

# Smash 'em Bash 'em Cyborgs

CIS 4820 Assignment 3

## Overall Game Idea

A first-person recreation of Rock 'em Sock 'em Robots, with additional flair. Two robots are battling to see who can score higher in sixty seconds. Each robot has the ability to punch left, punch right, block left, block right, and retreat to recharge their battery. Score is gained by successfully attacking the enemy, or successfully blocking the enemy's attack. Attacking and blocking will consume battery power, so each robot can retreat to their corner to recharge their battery once it has drained below 40%. From the corner, the robot can either advance forward willingly, or be forcefully thrust back into the fight once their battery is fully charged. If the robot's battery level drops to 0, they will be dazed for 3 seconds before being forcefully brought back to their corner to recharge.

Gameplay loops are balanced so that each fighting style has a drawback. Play heavy on your attacks and your battery will drain, forcing you to retreat. Staying back will thrust you back into combat, forcing you to stay in the action. Blocking incorrectly and getting hit will reduce your battery and net the opponent more points. The game features multiple enemy types with different play styles, which can be chosen as the desired opponent in the main menu.

## Game Level Layout

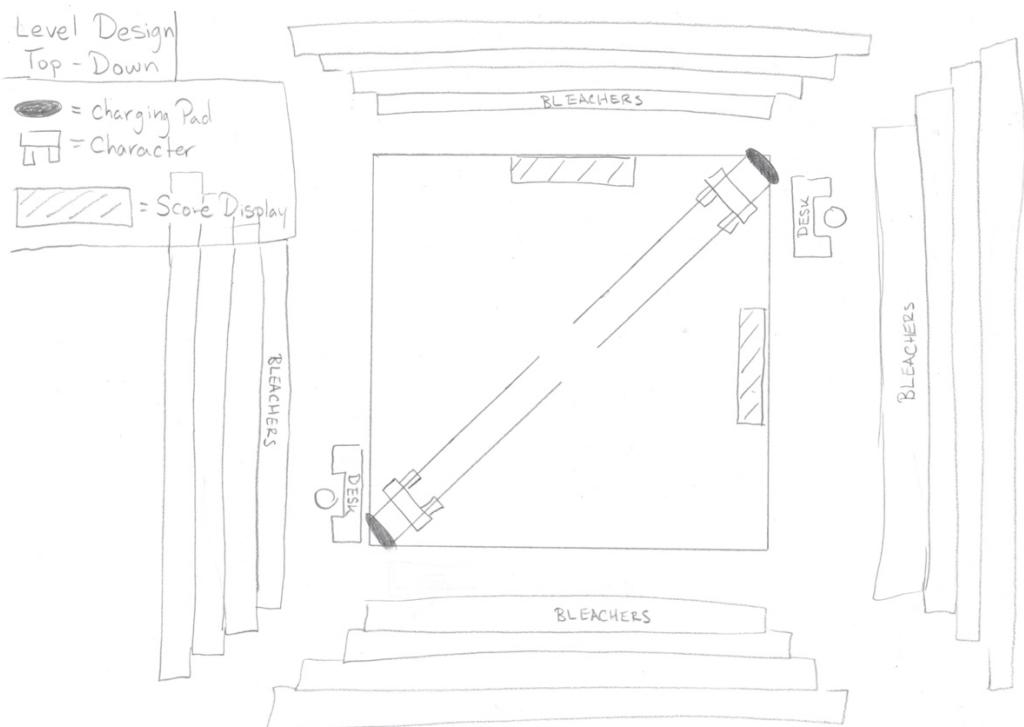
The game level is a futuristic boxing ring. The ring consists of two fighter's corners, as well as a rail along the floor that the robots are attached to. The rail allows the robots to slide toward each other from their respective corners. Each robot's corner is equipped with a wireless charger to recharge the fighter's battery level.

Diagram



Level Design  
Top - Down

● = Charging Pad  
■ = Character  
= Score Display



## Player Summary

### Controls

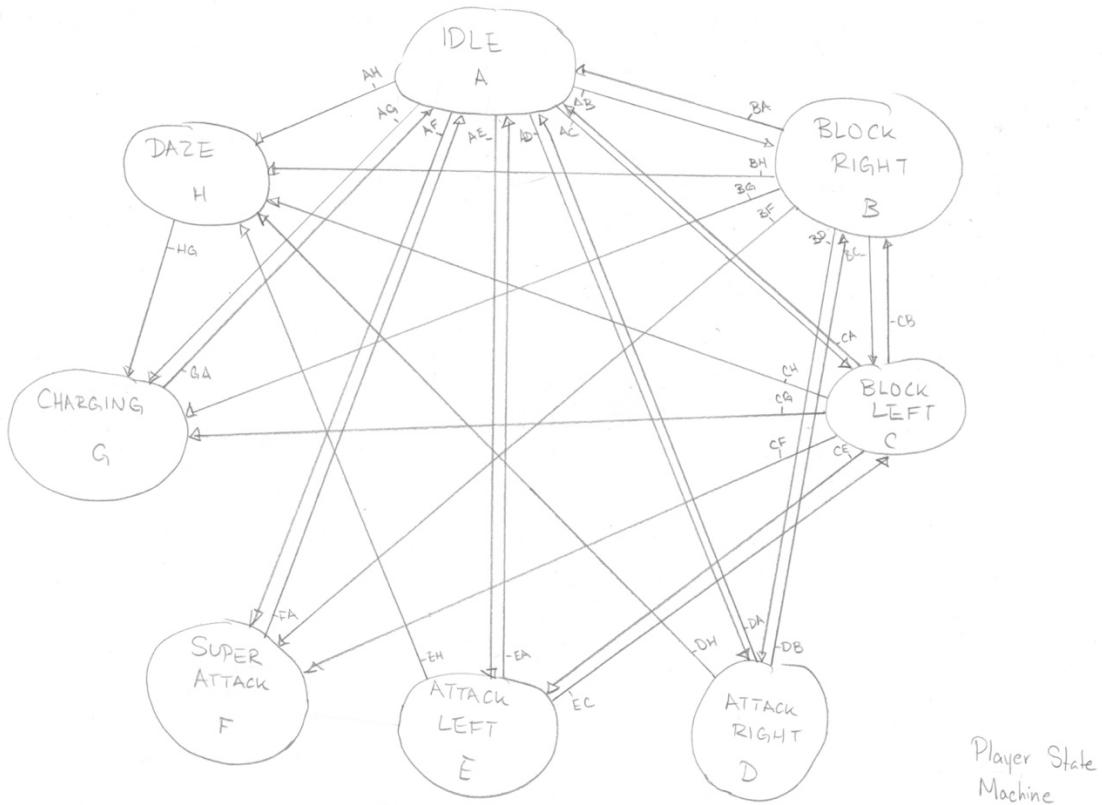
- Slide forward/Stop leaning (Center): W
- Slide backward (Retreat): S
  - o Only available when battery is below 40%
- Block left (BL): A
- Block right (BR): D
- Punch left (AL): Left mouse OR J
- Punch right (AR): Right mouse OR K
- Super attack (Super): Space
  - o Only available after successfully blocking 5 attacks

