

Design and Fabrication of an Automated Discharge Collection Unit of the Synthetic Hydro- Experimental Machine

**FYP-18-3
Project Presentation**

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Presentation Outline

- Objectives
- Deliverables
- Final Design

Designs | Exploded View.

- Production Plan

Currents Tasks | Next Tasks

- Accomplished Tasks

Synthetic Hydro-Experimental Machine



Introduction: Objectives

Main Objective

To automate the discharge collection process of the Synthetic Hydro-Experimental Machine.

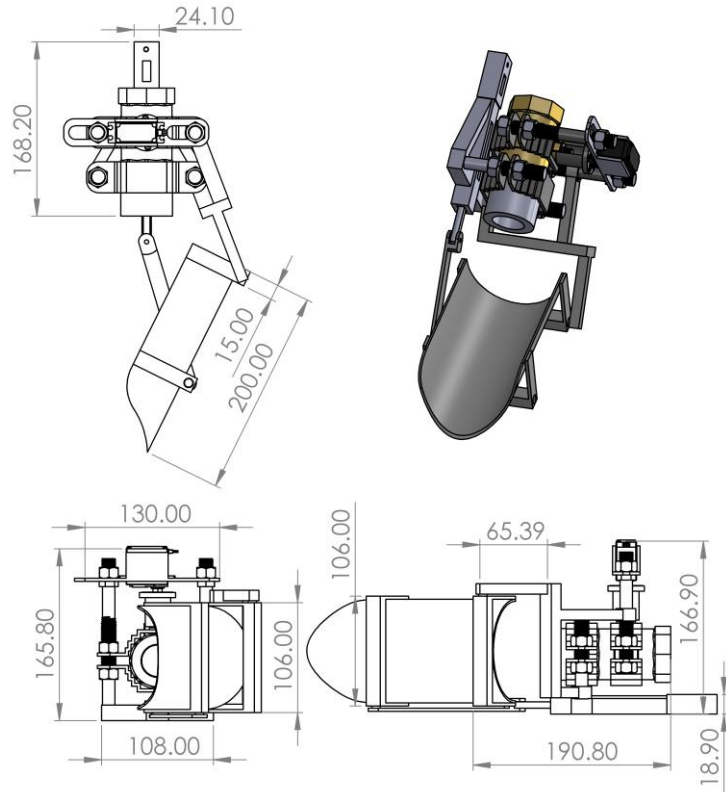
Specific Objectives

- To design an automated discharge flow control unit that can turn the ball valve in steps of less than 1° and divert the flow in less than 1 second.
- To design and fabricate a discharge handling unit with automated weight, time, and temperature measurements, and a discharge collection tank that can discharge in the shortest time possible.
- To design a graphical user interface and a robust control algorithm to integrate the units

