

# Project Portfolio

Mocking Robot

Balance Robot

Amnesea

Diabetic Retinopathy Disease Grading

Facially NFTs and Augmented Reality Watch

Art / Handcraft /Sculptures

# A.K.A

I am Ankit Kumar Agrawal, aka AKA.

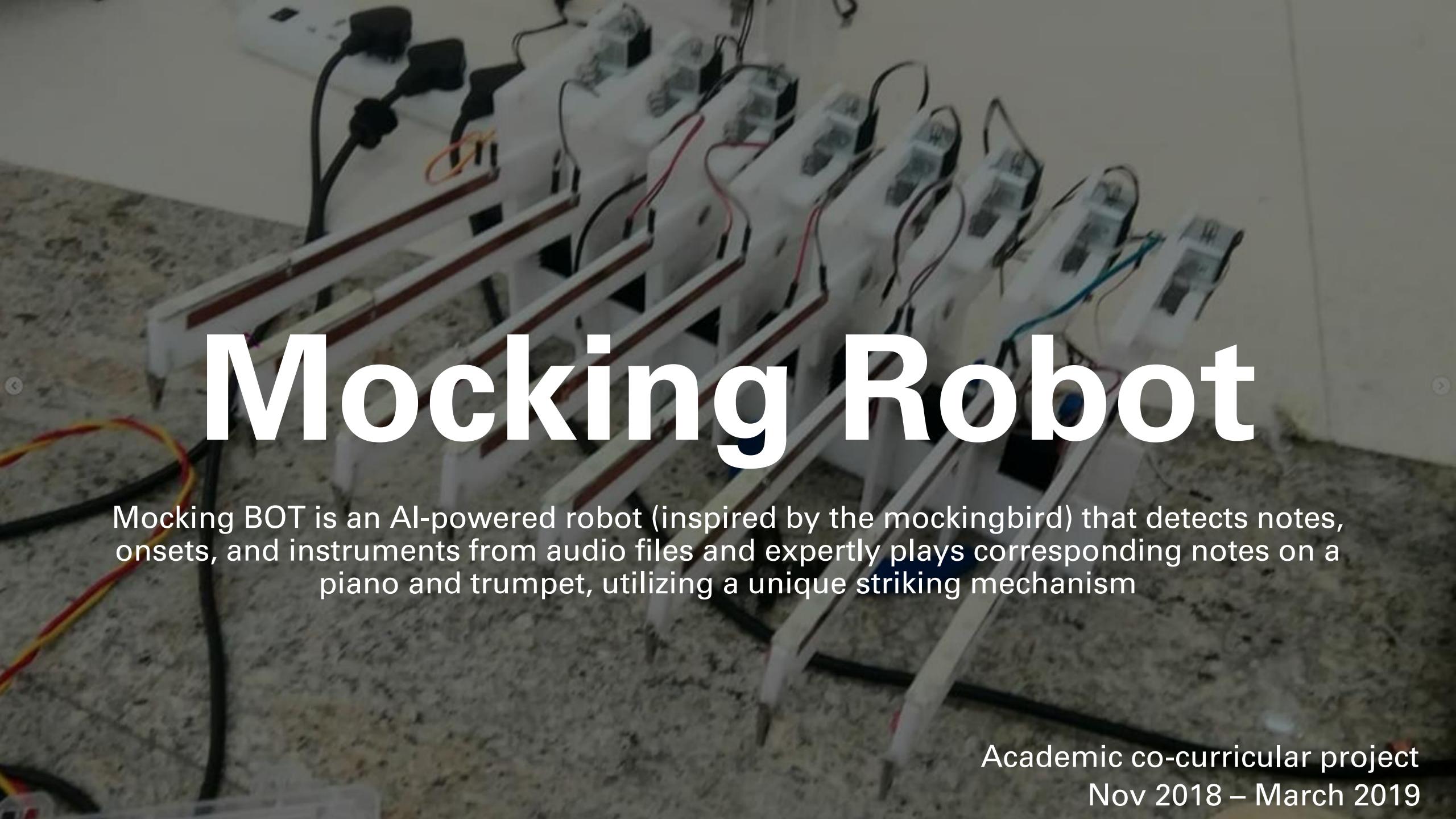
I am an enthusiastic explorer and dreamer, passionate about building valuable products. The experience of growing up in various, diverse Indian states deeply shaped my character through immersion in various cultures. Fueled by a passion for travel, photography, and a hearty appetite, I relish exploring unique cultures and savoring their distinctiveness in material and immaterial forms.

My approach is practical and resourceful, embracing unconventional methods. I meticulously evaluate options to make informed decisions as a Designer/Artist/Engineer. I am passionate about crafting tailored solutions to challenging problems.

I firmly believe that “mastery is a choice, not a chance”.