### Abilities

- Super attack:
  - o After successfully blocking 5 attacks, the player can retaliate and deliver a hard uppercut, knocking the enemy's head up (reminiscent of the original game) and launching them back into their corner to recharge.

### Player State Machine

- Animations will be wrapped inside of each state function.
- Key Inputs: BL, BR, Retreat, Center, AL, AR, Super (if this is true then the key is being pressed down)
- Booleans: SuperReady, IsFullBattery, IsLowBattery, IsDeadBattery, AttackFinished, IsLeft, IsRight, IsDazed

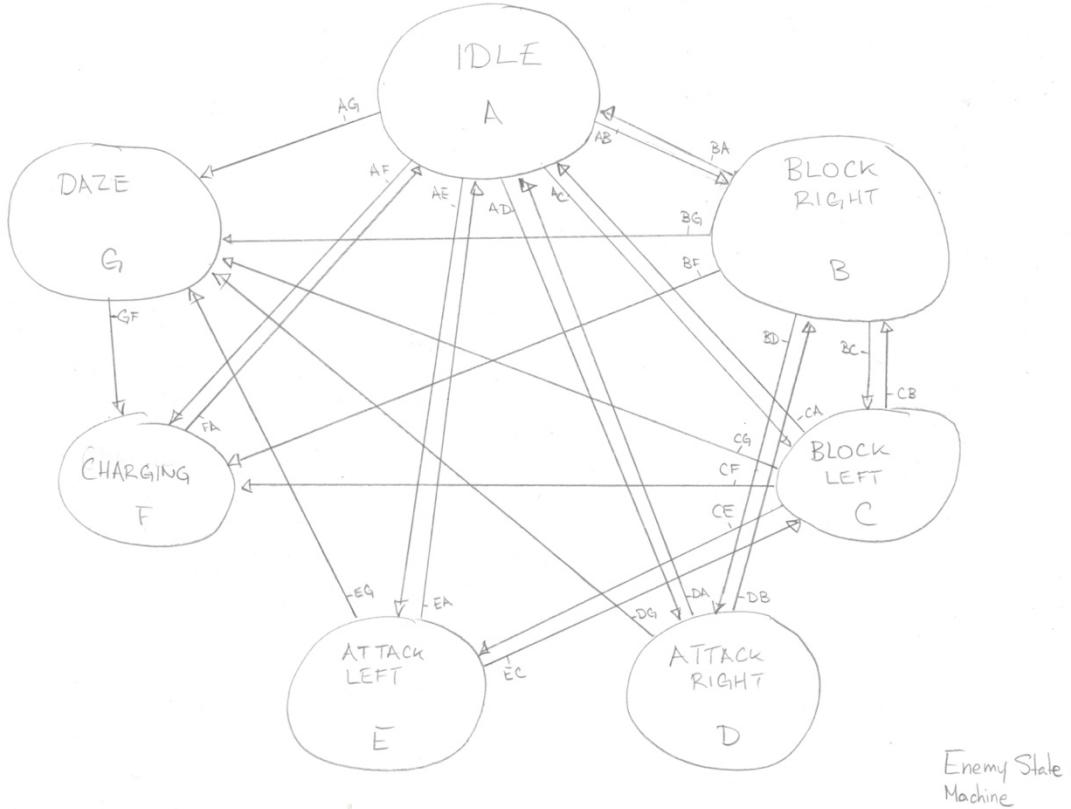


ID	State	Next State	Condition
AB	IDLE	BLOCK RIGHT	BR && !IsDeadBattery
AC	IDLE	BLOCK LEFT	BL && !IsDeadBattery
AD	IDLE	ATTACK RIGHT	AR && !IsDeadBattery
AE	IDLE	ATTACK LEFT	AL && !IsDeadBattery
AF	IDLE	SUPER ATTACK	Super && SuperReady && !IsDeadBattery
AG	IDLE	CHARGING	Retreat && IsLowBattery && !IsDeadBattery
AH	IDLE	DAZE	IsDeadBattery
BA	BLOCK RIGHT	IDLE	Center && !IsDeadBattery
BC	BLOCK RIGHT	BLOCK LEFT	BL && !IsDeadBattery
BD	BLOCK RIGHT	ATTACK RIGHT	AR && !IsDeadBattery
BF	BLOCK RIGHT	SUPER ATTACK	Super && SuperReady && !IsDeadBattery
BG	BLOCK RIGHT	CHARGING	Retreat && IsLowBattery && !IsDeadBattery
BH	BLOCK RIGHT	DAZE	IsDeadBattery
CA	BLOCK LEFT	IDLE	Center && !IsDeadBattery
CB	BLOCK LEFT	BLOCK RIGHT	BR && !IsDeadBattery
CE	BLOCK LEFT	ATTACK LEFT	AL && !IsDeadBattery
CF	BLOCK LEFT	SUPER ATTACK	Super && SuperReady && !IsDeadBattery
CG	BLOCK LEFT	CHARGING	Retreat && IsLowBattery && !IsDeadBattery
CH	BLOCK LEFT	DAZE	IsDeadBattery
DA	ATTACK RIGHT	IDLE	AttackFinished && !IsRight && !IsDeadBattery
DB	ATTACK RIGHT	BLOCK RIGHT	AttackFinished && IsRight && !IsDeadBattery
DH	ATTACK RIGHT	DAZE	IsDeadBattery
EA	ATTACK LEFT	IDLE	AttackFinished && !IsLeft && !IsDeadBattery
EC	ATTACK LEFT	BLOCK LEFT	AttackFinished && IsLeft && !IsDeadBattery
EH	ATTACK LEFT	DAZE	IsDeadBattery
FA	SUPER ATTACK	IDLE	AttackFinished
GA	CHARGING	IDLE	IsFullBattery    Center
HG	DAZE	CHARGING	!IsDazed

(Player State Machine)

## A Note on Enemy Behaviour

- All Enemies use the same transition diagram shown here, as their transition conditions are updated programmatically using the below weighted transition table.



- Enemies will sometimes randomly select a next state from a list of available states, using a weighted percentage. If the next state is unavailable to transition into, then it will be represented as "-". This transition will only occur every X seconds (defined as an enemy's attack cycle).
