

Ball Launching Design



Team 7
Team Slime
Name 1, Name 2, Name 3, Badhrie Sridhar

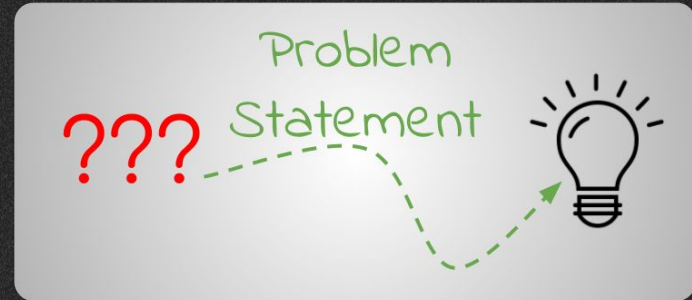
Fall 2022 // ME 250

Problem Statement

The team is tasked with building a ball launching mechanism.

Requirements:

- Ball becomes airborne
- Ball lands/sits in hole
- Feed 10 balls autonomously



Goals

Objectives

- Primary objective is to create a launching mechanism that continuously shoots 10 balls into the target accurately.
- Some of our sub-objectives are efficiency, low cost, accuracy, Environmentally friendly, reliable, and user friendly.

Constraints

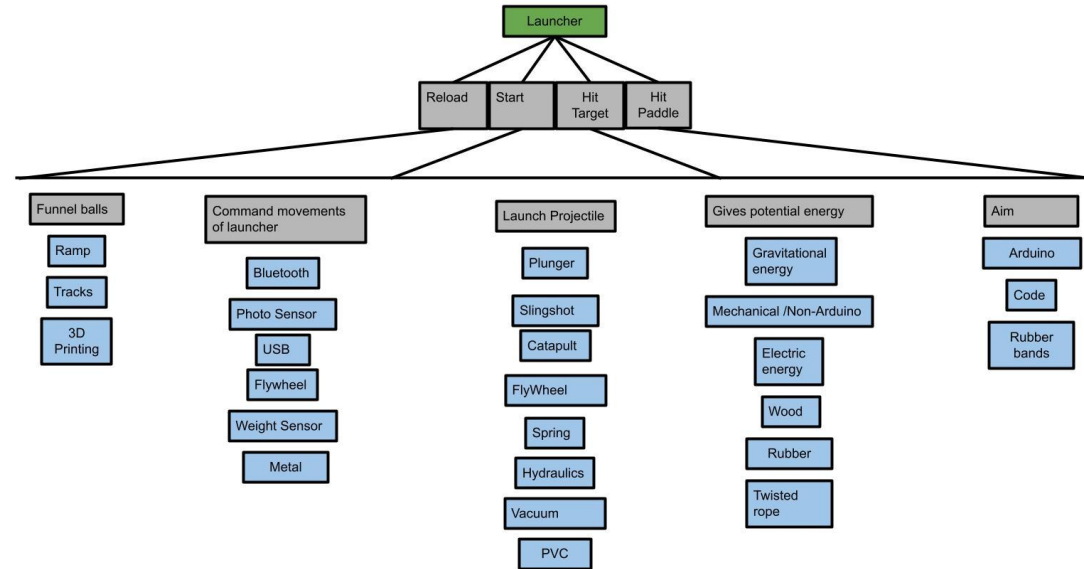
- No moving parts (excluding ping pong balls)
- Mechanism is autonomous
- 10 ping pong balls need to be launched into the air
- No more than 4 motors can be used
- Mechanism must not take longer than 3 minutes
- Mechanism must stay in specified area
- No commercial products
- Design must be original
- Device must be submitted by week 15



Function Means Tree

Primary Functions

- Launch
- Reload
- Hit Paddle
- Start
- Hit target
- Hit Paddle
- Funnel
- Send signals
- Use Potential energy



