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Project Title: Rainfall Inches Measuring Machine (RIMM)

Github: https://github.com/DRojasCSUCI/RIMM_Rainfall-Inches-Measuring-Machine

Project Description:
The goal of this project is to develop a web interface integrated system which would deploy a motor and a water sensor, both controlled by a SBC (Single-Board Computer) such as a Raspberry Pi or a MCU (Microcontroller Unit) such as an Arduino. The objective of this system is to build a machine which would measure the amount of rainfall in an hour. This machine would stay running as long as needed by pouring out the water in it's rain collector every hour.

Motivation:
The reason why I designed this project is because over the recent years I have seen less and less rainfall occur in Santa Barbara County, CA. I remember when I was in elementary school how much more often and harder it would rain in the city of Santa barbara and Goleta. However as time has gone on, my favorite weather seems further away from this county's grasp. Therefore, I decided that the first fundamental step to resolve this environmental issue would be to first measure the amount of rainfall year-round in various parts of the county. This is where this project comes in. Favorably, this machine would be placed in a multitude of uncovered areas where rainfall would reach it. By having many spread out over a wide area, we can get a better grasp on which areas are more affected by droughts or too much rainfall. This data could be used to assist prevention efforts for wildfires or hillside structural collapse.

Physical Components Required:
- (Necessary) Water Sensor
- (Necessary) Motor / Lever
- (Necessary) Controller Device (RPi Board / Arduino Board)
- (Necessary) Rain Collector Container
- (Necessary) Power Source (Battery / Electric Socket)
- (Necessary) Needed Electrical Components (Resistors, Wiring, ADC, etc...)
- (Recommended) Water-Proof Protection from Rain, Condensation, Etc... (Casing, etc...)
- (Recommended) Filter To Keep Foliage / Debris Out Of Collector Container

Hardware Level:
The controller device will probably need to receive power from a battery pack because portability of the system could be crucial. This would then mean that the motor and water sensor must also receive power from the controller board because it will connect to the entire system's power supply. Furthermore, the motor must also interact with and control the rain collector container. This could be either done by creating a cup holder connected to the motor, or by designing a custom container which would fit around the motor itself. The water sensor, I have decided, will be located in the container where the rain will be collected. It is important to note that it must be first calibrated to map what resistance readings equate to what volume of water. Or in this case, inches of rainfall. This of course depends on the dimensions of the container used. Other supplementary necessary electrical components such as resistors or signal converters have not been decided upon yet. I am unsure if I will have time to implement water-proof prevention mechanisms to this machine, but ideally we would need the board to be enclosed in an airtight case which would also be required to provide a cooling mechanism for the electronic components inside.

Software Level:
The controller device is responsible for not only moving the motor, but also for reading the measurements from the water sensor. The web interface will most likely be used to interface with a database which would hold the data for one or more machines, over many dates. I also plan for the web interface to display the current reading of every machine connected to it. This value would be updated periodically. If given enough development time, the period would be able to be modified through the web interface. Due to a development time limit of approximately one month, the web interface will most likely be done using CSU Channel Islands's CI Keys service, which is used to create / manage domains and websites. If interfacing between the controller board and this service proves impossible, then I will need to host a simple web server on the controller board instead. Another alternative would be to create a docker container to simulate a web server, however this would provide limited networking because it would not be connected to a Wide Area Network, only a Local Area Network. I plan to use Python as the programming language for this project. Why? Simplicity and experience.

Planned Schedule:

DATE	GOAL DESCRIPTION	MILESTONE
Friday, October 28, 2021	Formulate Project Idea and Create Proposal Document.	Project Proposal
Friday, November 4, 2021	Connect the Water Level Sensor and Motor to the controller device. Test that they all work correctly and are not malfunctioning.	
Friday, November 11, 2021	Design a container that will hold the liquids. Incorporate it into the system by Mapping Water Level Sensor and by attaching to the motor.	
Friday, November 18, 2021	Create the web server. Create a Progress Report.	Progress Report
Friday, November 25, 2021	Interface with the web server to finish the project. Ensure it is all working correctly.	
Friday, December 3, 2021	Create the Final Report. If time allows, implement one or more recommended features.	Final Report