  - o I.e., from IDLE there is a 25% chance to block right, 25% chance to block left, 20% chance to attack left, 20% chance to attack right, and 10% chance to stay idle
  - o This will be represented in a weighted table like so:

Current State	Next State						
	IDLE	BLOCK RIGHT	BLOCK LEFT	ATTACK RIGHT	ATTACK LEFT	CHARGING	DAZE
IDLE	10	25	25	20	20	-	-
Charge Available	5	20	20	15	15	25	-
BLOCK RIGHT	25	10	25	40	-	-	-
Charge Available	20	10	20	35	-	15	-
BLOCK LEFT	25	10	25	40	-	-	-
Charge Available	20	10	20	35	-	15	-
CHARGING	50	-	-	-	-	50	-

(Example Enemy Weighted Transition Table)

- Note: when charging is available, it will modify the current weighted values using the value provided in the cell. I.e., if charging is available, then IDLE -> BLOCK RIGHT has a 20% chance instead of 25%.
- Note: attacking and dazed functionality do not randomly assign next state, so they are omitted from this table.

## Enemy 1

The Terminated – “Hasta la vista, baby.”

### Overview

This enemy had its ocular circuits removed after stealing his owners motor oil. He's been used as a training dummy for years and has suffered severe wiring damage in his memory component. Due to this, he attacks slowly, does not respond to player input, and randomly moves between states with some strategy.

### Abilities

(Identical to player abilities, minus the super attack)

- The enemy can punch left, punch right, block left, block right, and retreat when his battery is below 40%.

### Behaviour

- Attack Cycle: 1.5 seconds
- Weighted Transition Table:

Current State	Next State						
	IDLE	BLOCK RIGHT	BLOCK LEFT	ATTACK RIGHT	ATTACK LEFT	CHARGING	DAZE
IDLE	10	25	25	20	20	-	-
Charge Available	5	20	20	15	15	25	-
BLOCK RIGHT	25	10	25	40	-	-	-
Charge Available	20	10	20	35	-	15	-
BLOCK LEFT	25	10	25	40	-	-	-
Charge Available	20	10	20	35	-	15	-
CHARGING	50	-	-	-	-	50	-

(Enemy 1 Weighted Transition Table)

### State machine

- Animations will be wrapped inside of each state function.
- String: PrevState (stores the name of the previous state)
- Booleans: IsDazed, IsLowBattery, IsDeadBattery, IsFullBattery, Idle, BL, BR, Charge, AL, AR

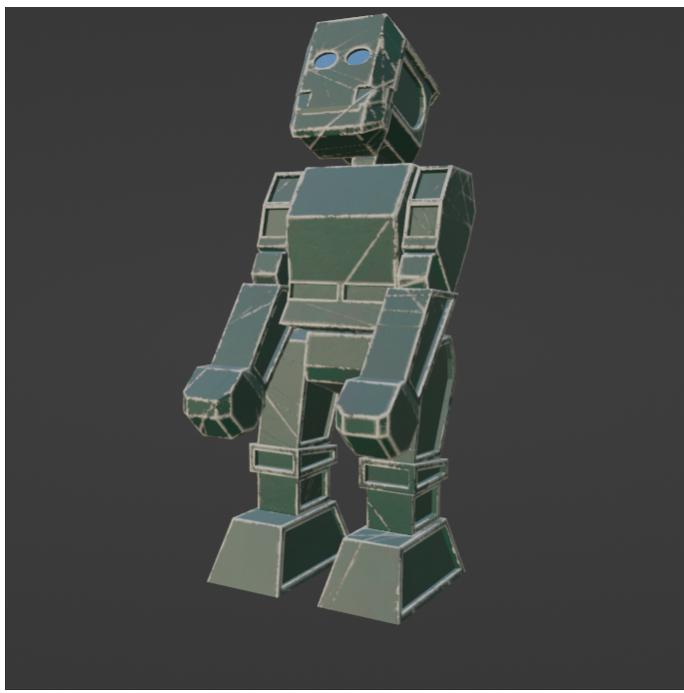
- Note: Idle, BL, BR, Charge, AL, AR are encoded in a 1-hot format, and relate to whichever weighted percentage was randomly chosen from the weighted transition table.
  - I.e. if currently IDLE and next state was randomly chosen as BLOCK RIGHT, the booleans would be encoded as follows:
  - Idle: F, BL: F, BR: T, AL: F, AR: F, Charge: F

