ROSE-HULMAN INSTITUTE OF TECHNOLOGY

Plant Environment Device

ME430 Project Report

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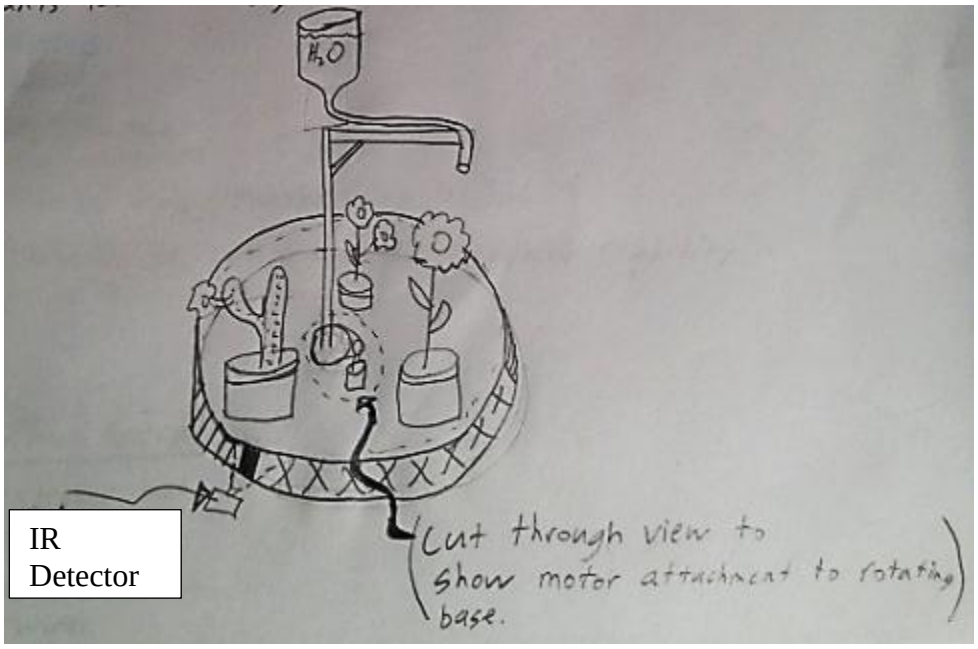
Contents

Description

The proposed device will be designed to water a group of plants on a predetermined schedule. The system will rotate to allow each plant to be watered. The device will be rotated using a dc motor and will be able to determine a plants location using a predetermined center point. The center point will be set using an IR detector that will set the system to "home" at the first IR emitter it detects. It will then be able to detect each plants location using other IR Emitters given a location number based on the home position.

Concept Idea



Inputs

- Time
- IR Detector
- Photo Sensor

Outputs

- Water dispenser valve
- DC Motor
- IR Emitters

Parts List:

Electronic Parts:

Name	Quantity	Link to Purchase Location	Picture	Unit Cost	Total Cost
DC Motor	1	https://www.sparkfun.com/products/8912		12.95	12.95
Servo	1	https://www.sparkfun.com/products/9064		12.95	12.95
1/4” Valve	1	http://www.menards.com/main/plumbing/rough-plumbing/installation-maintenance/supply-valves/1-4-quick-connect-x-1-4-quick-connect-valve-straight/p-1713684-c-9415.htm		5.23	5.23
IR Detector/Emitters	1-3			Mechtronics Lab Kit	0
				Total Cost	$31.13

Easy accessible Parts:

- Bottle
- Tubing
- Gears or Pulleys
- Plants
- Lazy Susan

Already Acquired Parts:

- PIC Controller
- Diodes
- Capacitors
- Breadboard
- Resistors
- Wires

Goals/Extras

Minimum Goal:

- To have a plant sustainability device water and rotate plants on a given schedule.

Extra:

- If we have more time, we would like to add a photo sensor that rotates the plants toward the sun.
- Also, we would like to add a way to dispense plant fertilizer, if time is still available.

Completed Project

Figure 1 Team Picture with Completed Project

The completed plant watering device was an overall success. Our device was programmed to be able to water a group of plants on a predetermined schedule. In order to do this we built a lazy susan incorporating the following components. The valve system was water fed by gravity and relied on a servo that rotated a cut off valve. The lazy susan was driven by a 100:1 dc motor using pulse width modulation that ran a pulley. In order to find each plant, we had to abandon our original idea of using a light to frequency sensor. As an alternative design we created an IR detection system. Our devices was then able to detect each plants location using multiple IR Emitters mounted to the lazy susan and a single IR detector using analog to digital conversion. The PIC board controlled each of these input and output devices using two different timers. One timer controlled the time between the process of feeding the plants. The second timer controlled to amount of time that the valve stayed open to water the plant.

Figure 2 Top-down view of the Final Project

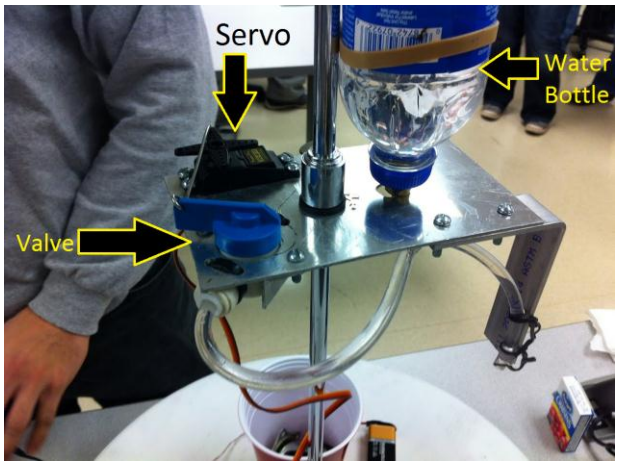


Figure 3 Side view of the Servo and Valve System

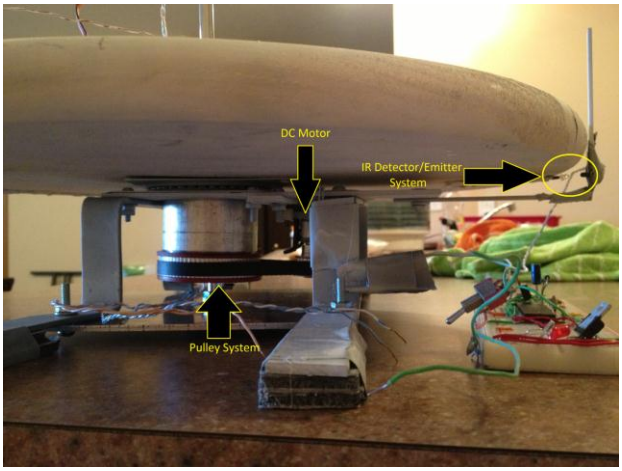


Figure 4 Side View of the DC Motor and Pulley System for the Lazy Susan