# Mocking Robot



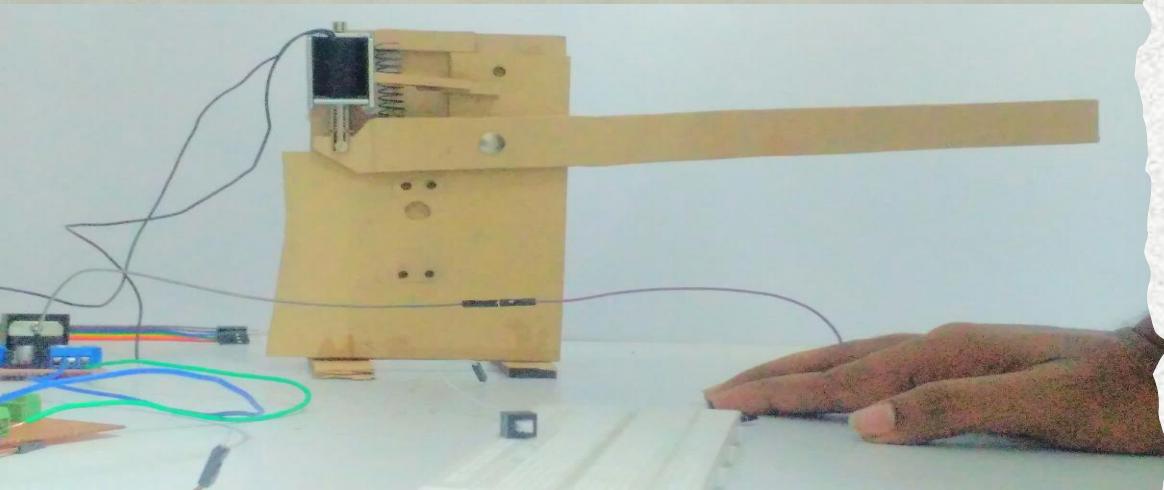
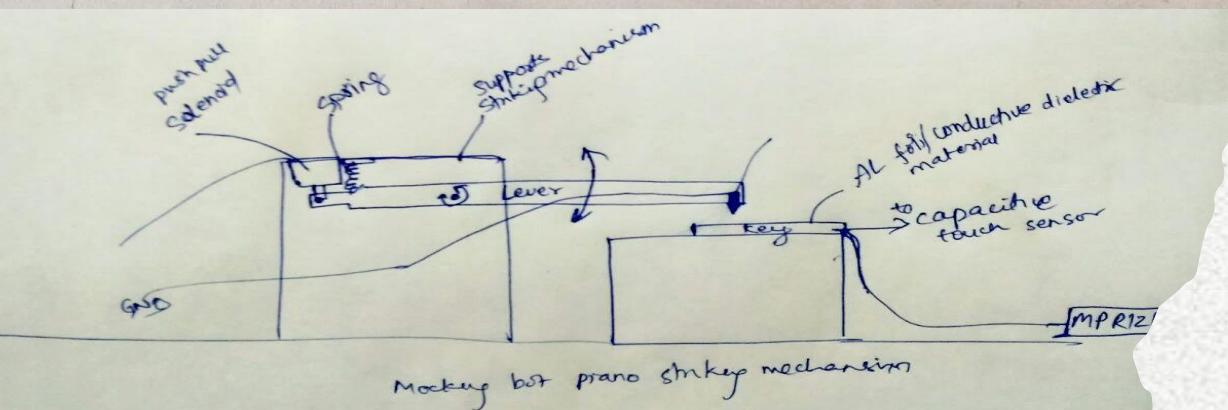
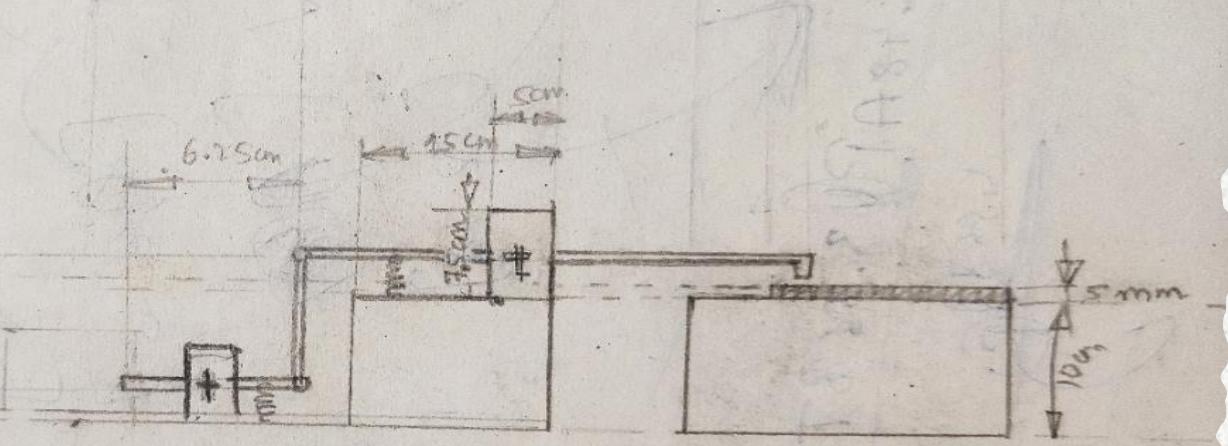
Mocking BOT is an AI-powered robot (inspired by the mockingbird) that detects notes, onsets, and instruments from audio files and expertly plays corresponding notes on a piano and trumpet, utilizing a unique striking mechanism

Academic co-curricular project  
Nov 2018 – March 2019

# The Design

My Key Contribution inspired by human fingers involved conceptualizing a solenoid-based striking mechanism with the following features:

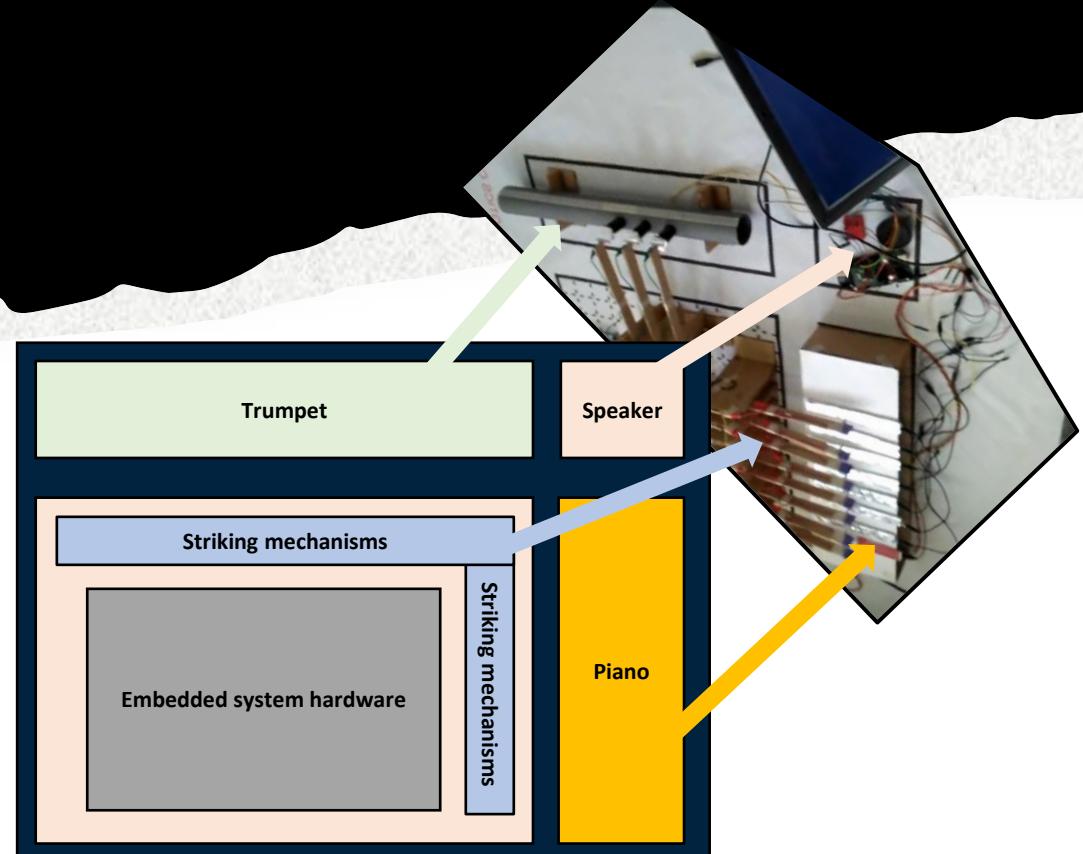
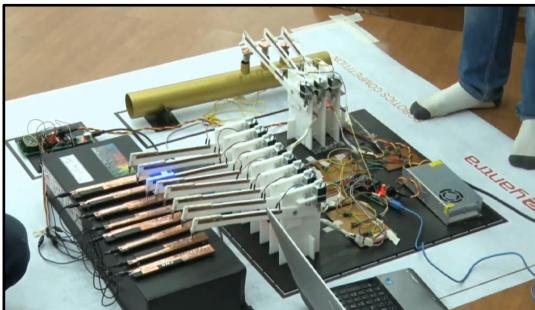
- **Instantaneous** - ~400 ms response time.
- **Stable & Scalable** - Can be repeated for any number of striking surfaces
- **Visually noticeable** - Includes an Indicator light to show which striking key is in operation
- **Compatibility** - This striking mechanism can play multiple categories of Musical instruments e.g., Piano, Trumpet, Keyboard