ID	State	Next State	Condition
AB	IDLE	BLOCK RIGHT	BR && !IsDeadBattery
AC	IDLE	BLOCK LEFT	BL && !IsDeadBattery
AD	IDLE	ATTACK RIGHT	AR && !IsDeadBattery
AE	IDLE	ATTACK LEFT	AL && !IsDeadBattery
AF	IDLE	CHARGING	Charge && !IsDeadBattery
AG	IDLE	DAZE	IsDeadBattery
BA	BLOCK RIGHT	IDLE	Idle && !IsDeadBattery
BC	BLOCK RIGHT	BLOCK LEFT	BL && !IsDeadBattery
BD	BLOCK RIGHT	ATTACK RIGHT	AR && !IsDeadBattery
BF	BLOCK RIGHT	CHARGING	Charge && !IsDeadBattery
BG	BLOCK RIGHT	DAZE	IsDeadBattery
CA	BLOCK LEFT	IDLE	Idle && !IsDeadBattery
CB	BLOCK LEFT	BLOCK RIGHT	BR && !IsDeadBattery
CE	BLOCK LEFT	ATTACK LEFT	AL && !IsDeadBattery
CF	BLOCK LEFT	CHARGING	Charge && !IsDeadBattery
CG	BLOCK LEFT	DAZE	IsDeadBattery
DB	ATTACK RIGHT	BLOCK RIGHT	AttackFinished && PrevState == "BLOCK RIGHT"
DA	ATTACK RIGHT	IDLE	AttackFinished && PrevState != "BLOCK RIGHT"
DG	ATTACK RIGHT	DAZE	IsDeadBattery
EC	ATTACK LEFT	BLOCK LEFT	AttackFinished && PrevState == "BLOCK LEFT"
EA	ATTACK LEFT	IDLE	AttackFinished && PrevState != "BLOCK LEFT"
EG	ATTACK LEFT	DAZE	IsDeadBattery
FA	CHARGING	IDLE	Idle    IsFullBattery
GF	DAZE	CHARGING	!IsDazed

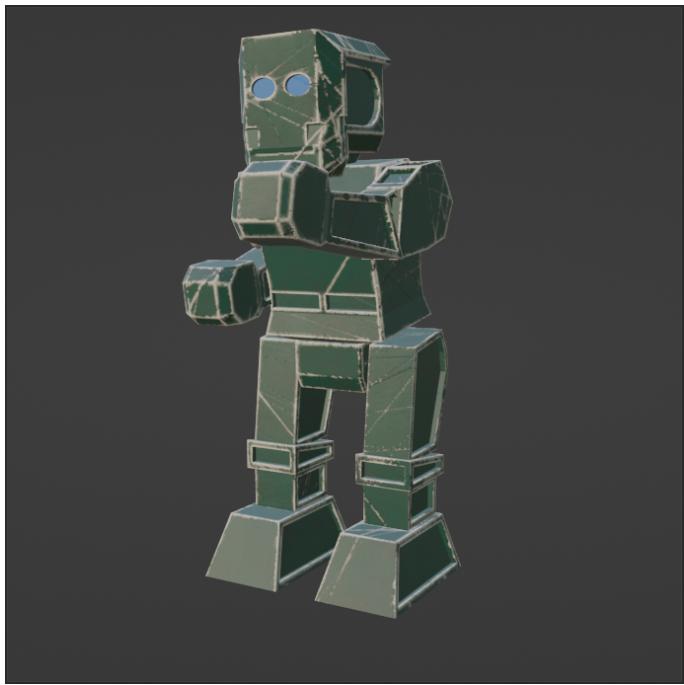
(Enemy 1 State Machine)

Animations

Christian Catalano  
Student #: 1120832  
March 8, 2023



(Dazed/Charging)



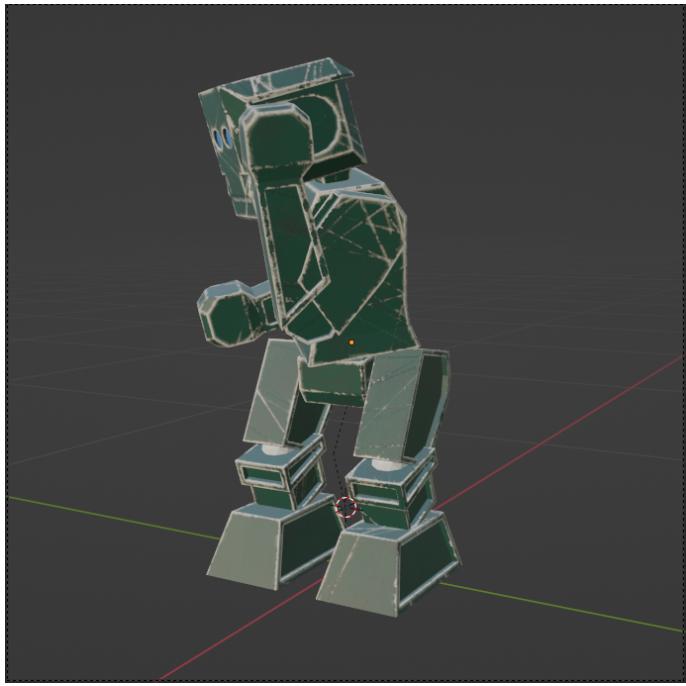
(Attack Left)