Morphological Chart

	Means 1	Means 2	Means 3	Means 4	Means 5	Means 6	Means 7	Means 8	Means 9	Means 10	Total # of Means
Launch	Plunger	Spring	FlyWheel	Hydraulics	gravity	servo	catapult	rubber bands			8
Reload	Electrical Energy	Gravitational Energy	Spring	Vacuum	Plunger	Servo	Switch				7
Start Device	Gravity	Switch	Light	Code	PhotoSensor	button					6
Hit Target	Arduino	PVC	Plastic	Aluminum	Nickel Silver	Glass	Stainless Steel	catapult	spring		9
Become Airborne	Photo Sensor	Weight Sensor	Fly Wheel	Wood	PVC	3D printing	Funnel				7
Funnel balls	Mechanical/Arduino	Ultrasonic Sensor	Tracks	Funnel	Sheet Metal	Servo	Gravity				7
Hit Paddle	Rubber Band	Catapult	FlyWheel	Plunger	Spring	Hyrdraulics	Gravity				7
Send Signals	USB	Bluetooth	Wires	Metal	Photo Sensor	Ultra Sensor	Scale	Servo Motor	Steppa Motor		9
Aim	Nickel Silver	Rubber	Sheet Metal	Tinplate	PVC	Arduino	Code	Servo	Gravity		9
Gives Structure	Glass	Metal	Plastic	glass	pvc	MDF	nickle silver	PLA plastic	Sheet Metal	acrylic	10
											840157920

Total possible outputs 840,157,920



Reduced Morph Chart

Function 1	Launch	Spring	FlyWheel	hydraulics	Firing Pin				4
Function 2	Reload	Electrical Energy	Gravitational Energy	sping	servo	plunger	Bolt		6
Function 3	Start Device	Electrical Energy	switch	code	light				4
Function 4	Hit Target	arduino	plastic	catapult	spring				4
Function 5	Become Airborne	weight sensor	spring	Flywheel	Photo sensor	3D printing	funnel		6
Function 6	Aim	Plunger	FlyWheel	Servo	Funnel				4
Function 7	Hit Paddle	catapult	spring	Flywheel	funnel	3D printing	hydraulics		6
Function 8	Send Signals	USB	wires	bluetooth	photo sensor	Code	Arduino		6
Function 9	Funnel balls	Aluminum	PVC	tracks	Funnel	servo	Wood	3D Printing	7
Function 10									2322432

Total possible outputs 2322432

Our top concepts

Concept 1

A spring catapult that used arduino and 3d Printed parts to launch the ball

Concept 2

A servo actuated trebuchet that used gravity to propel the ball

Concept 3

A nerf blaster style device that used 3d printed parts a spring and a plunger

Concept 4

A flywheel design that used a spinning disk as a feeding mechanism

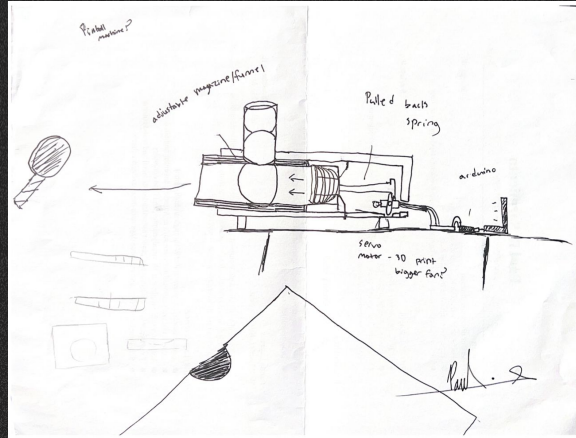
Concept 5

A flywheel based design that uses a servo and a funnel to feed the firing mechanism

Our penultimate designs

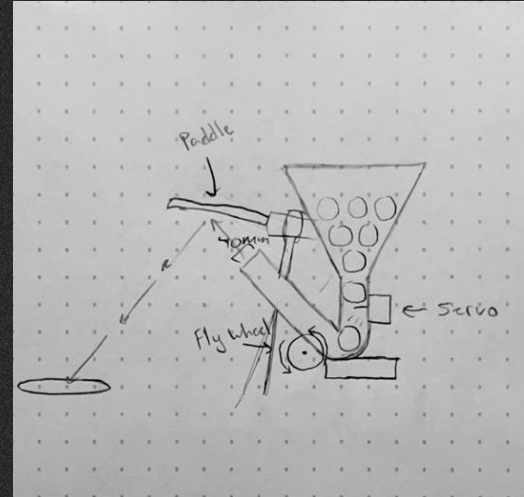
Spring and plunger design

Uses a compressed spring and plunger design to force air behind the ball propelling it with the springs potential energy



Fly Wheel Servo design

Gravity fed and uses a flywheels inertia to propel the ball upward into a paddle



OUR FINAL DESIGN CHOICE

CONCEPT 5