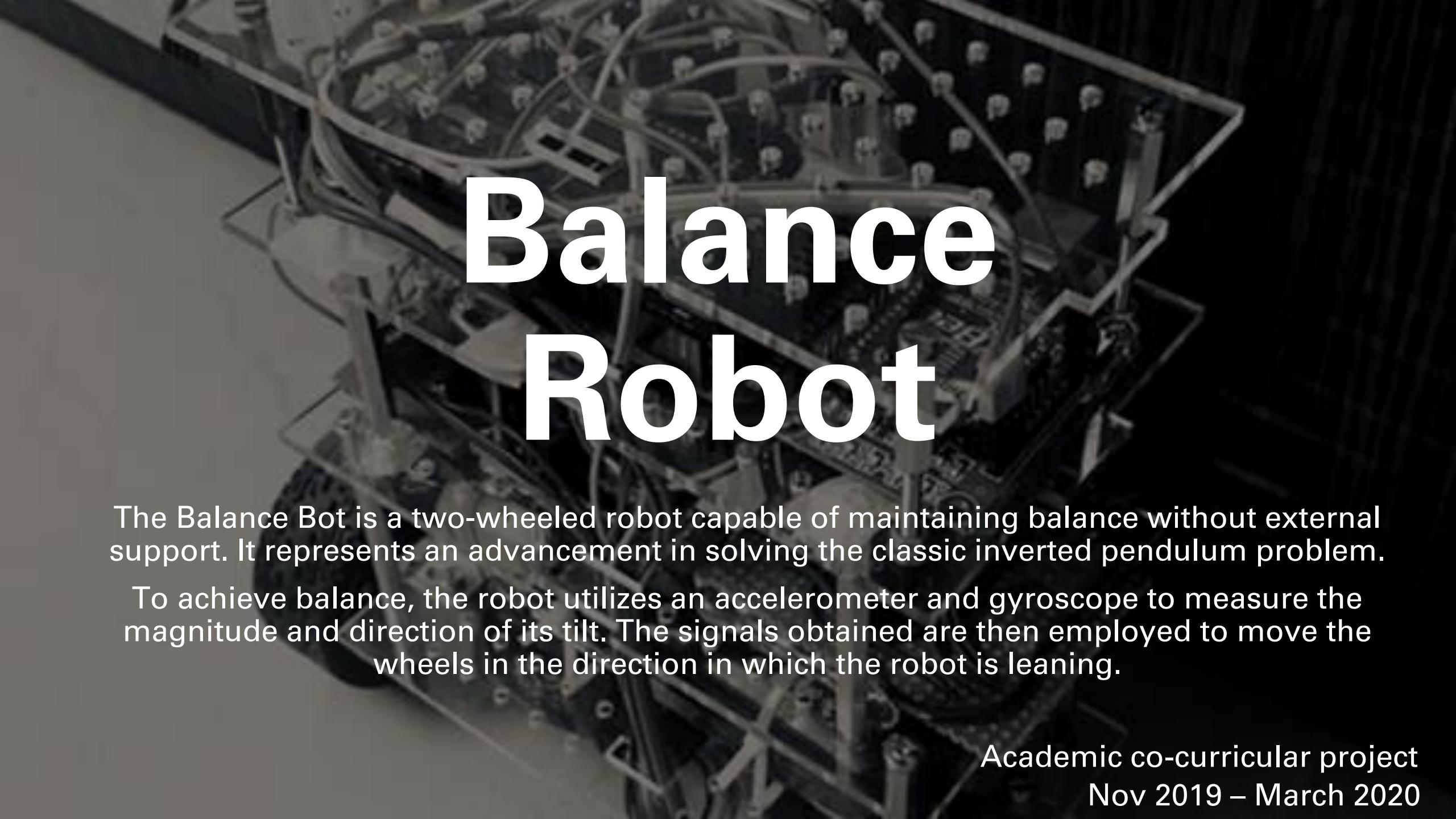
# Working Demonstration

Along with the striking mechanism design, I developed an instrument detection system. I optimized hyperparameters and compared Fourier transforms, accuracy, and entropy of audio files using a novel machine learning approach, thus achieving an average accuracy of 92.6% in detecting an audio file containing four instruments: Flute, Piano, Trumpet, and Violin

Find More Details about the project on YouTube: <https://www.youtube.com/watch?v=Ug9pBSWKVJ4>



# Balance Robot

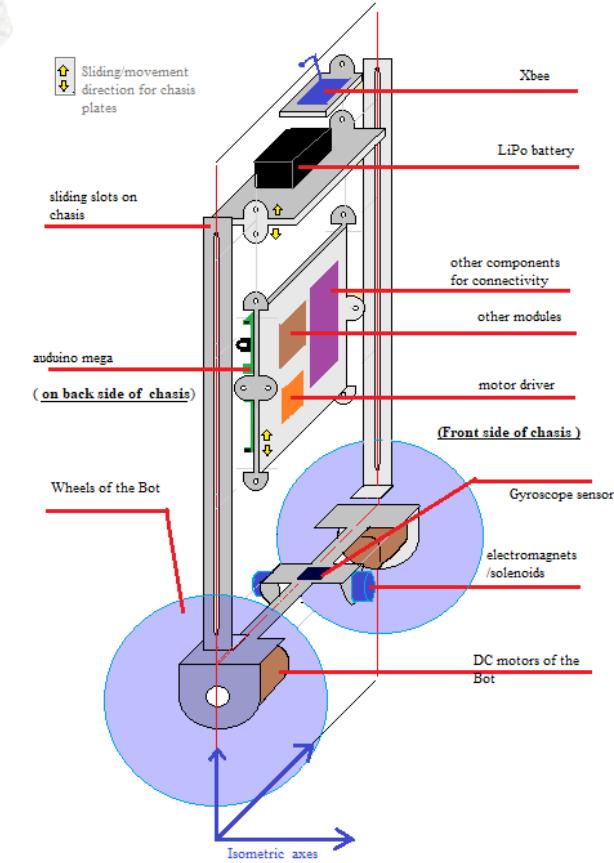
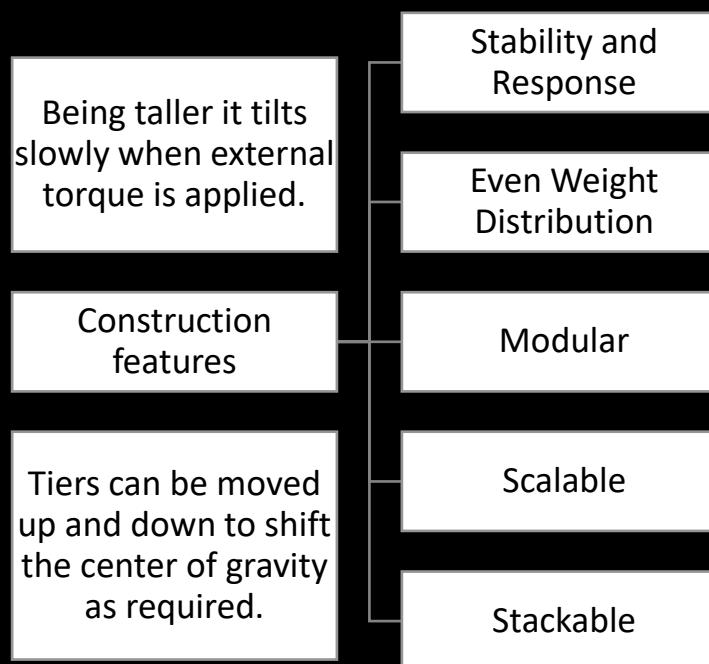


The Balance Bot is a two-wheeled robot capable of maintaining balance without external support. It represents an advancement in solving the classic inverted pendulum problem.

To achieve balance, the robot utilizes an accelerometer and gyroscope to measure the magnitude and direction of its tilt. The signals obtained are then employed to move the wheels in the direction in which the robot is leaning.