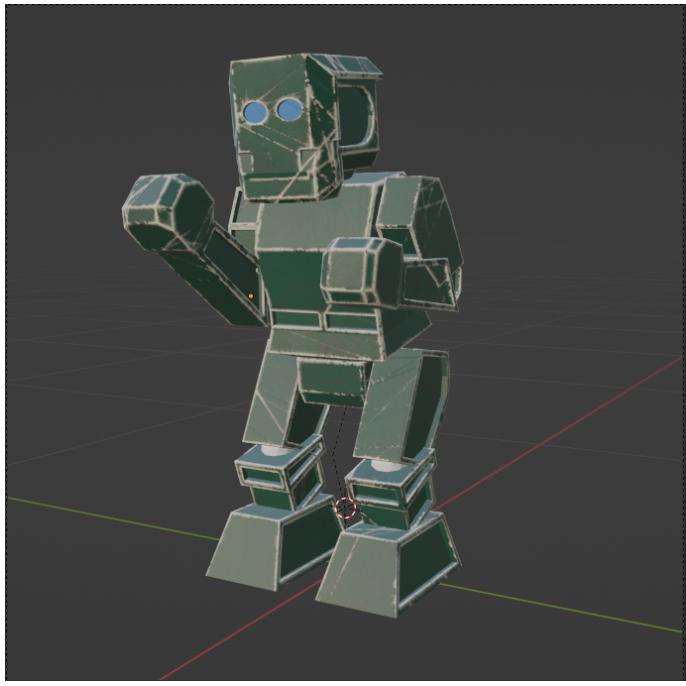
(Attack Right)



(Block Left)



(Block Right)



(Idle)

## Enemy 2

“Jumping Jack”

### Overview

This robot was trained by a billion kangaroos over his multi-century life. He delivers fast attacks, and cares little for his battery level.

### Abilities

(Identical to player abilities, minus the super attack)

- The enemy can punch left, punch right, block left, block right, and retreat when their battery is below 40%.
- When player's state changes, has a chance to respond directly to it, applying the exact opposite move to grant the enemy more points.
  - o Available counter-states:
    - ATTACK RIGHT
    - ATTACK LEFT
    - BLOCK RIGHT
    - BLOCK LEFT

### Behaviour

- Attack Cycle: 1 second
- Weighted Transition Table:

Current State	Next State						
	IDLE	BLOCK RIGHT	BLOCK LEFT	ATTACK RIGHT	ATTACK LEFT	CHARGING	DAZE
IDLE	10	15	15	30	30	-	-
Charge Available	10	15	15	25	25	10	-
BLOCK RIGHT	15	5	20	60	-	-	-
Charge Available	10	5	15	60	-	10	-
BLOCK LEFT	15	5	20	60	-	-	-
Charge Available	10	5	15	60	-	10	-
CHARGING	60	-	-	-	-	40	-

(Enemy 2 Weighted Transition Table)

### State machine

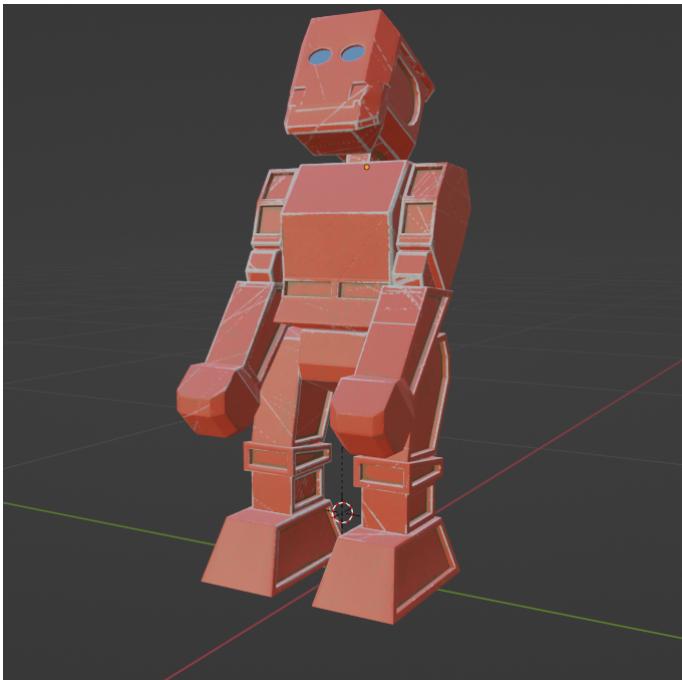
- Animations will be wrapped inside of each state function.
- Strings:
  - o PrevState (stores the name of the previous state)
  - o OppositeMove (stores the optimal response to the players current state)
- Booleans: IsDazed, IsLowBattery, IsDeadBattery, IsFullBattery, Idle, BL, BR, Charge, AL, AR, MoveAvailable, Counter

- Note: MoveAvailable represents if the state in OppositeMoves is an available state to transition into
- Note: Counter represents if the enemy is currently responding directly to the player's move.
- Note: Idle, BL, BR, Charge, AL, AR are encoded in a 1-hot format, and relate to whichever weighted percentage was randomly chosen from the weighted transition table.