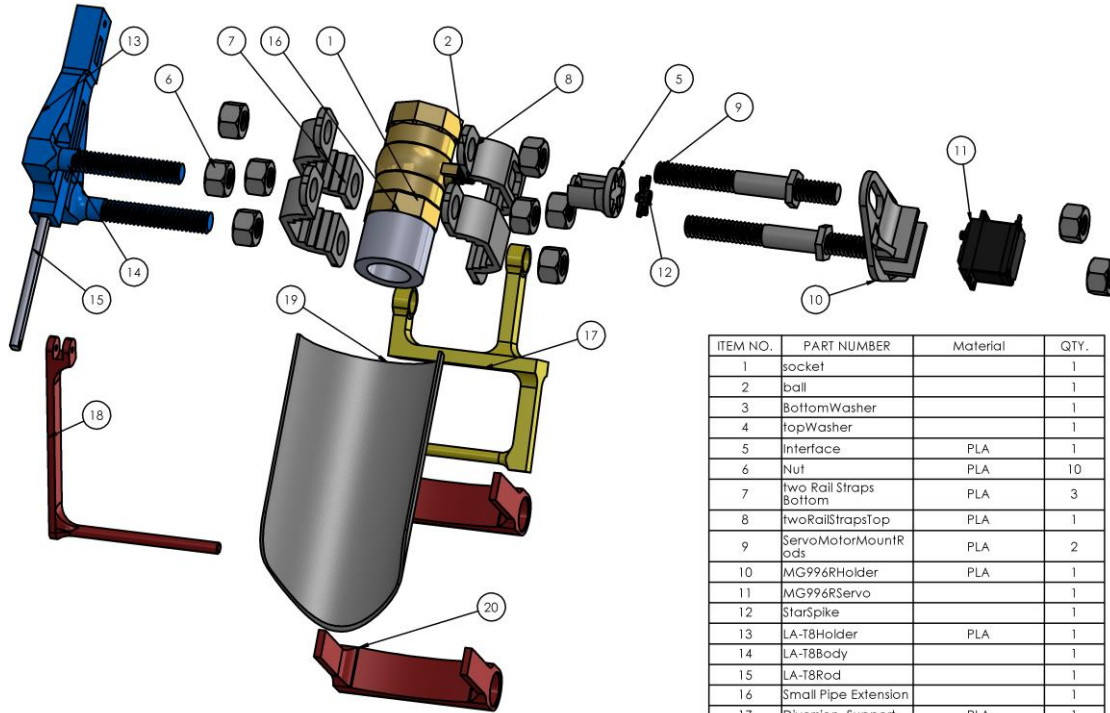
Deliverables

Deliverable	Status
A discharge flow control mechanism that can turn in steps of less than 1 degree.	
A diversion mechanism that can divert in less than a second	
A discharge collection tank can collect more than 0.02m ³ of the discharge.	
A weight measurement device with a gauge factor of more than 2.	
A graphical user interface for controlling the system and displaying the results.	