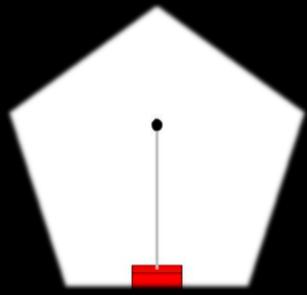
# Chassis Design

My primary contribution involved formulating and conceptualizing the chassis design for Robot. These are its features:

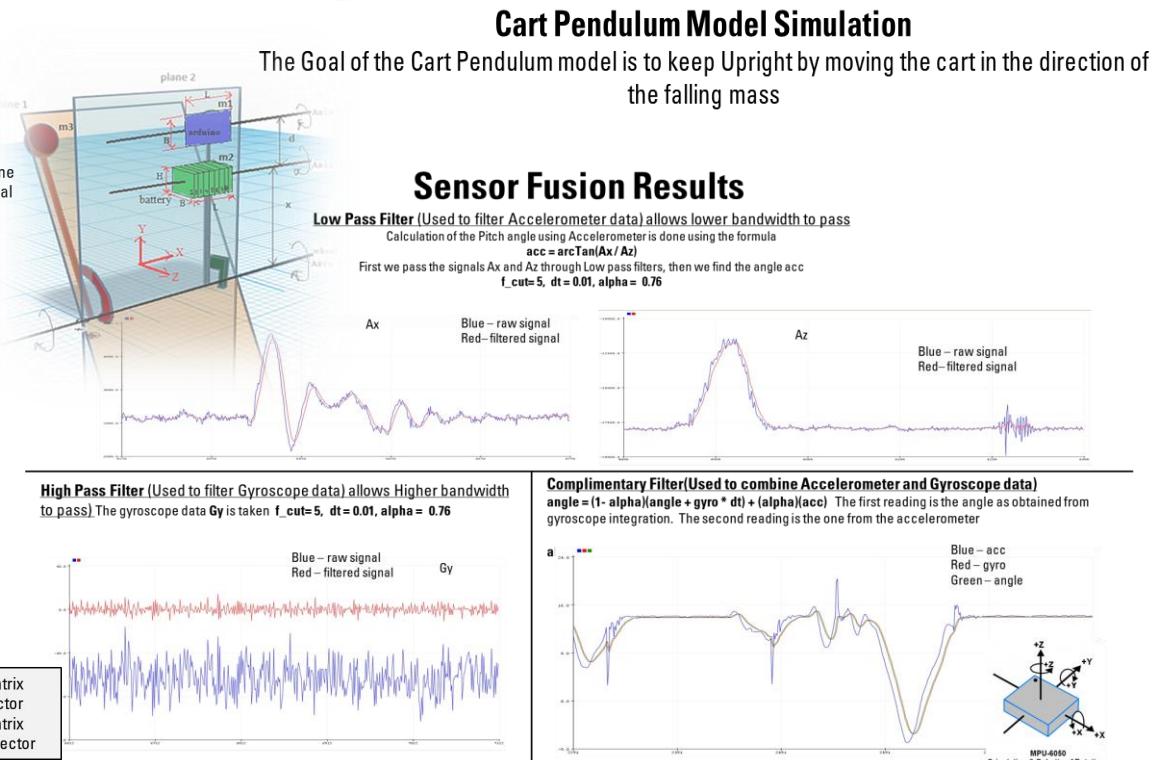
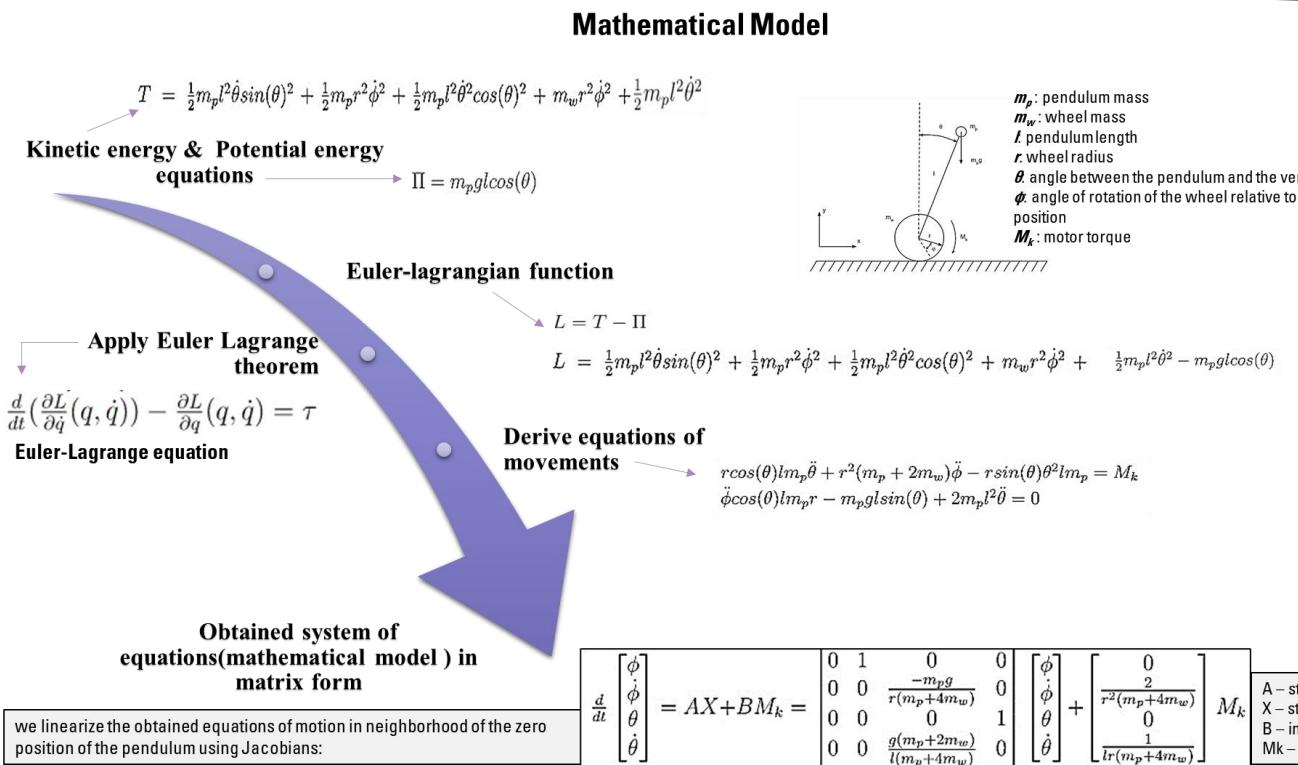