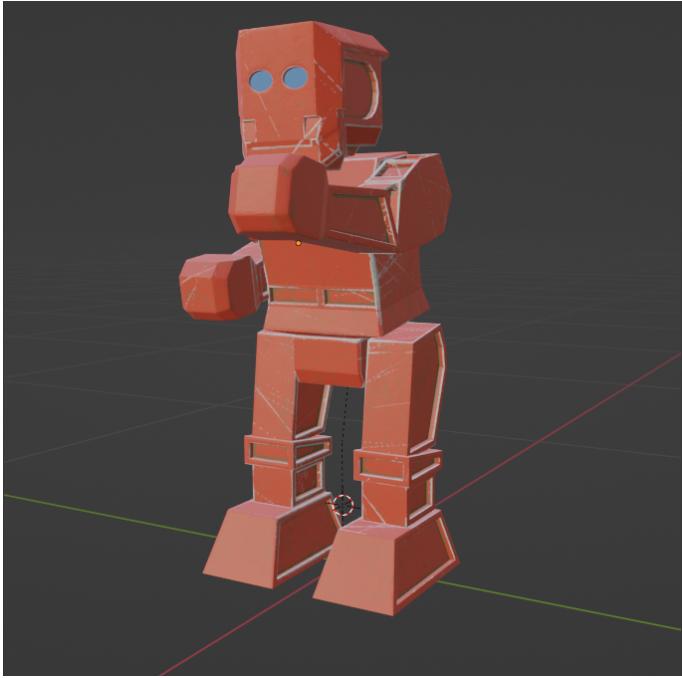
ID	State	Next State	Condition
AB	IDLE	BLOCK RIGHT	((MoveAvailable && Counter && OppositeMove == "BLOCK RIGHT")    BR) && !IsDeadBattery
AC	IDLE	BLOCK LEFT	((MoveAvailable && Counter && OppositeMove == "BLOCK LEFT")    BL) && !IsDeadBattery
AD	IDLE	ATTACK RIGHT	((MoveAvailable && Counter && OppositeMove == "ATTACK RIGHT")    AR) && !IsDeadBattery
AE	IDLE	ATTACK LEFT	((MoveAvailable && Counter && OppositeMove == "ATTACK LEFT")    AL) && !IsDeadBattery
AF	IDLE	CHARGING	(!Counter    !MoveAvailable) && Charge && !IsDeadBattery
AG	IDLE	DAZE	IsDeadBattery
BA	BLOCK RIGHT	IDLE	(!Counter    !MoveAvailable) && Idle && !IsDeadBattery
BC	BLOCK RIGHT	BLOCK LEFT	((MoveAvailable && Counter && OppositeMove == "BLOCK LEFT")    BL) && !IsDeadBattery
BD	BLOCK RIGHT	ATTACK RIGHT	((MoveAvailable && Counter && OppositeMove == "ATTACK RIGHT")    AR) && !IsDeadBattery
BF	BLOCK RIGHT	CHARGING	(!Counter    !MoveAvailable) && Charge && !IsDeadBattery
BG	BLOCK RIGHT	DAZE	IsDeadBattery
CA	BLOCK LEFT	IDLE	(!Counter    !MoveAvailable) && Idle && !IsDeadBattery
CB	BLOCK LEFT	BLOCK RIGHT	((MoveAvailable && Counter && OppositeMove == "BLOCK RIGHT")    BR) && !IsDeadBattery
CE	BLOCK LEFT	ATTACK LEFT	((MoveAvailable && Counter && OppositeMove == "ATTACK LEFT")    AL) && !IsDeadBattery
CF	BLOCK LEFT	CHARGING	(!Counter    !MoveAvailable) && Charge && !IsDeadBattery
CG	BLOCK LEFT	DAZE	IsDeadBattery
DB	ATTACK RIGHT	BLOCK RIGHT	AttackFinished && PrevState == "BLOCK RIGHT"
DA	ATTACK RIGHT	IDLE	AttackFinished && PrevState != "BLOCK RIGHT"
DG	ATTACK RIGHT	DAZE	IsDeadBattery
EC	ATTACK LEFT	BLOCK LEFT	AttackFinished && PrevState == "BLOCK LEFT"
EA	ATTACK LEFT	IDLE	AttackFinished && PrevState != "BLOCK LEFT"
EG	ATTACK LEFT	DAZE	IsDeadBattery
FA	CHARGING	IDLE	Idle    IsFullBattery
GF	DAZE	CHARGING	!IsDazed

(Enemy 2 State Machine)

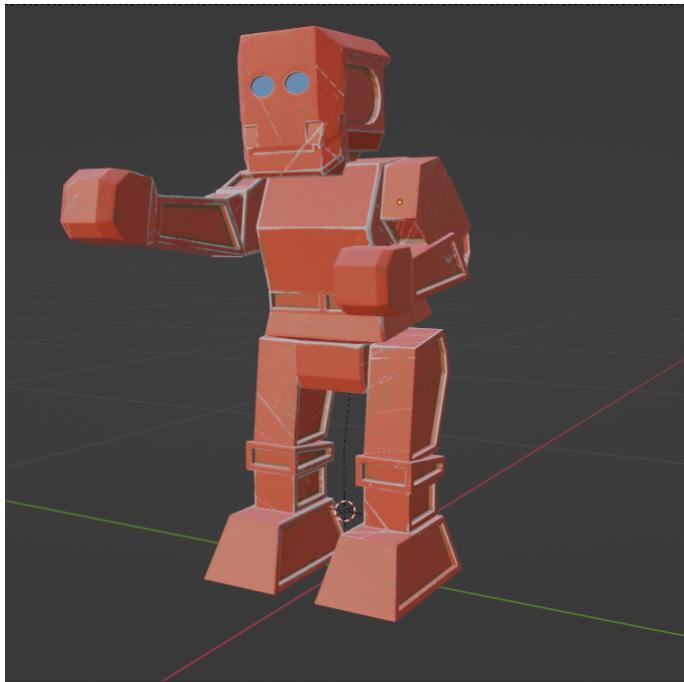
Animations



(Dazed/Charging)



