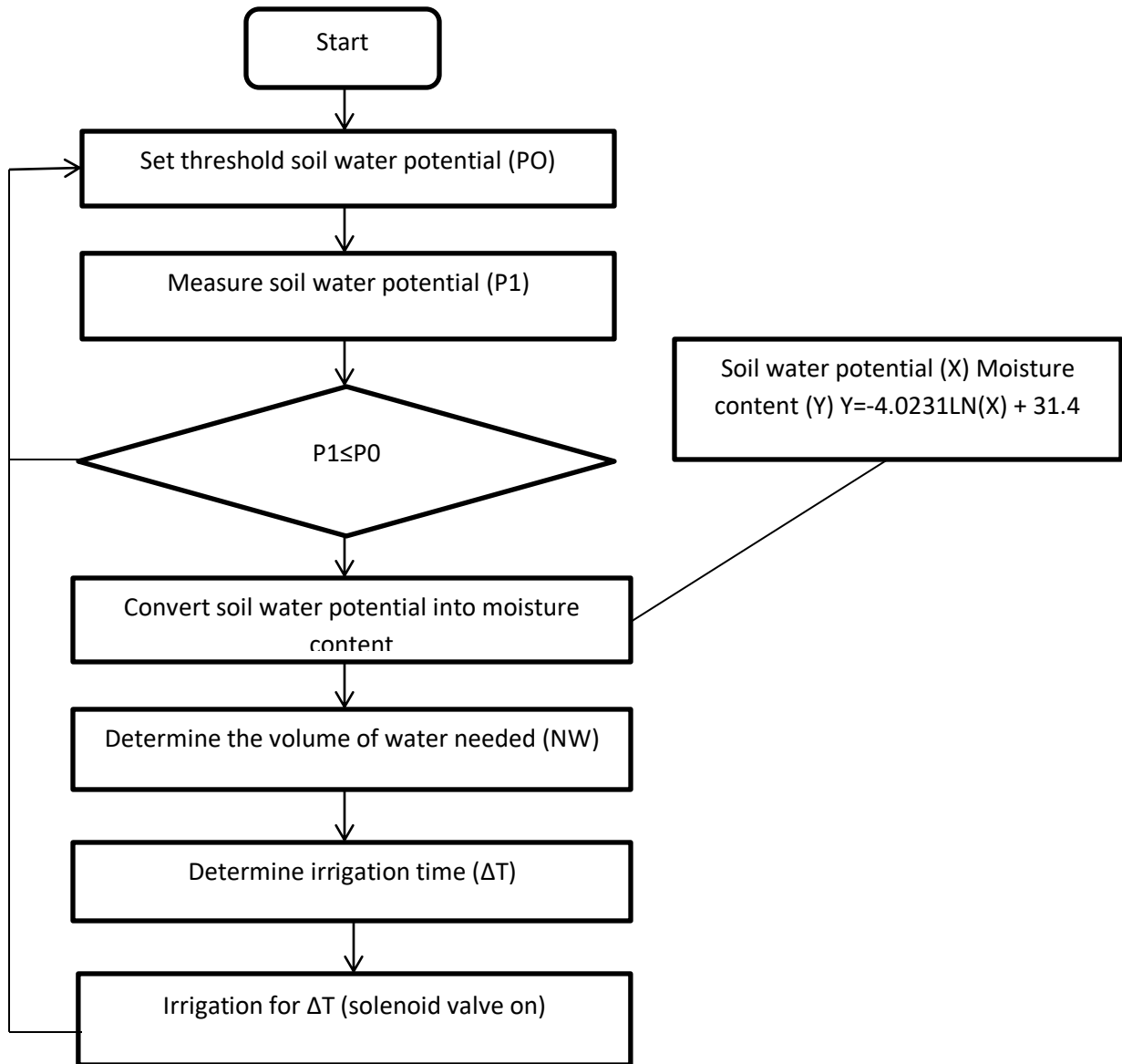
In this project we are using Arduino UNO to control the motor. The irrigation system will operate by setting the time and with the assist of moisture soil sensor to measure the level of soil moisture and the signals to Arduino if watering is required. The motor or water pump supplies water to the plants until the desired moisture level is reached. To complete the system by using Arduino UNO, it has a concept flow to make the system better and efficient. After that, the coding of Arduino UNO are set up by using Arduino software which is time and moisture of soil are been control by the Arduino systems. For the time; watering plant start at 8.00 a.m. until 6.00 p.m. but it's depend on the soil moisture.

NUMBER 3 - Support your answer with a flowchart and an algorithm

FLOWCHART



ALGORITHM



NUMBER 4 – Draw the top-down or Bottom-up design approach of the application

BOTTOM-UP DESIGN APPROACH