# Behind the scenes

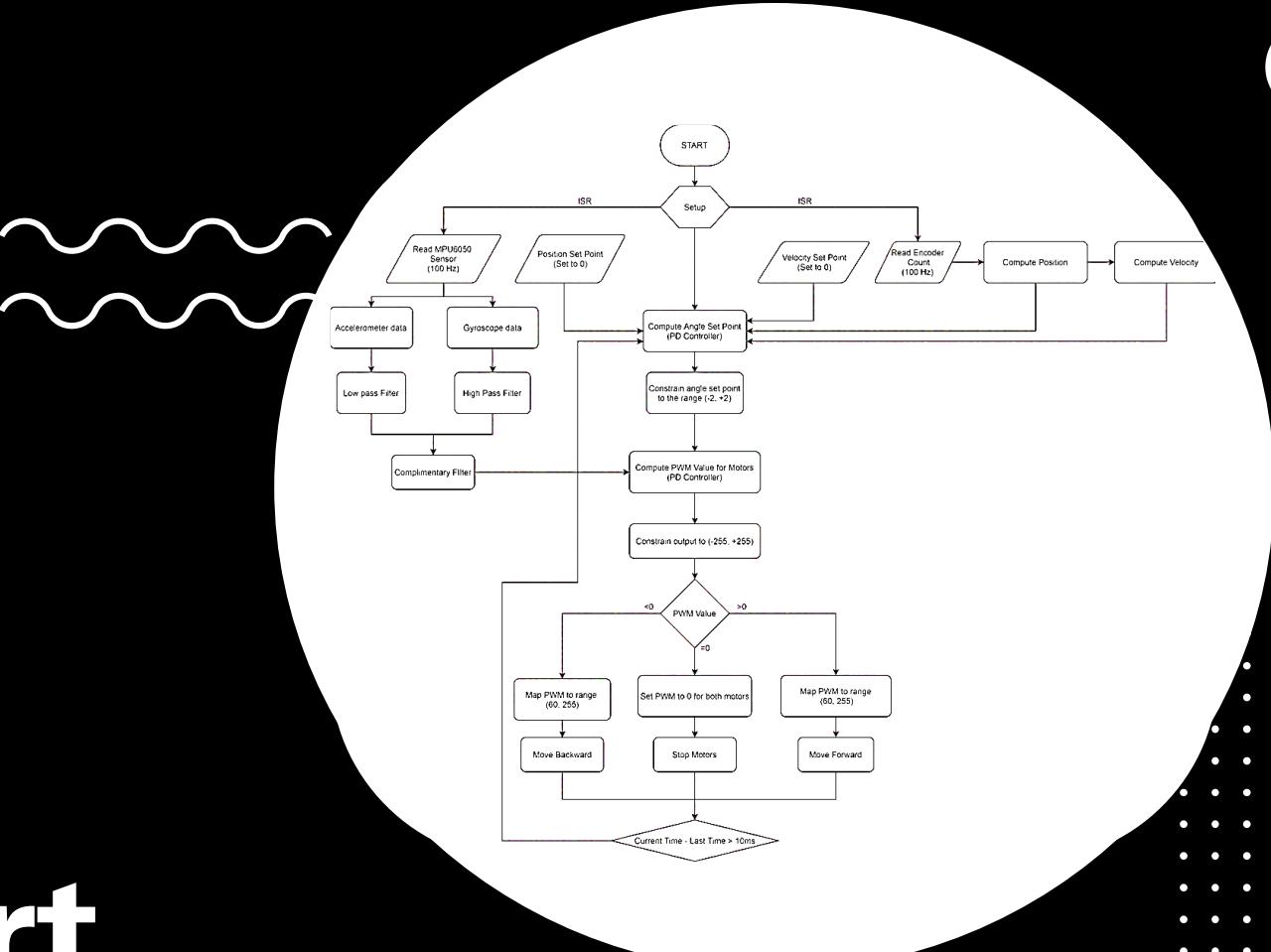
## (Applied Physics and Control systems)