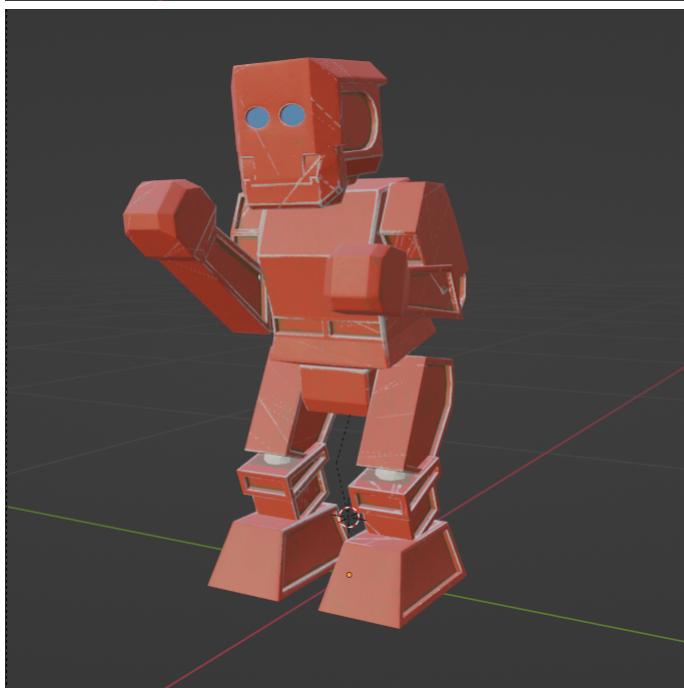
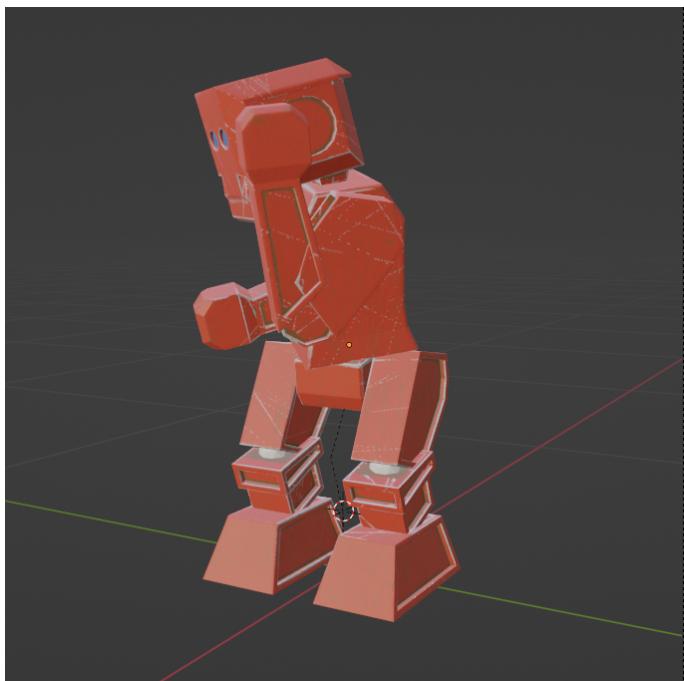
(Attack Left)



(Attack Right)



(Block Left)



## Enemy 3

“Forcefield Frank”

### Overview

This robot was trained to be a back-catcher in little league baseball. Due to this, he favours defensive play, and has fast defensive reactions.

### Abilities

(Identical to player abilities, minus the super attack)

- The enemy can punch left, punch right, block left, block right, and retreat when their battery is below 40%.
- When player's state changes, has a chance to respond directly to it, applying the exact opposite move to grant the enemy more points.
  - o Available counter-states:
    - BLOCK RIGHT
    - BLOCK LEFT

### Behaviour

- Attack Cycle: 1 second
- Weighted Transition Table:

Current State	Next State						
	IDLE	BLOCK RIGHT	BLOCK LEFT	ATTACK RIGHT	ATTACK LEFT	CHARGING	DAZE
IDLE	10	30	30	15	15	-	-
Charge Available	10	25	25	10	10	20	-
BLOCK RIGHT	5	25	25	45	-	-	-
Charge Available	5	20	20	35	-	20	-
BLOCK LEFT	5	25	25	45	-	-	-
Charge Available	5	20	20	35	-	20	-
CHARGING	30	-	-	-	-	70	-

(Enemy 3 Weighted Transition Table)

### State machine

- Animations will be wrapped inside of each state function.
- Strings:
  - o PrevState (stores the name of the previous state)
  - o OppositeMove (stores the optimal response to the players current state)
- Booleans: IsDazed, IsLowBattery, IsDeadBattery, IsFullBattery, Idle, BL, BR, Charge, AL, AR, MoveAvailable, Counter
  - o Note: MoveAvailable represents if the state in OppositeMoves is an available state to transition into

- Note: Counter represents if the enemy is currently responding directly to the player's move.
- Note: Idle, BL, BR, Charge, AL, AR are encoded in a 1-hot format, and relate to whichever weighted percentage was randomly chosen from the weighted transition table.

ID	State	Next State	Condition
AB	IDLE	BLOCK RIGHT	( (MoveAvailable && Counter && OppositeMove == "BLOCK RIGHT")    BR ) && !IsDeadBattery
AC	IDLE	BLOCK LEFT	( (MoveAvailable && Counter && OppositeMove == "BLOCK LEFT")    BL ) && !IsDeadBattery
AD	IDLE	ATTACK RIGHT	(!Counter    !MoveAvailable) && AR && !IsDeadBattery
AE	IDLE	ATTACK LEFT	(!Counter    !MoveAvailable) && AL && !IsDeadBattery
AF	IDLE	CHARGING	(!Counter    !MoveAvailable) && Charge && !IsDeadBattery
AG	IDLE	DAZE	IsDeadBattery
BA	BLOCK RIGHT	IDLE	(!Counter    !MoveAvailable) && Idle && !IsDeadBattery
BC	BLOCK RIGHT	BLOCK LEFT	( (MoveAvailable && Counter && OppositeMove == "BLOCK LEFT")    BL ) && !IsDeadBattery
BD	BLOCK RIGHT	ATTACK RIGHT	(!Counter    !MoveAvailable) && AR && !IsDeadBattery
BF	BLOCK RIGHT	CHARGING	(!Counter    !MoveAvailable) && Charge && !IsDeadBattery
BG	BLOCK RIGHT	DAZE	IsDeadBattery
CA	BLOCK LEFT	IDLE	(!Counter    !MoveAvailable) && Idle && !IsDeadBattery
CB	BLOCK LEFT	BLOCK RIGHT	( (MoveAvailable && Counter && OppositeMove == "BLOCK RIGHT")    BR ) && !IsDeadBattery
CE	BLOCK LEFT	ATTACK LEFT	(!Counter    !MoveAvailable) && AL && !IsDeadBattery
CF	BLOCK LEFT	CHARGING	(!Counter    !MoveAvailable) && Charge && !IsDeadBattery
CG	BLOCK LEFT	DAZE	IsDeadBattery
DB	ATTACK RIGHT	BLOCK RIGHT	AttackFinished && PrevState == "BLOCK RIGHT"
DA	ATTACK RIGHT	IDLE	AttackFinished && PrevState != "BLOCK RIGHT"
DG	ATTACK RIGHT	DAZE	IsDeadBattery
EC	ATTACK LEFT	BLOCK LEFT	AttackFinished && PrevState == "BLOCK LEFT"
EA	ATTACK LEFT	IDLE	AttackFinished && PrevState != "BLOCK LEFT"
EG	ATTACK LEFT	DAZE	IsDeadBattery
FA	CHARGING	IDLE	Idle    IsFullBattery
GF	DAZE	CHARGING	!IsDazed

