

# Microavionics Final Project Proposal (5067)

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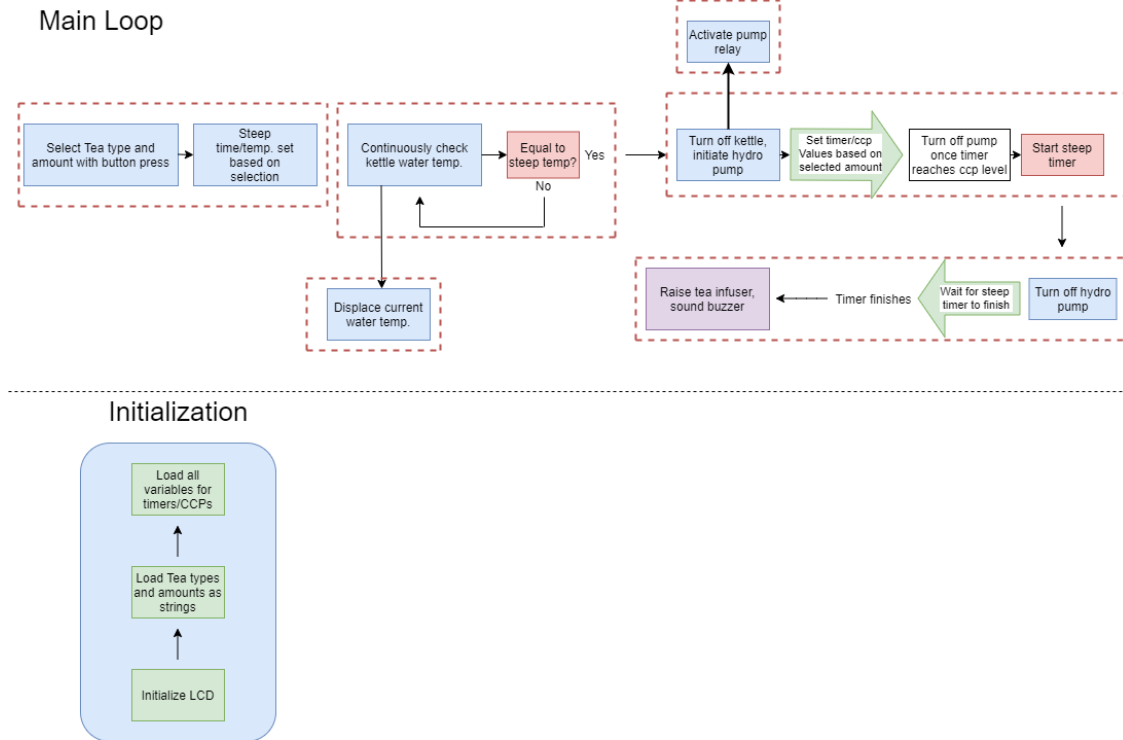
**Due 10/6/20**

## **A. Proposed Project Description**

The final project will be an automated tea making system. Inputs to the system include amount and type of tea. The system will utilize an external temperature sensor, hydro pump to moderate the steep temperature and time of the tea, and a servo/stepper motor. As the heated water reaches the predetermined temperature set by the users choice of tea, the hydro pump will begin adding water to the tea pot. Input from the user specifying how much tea is desired will set different timer values in order to run the pump for different times. As water is heated and measured, the temperature will be output to the LCD. The flow rate of the pump will be used to run the pump for the appropriate amount of time to pump the desired amount of water. Once enough water has been added to the pot, the hydro pump will turn off, the steep timer will start and be output on the LCD. Once the steep time has been reached, a servo/stepper motor will lift the tea infuser out of the tea pot, and a buzzer will sound alerting that the tea is ready.

The core functionality of this project consists of reading water temperature from a kettle, determine when it is hot enough, then pump water into a tea pot. User input defines how long the tea will steep, and an actuator will remove the infuser from the tea pot. Overall the project must be able to use a 1-wire thermometer, output data to the LCD, generate PWM signals, and send control signals for motors/relays. Additional aspects of the project if time permits include using a hotplate and a relay in order to control temperature to the kettle, as well as using a small stepper motor with a motor driver to lift the infuser out of the tea pot. Possible off ramps include removing the temperature output to the LCD, reducing number of different tea types and inputs to the system, and/or removing functionality of removing tea infuser from the tea pot.