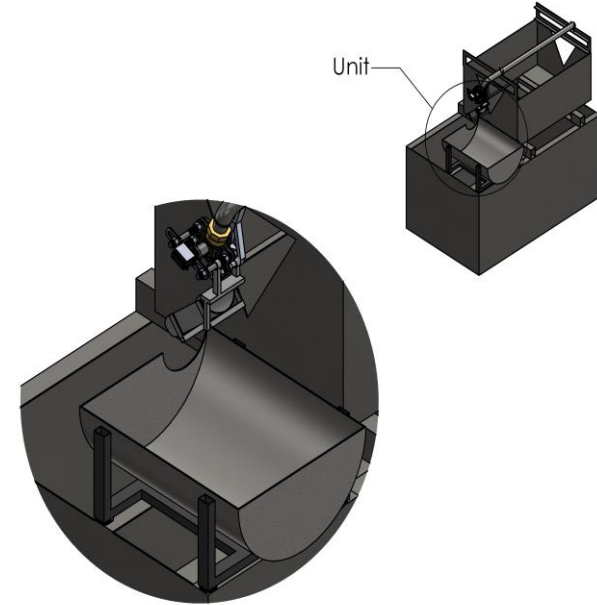
Final Design



Final Design



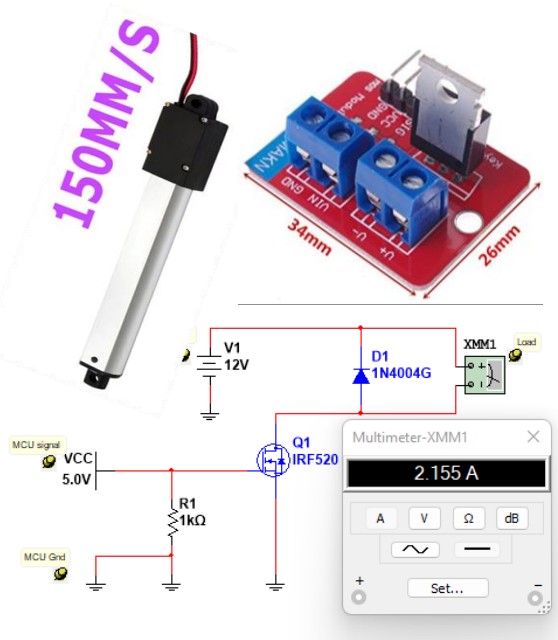
ITEM NO.	PART NUMBER	Material	QTY.
1	socket		1
2	ball		1
3	BottomWasher		1
4	topWasher		1
5	Interface	PLA	1
6	Nut	PLA	10
7	two Rail Straps Bottom	PLA	3
8	twoRailStrapsTop	PLA	1
9	ServoMotorMountRods	PLA	2
10	MG996RHolder	PLA	1
11	MG996RServo		1
12	StarSpike		1
13	LA-T8Holder	PLA	1
14	LA-T8Body		1
15	LA-T8Rod		1
16	Small Pipe Extension		1
17	Diversion Support	PLA	1
18	Kinematic Link 2	PLA	1
19	flap	PLA	1
20	FlapHolder	PLA	2