(Enemy 3 State Machine)

Animations



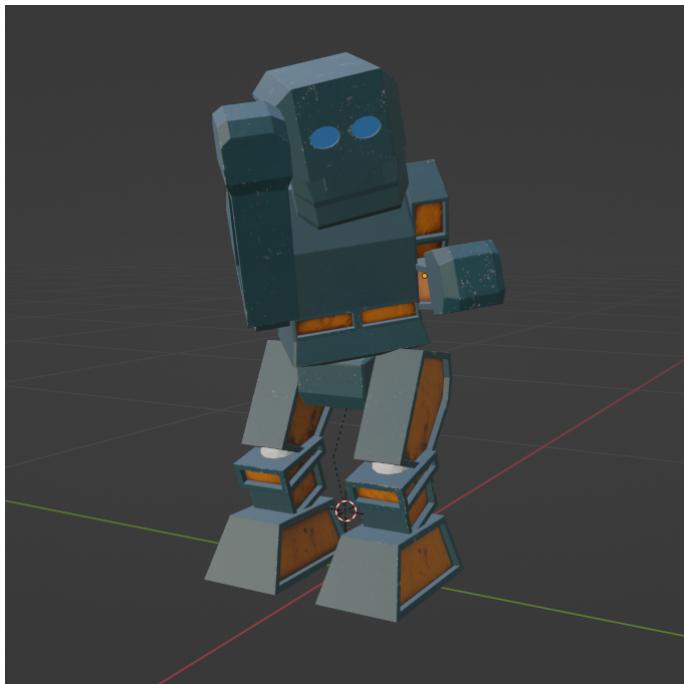
(Dazed/Charging)



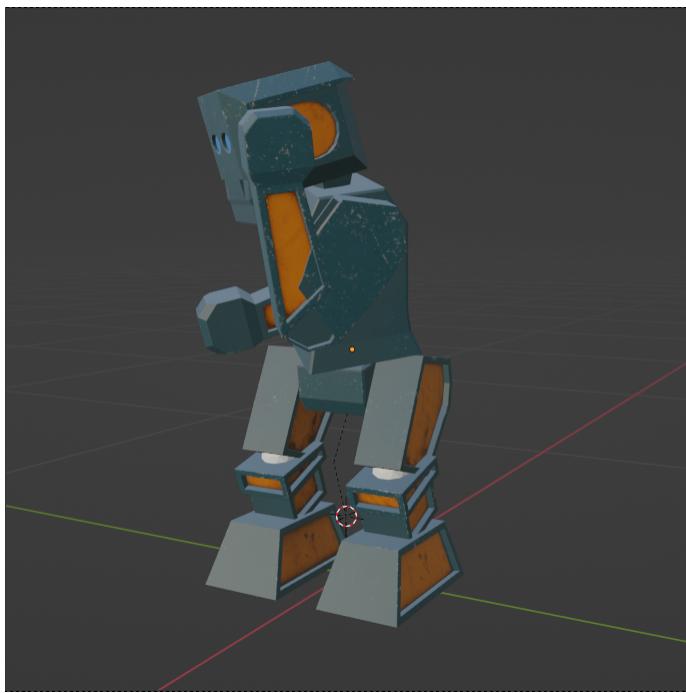
(Attack Left)



(Attack Right)



(Block Left)



(Block Right)



(Idle)

## Other Game Entities

### Charging Pad:

- When a player/enemy comes into contact with the charging pad, their battery level increases by 20% per second.
- If the player/enemy in contact with the charging pad reaches 100% battery, they are forcefully ejected off of the pad.

### Match Timer:

- Starts at 60 seconds and counts down towards 0.
- Once it reaches 0 seconds the match is over.
- Displays on the UI and physically in the ring.

### Score Displays:

- Will display each player's score on a TV screen next to the ring

## Feature Schedule & Team Information

The team will consist of one designer/developer, Christian Catalano. I will do all of the work for the project.

The features & release schedule is as follows:

- Character & enemy model creation including animations:
  - o **Monday, March 13<sup>th</sup>**
- Game level creation:
  - o **Thursday, March 16<sup>th</sup>**
- Main Menu:
  - o **Thursday, March 16<sup>th</sup>**
  - o Blurred background of ring that changes on menu select
- Character/enemy control:
  - o **Monday, March 20<sup>st</sup>**
- Game UI and match mechanic implementation:
  - o **Friday, March 24<sup>th</sup>**
  - o Score calculation
  - o Match Timer
  - o Match UI
  - o Win/loss UI
- Fighter Select:
  - o **Sunday, March 26<sup>th</sup>**