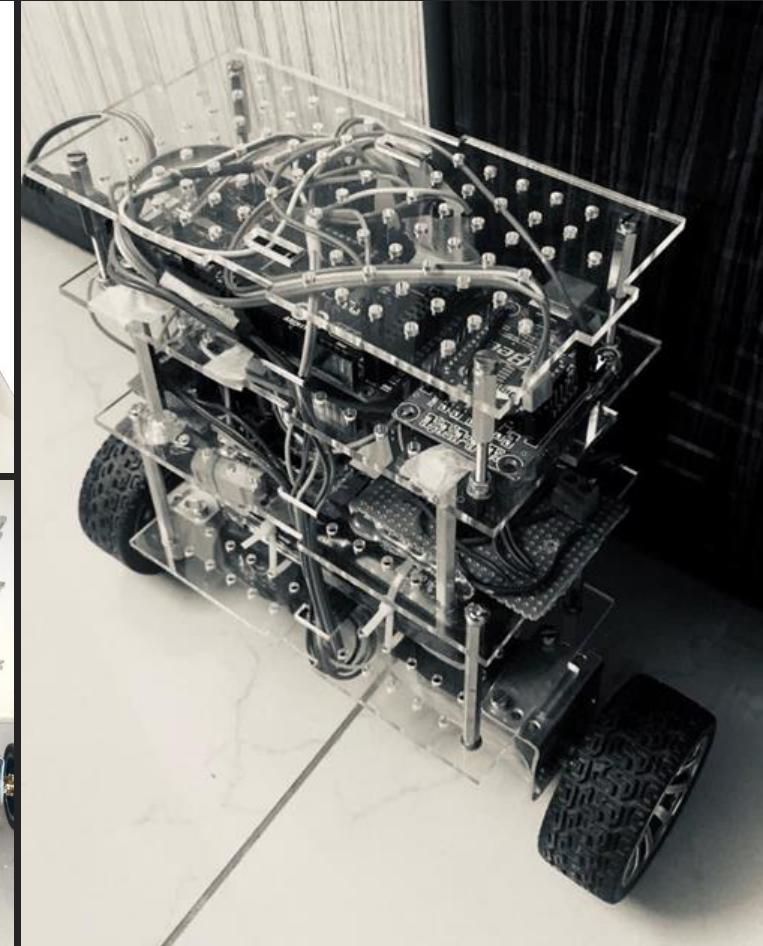
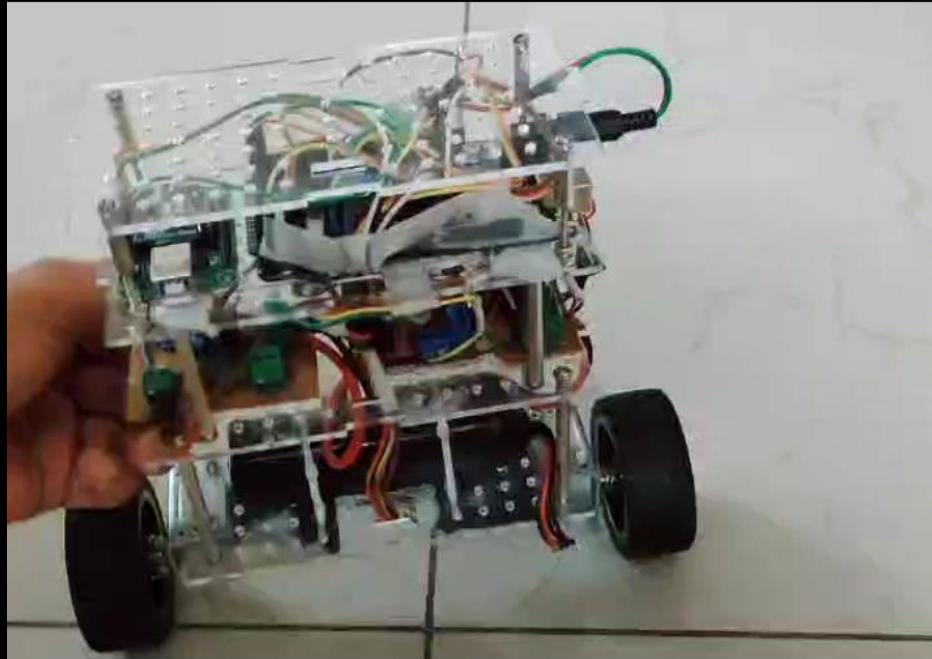
Along with the Chassis design, I developed the Mathematical model and simulation using Octave. I calculated all the components weights, dimensions and pacements as per my chassis designs, calculated jacobians, used laws of motion and applied mathematics to come up with the final system of equations to form mathematical model. This then was used for silumation and sensor fusion for self balancing of torque and remote control. Here is a glimpse into what transpired during the making of this robot..



# Control Systems Design Flow-Chart



# Working Demonstration



# amnesea



As the co-founder and CEO of Amnesea since July 2022, I've had the incredible opportunity to present our games "TimeBound" and "KeyBound" at the India Game Developers Conference (IGDC) in 2023. The response from attendees, Venture Capital Investors, and publishers has been overwhelmingly positive, which has been incredibly rewarding. IGDC holds a significant place as Asia's Biggest Game Developer Conference, making our reception even more exciting.

Moreover, our game "TimeBound: History's Legacy" was honored as a Top 10 Finalist in the BYOG Game Jam 2023 organized by IGDC, further affirming the recognition and potential of our creations. It's been an amazing journey showcasing our work and receiving such enthusiastic support from the gaming community.

Personal Venture startup & projects  
April 2023 – Present

# What is it and What I Did

I oversaw the development of core gameplay mechanics and guided the user experience across our games. Additionally, I crafted the tilemaps, defining game level layouts, and shaped the overall aesthetics.

## AMNE

derived from the Greek word ‘amnesia’, referring to the loss of memory or the inability to recall

## SEA

represents an expansive body of water, often associated with vastness, depth, and mystery