## B. Software Flow Chart



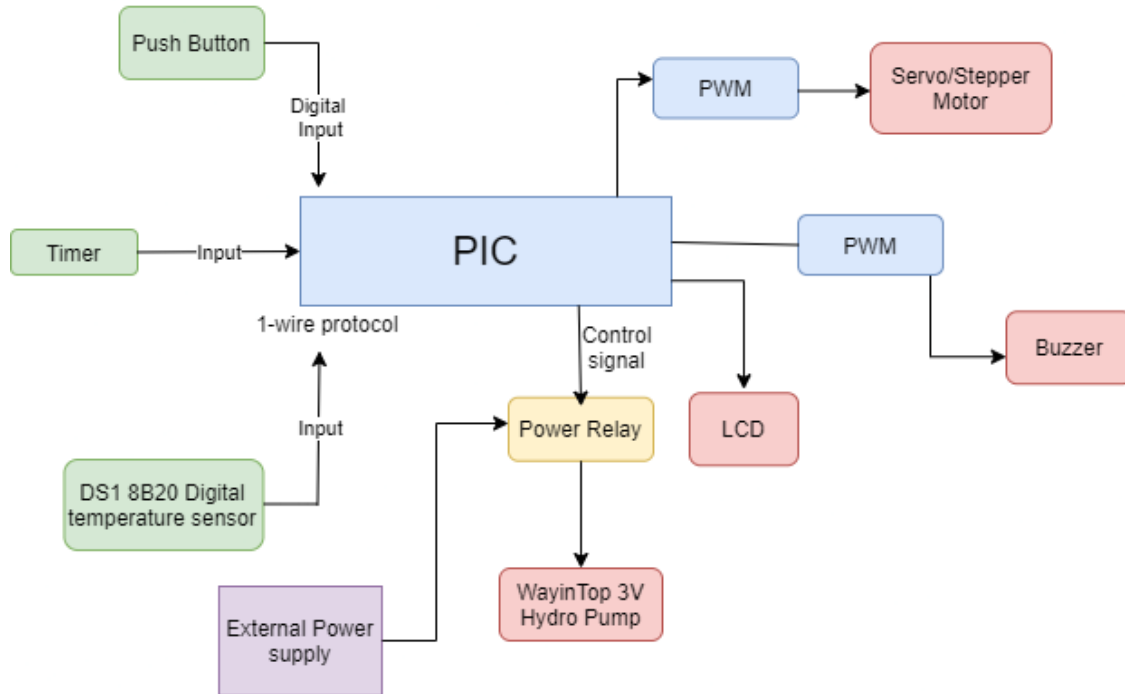
**Fig. 1** The chart above shows the high level software flow for the project as a whole

## C. PIC Resources Used

This project will utilize the LCD, Buzzer, I/O pins, and push buttons on the board.

