

- (a) The module should take sensor data as an input.
- (b) The control module should determine the actuation required from the sensor data depicting the current state of the system.
- (c) The control module should provide appropriate signals to allow for the required actuation.

2. Non-functional requirements.

The algorithm should be straightforward and allow for direct implementation.

3.4.2 Control Algorithm

The control algorithm is as shown in figure 3.2 below.

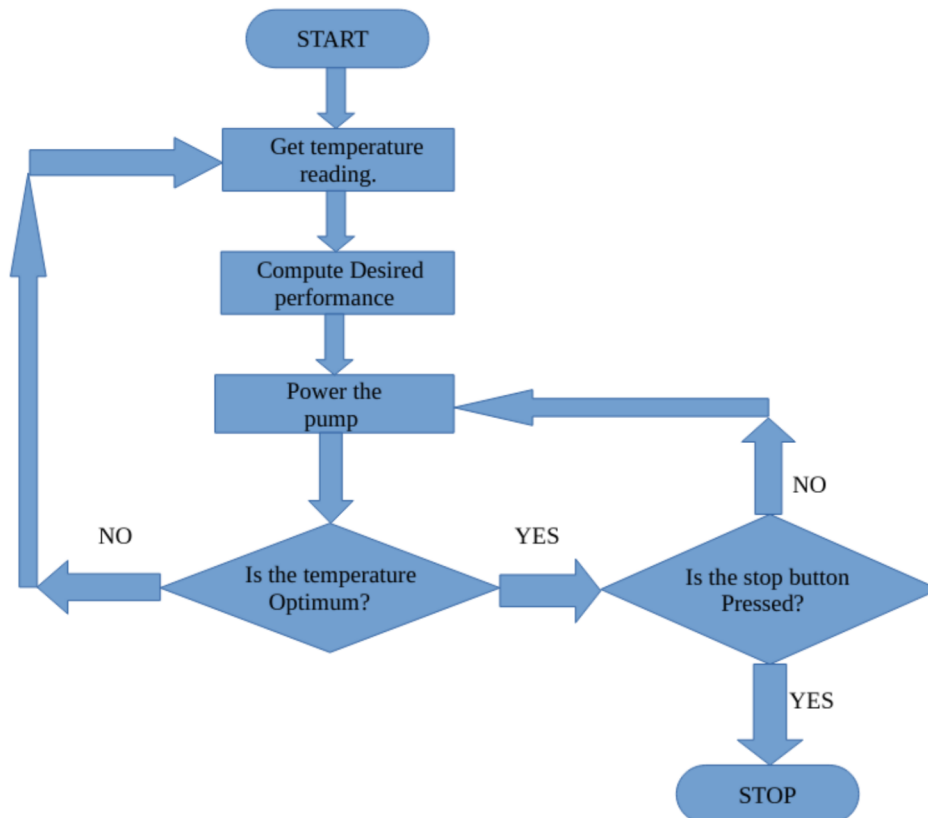


Figure 3.2: Program Flow Chart

3.4.3 Data collection

1. Modelling and simulation

The control algorithm will be modelled using computer software and different algorithms simulated and responses observed. The data collected will be visualized to compare input signals and the responses that consequently occur.

2. Experimental testing

The fabricated mechanism will undergo iterative testing to acquire the optimum tuning parameters of the control algorithm.

3.4.4 Data analysis

The data from the simulation will allow for the determination of the most appropriate control algorithm to be used in implementing the dynamic cooling rate. This will then be actualized through firmware to be run on the system's microcontroller.

4 Expected Outcomes

The expected outcomes are:

1. Mechanical structure with consisting of a combustion chamber with a cooling jacket and a plumbing to achieve the cooling system.
2. Electrical system to power the sensors, microcontroller, valves and pumps.
3. A control algorithm to achieve closed loop cooling control.

4.1 Time plan

TASKS	TIME							
	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Literature review								
Research proposal								
Design								
Simulation								
Presentations								
Presentations								
Material acquisition								
Fabrication								
Testing								
Final presentation								

Table 4.1: Time plan

4.2 Budget

	Item	Description	Cost per unit(Kshs.)	Total(Kshs.)
1	Chamber material	Machining purposes	5000	5000
2	Pump	Fluid flow	5000	5000
3	Microcontroller	Function control	2000	2000
4	Valves	Flow control	2000	2000
5	Assorted sensors	System state	2000	2000
6	Assorted electronics	Electronic wiring	1000	1000
7	Plumbing fittings	Fluid flow	2000	2000
8	Coolant tank	Stores the coolant	3000	3000
				22000

Table 4.2: Budget

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