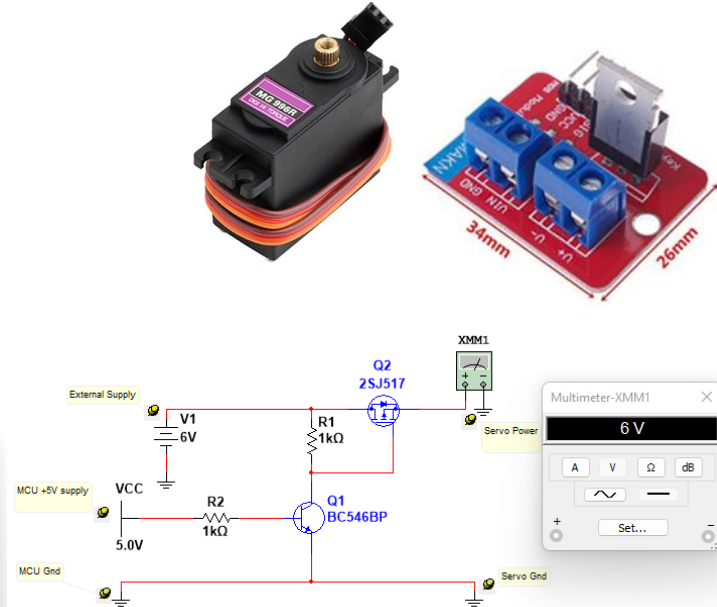
DETAIL Unit
SCALE 1 : 10

Final Design: Electrical

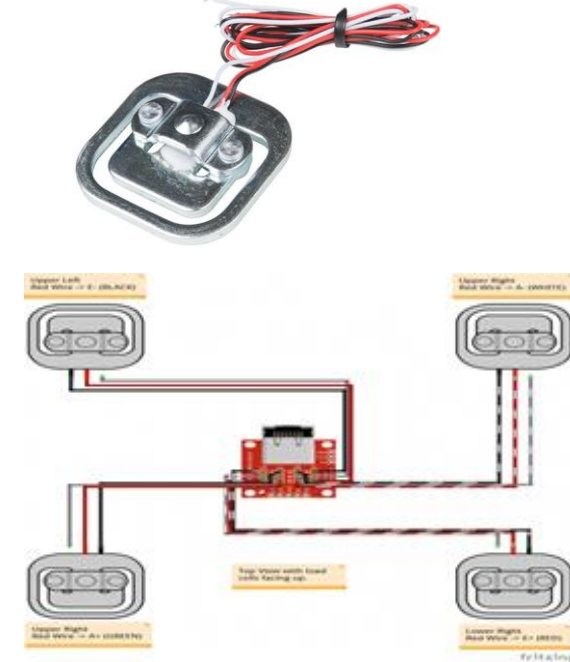
LA-T8 Micro-linear actuator



MG996R Servo motor



50Kg Strain-type load cells



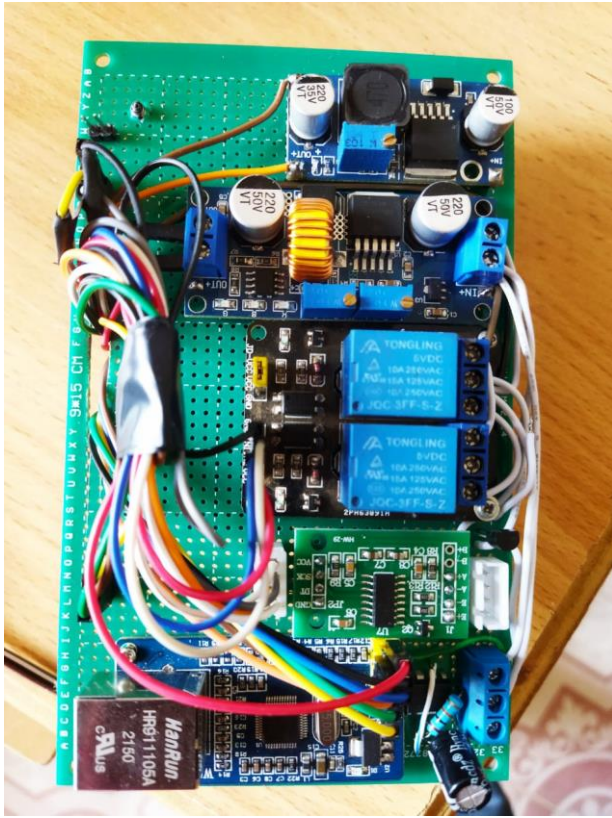
Production Plan

Week		Tasks/Activities	Materials Required	Special Equipment	Simultaneous Activity	Status
1	Main activity	Acquisition of materials				
		a) Ordering.	Poly-Actic Acid(PLA)		Design for production	
		b) Scraps	Stainless Steel sheet			Done
2	Main activity	3D Printing(Discharge Flow Control)				
		a) Straps	PLA	3D printer	Circuit Assembly	Done
		b) MG996R Servo motor holder	PLA		GUI Development	
		c) Mounting rods	PLA			
		d) Interface	PLA			
		e) Nuts	PLA			
3	Main activity	3D Printing(Discharge Diversion)				Done
		a) LA-T8 Holder	PLA	3D printer	Circuit Assembly	
		b) Diversion support	PLA		GUI Development	
		c) Straps	PLA			
		d) Nuts	PLA			
		e) Flap holder	PLA			
		f) Flap	PVC			

Production Plan

Week	Tasks/Activities	Material	Special Equipment	Simultaneous Activity	Status
5	Main activ	Mechanical assembly on site		Firmware development	Done
		a) Flow control			
		b) Flow diversion			
		c) Discharge handling			
6	Main activ	Electrical Assembly			Done
		a) Circuit development			
		b) Circuit Assembly			
7	Main activ	Final Assembly and calibration		Testing	Ongoing
		a) Calibration			
		b) Testing			
		c) Ethernet Support			
8	Main activ	Ethernet Support		Troubleshooting	Ongoing
		a) Desktop GUI			
		b) Ethernet - Black_f407ve comm.			