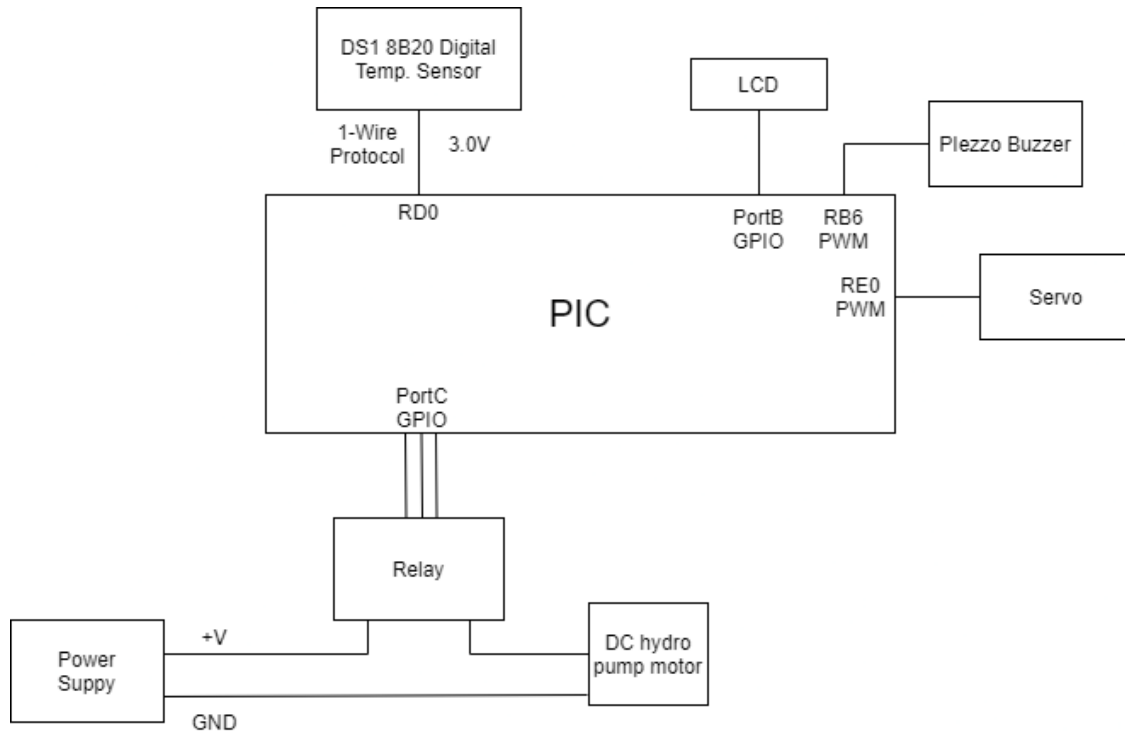
#### D. Functional Block Diagram

### Functional Block Diagram



**Fig. 2** The block diagram above shows the high level functionality of the board and peripherals for the project

Not shown above in the FBD is the integration of the temperature sensor and water pump with the tea kettle. Since water will no longer need to be poured out of the spout of the tea kettle, the nylon tubing for the water pump and the wiring for the temperature sensor will be routed through the spout. The temperature sensor will be suspended in the water and the end of the tubing will sit just above the bottom of the kettle.



**Fig. 3** The block diagram above shows the high level functionality of the board and peripherals for the project

Component	Manufacturer\ Part NO.	Price	Order Status
Temperature Sensor	Adafruit 1528-1592-ND	\$9.95	Ordered
Hydro Pump	WayinTop N/A	\$12.99	Ordered
Power Relay	SainSmart 101-70-100	\$9.66	Ordered

#### 1. Order Links

[https://www.adafruit.com/shopping\\_cart](https://www.adafruit.com/shopping_cart)

[https://www.amazon.com/SainSmart-101-70-100-2-Channel-Relay-Module/dp/B0057OC6D8/ref=sr\\_11?dchild=1&keywords=SainSmart+relay&qid=1604796225&sr=8-1](https://www.amazon.com/SainSmart-101-70-100-2-Channel-Relay-Module/dp/B0057OC6D8/ref=sr_11?dchild=1&keywords=SainSmart+relay&qid=1604796225&sr=8-1)

[https://www.amazon.com/WayinTop-Submersible-Flexible-Fountain-Aquarium/dp/B07TMW5CDM/ref=sr\\_112?dchild=1&keywords=micro+water+pump&qid=1604794831&sr=8-12](https://www.amazon.com/WayinTop-Submersible-Flexible-Fountain-Aquarium/dp/B07TMW5CDM/ref=sr_112?dchild=1&keywords=micro+water+pump&qid=1604794831&sr=8-12)

#### E. Status and Concerns

Currently the progress of the project is the planning that is detailed in the proposal, and pseudocode will begin to be written shortly. Parts are on order for the project and should be arriving within the next week. The biggest concern for this project is the complexity in dealing with 1-wire protocol for the temperature sensor and the time it may take to develop the code to interface with it. To mitigate this, this aspect of the project will be the first to be developed so as to allow time for debugging and help. Another concern for this project is the overall difficulty being too easy. Due to untimely specification realizations, the water level component of the project was removed. The solution was to instead measure water via a software implementation of different timers to control the pump for different times based on the

desired amount of tea. I'd like to meet with Trudy to discuss if this is a suitable replacement since it makes the project more software heavy, or if a hardware replacement is necessary.