Task Accomplished

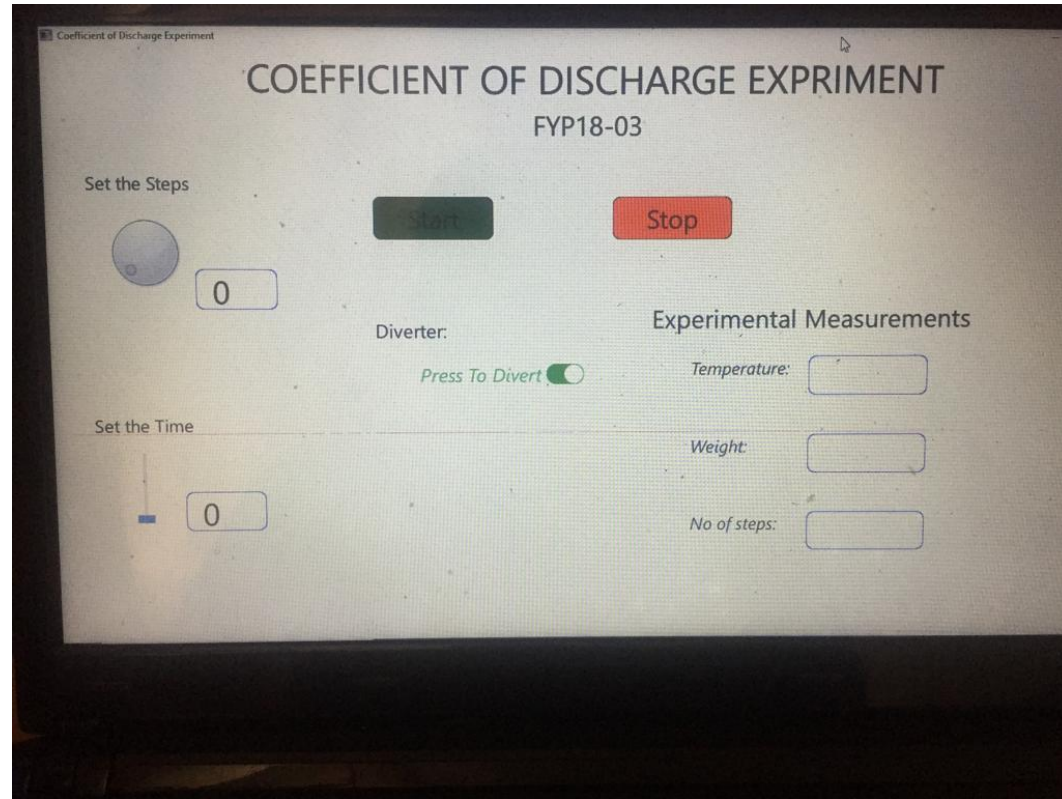


J. J. Mwimali, K.E. Koech: Design and Fabrication of an automated Discharge Collection Unit of the Synthetic Hydro Experimental Machine.

Tasks Accomplished



Task Accomplished



Task Accomplished

Project Firmware Source code.

<https://github.com/EricoDeMecha/FYP18-03-Software>



Budget

Item No	Item	Description	Unit Cost	Qty	Estimated Cost	True cost
1	Servo Motor	MG996R(4.8Kg/cm)	800	1	800	800
2	Linear Actuator	LA-T8 Linear Actuator	3500	1	3500	3500
3	Load cells	50 Kg Load cells	150	4	600	600
4	Load cell Amplifier	HX711	100	1	100	100
5	Temperature Sensor	DS18B20 Immersible	300	1	300	300
6	Solenoid valve	3/4" Plastic	900	1	900	X
7	MCU	STM32F407VET6	4400	1	4400	4400
8	LCD	320x240 Touch LCD	1200	1	1200	1200
9	Power MOSFET	IRF520 N-ch	550	3	1650	X
10	Voltage Regulator	XL4015 DC-DC adjustable buck module	400	3	1200	800
11	Transformer	AC 220V TO DC 12V 5A Transformer Power Supply	1100	1	1100	1100
12	Fabrication Cost	3D printing & Others	10000	1	10000	6000
Total					22600	18800

The image features a dense canopy of bright green maple leaves, with sunlight filtering through to create a soft, glowing effect. The leaves are primarily in the foreground, framing the central text. The background is a blurred mix of green and yellow, suggesting a sunlit forest floor. The text 'THANK YOU' is centered in a bold, black, serif font.

THANK YOU