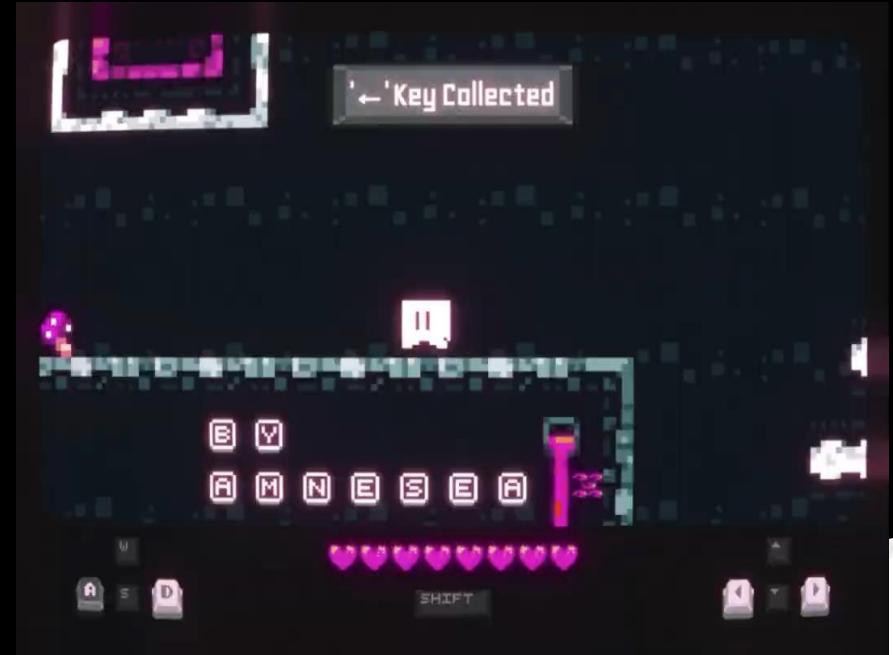
# KEY BOUND

You're a -KEY- inside a -KEYBOARD- which has lost its keys.  
Reclaim 'Space' with the 'Limited Keys' that still work to restore your keyboard.

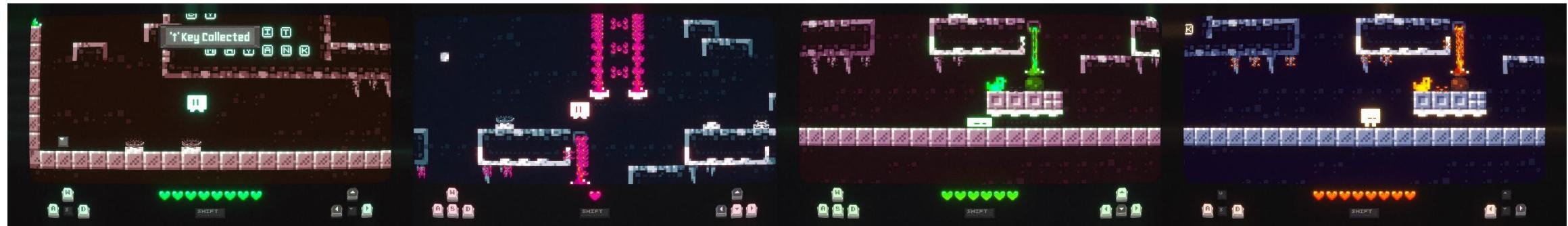
Play here – [Web App Playable Link on itch.io /keyboard](https://agrmayank.itch.io/keyboard) (<https://agrmayank.itch.io/keyboard>)

Watch here – [KeyBound \(Early Gameplay\) - YouTube link](https://www.youtube.com/watch?v=095G0ljCfe8) (<https://www.youtube.com/watch?v=095G0ljCfe8>)

To look at the pitch deck, click here – [Keyboard Pitch onedrive ppt read-only link](https://1drv.ms/p/s!AoGBdysGkQjj8lHeVBjVR6BXMGgFw?e=iSIRh2)  
(<https://1drv.ms/p/s!AoGBdysGkQjj8lHeVBjVR6BXMGgFw?e=iSIRh2>)



## Gameplay & screenshots



Personal project

# TIMEBOUND

In this unique world, players are not just time travelers but the architects of a new future. Their adventures aren't just about fixing inventions but about rewriting destiny itself, one chapter at a time. An extraordinary mission: restoring the past by fixing inventions and correcting historical anomalies.

Play here – [Web App Playable Link on itch.io /timebound](https://agrmayank.itch.io/timebound) (<https://agrmayank.itch.io/timebound>)

Watch – [TimeBound Game Trailer - YouTube link](https://www.youtube.com/watch?v=x6BFQcNcK0M) (<https://www.youtube.com/watch?v=x6BFQcNcK0M>)

# TIMEBOUND

## Gameplay & screenshots



Personal Project

**We have partnered with the Microsoft Xbox team and PlayStation to publish our games on the Xbox Store and Steam.**

**This is an ongoing project and currently, we are in talks with a few potential investors including SONY Interactive Entertainment.**

To look at the pitch deck, click here:

[AMNESEA Pitch onedrive Microsoft PowerPoint read-only link](#)

( <https://1drv.ms/p/s!AoGBdysGkQjJj8IFxT1sHow7DKv6NQ?e=uuLxVg> )

# Diabetic Retinopathy detection

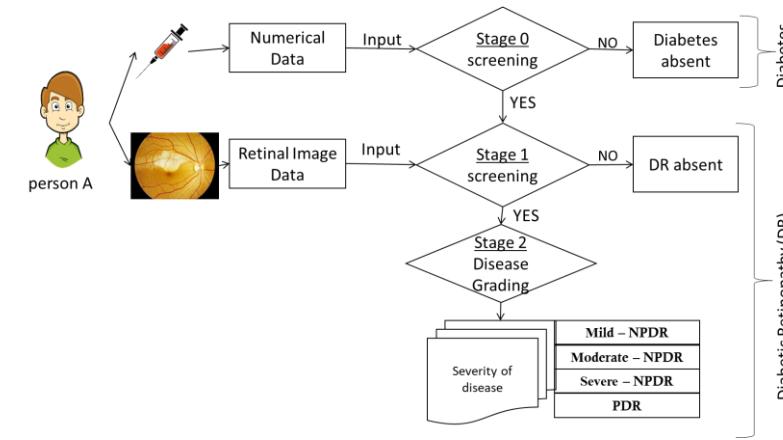
Diabetic Retinopathy is a complication of diabetes characterized by damage to blood vessels in the eye. As of 2020, over 100 million adults worldwide have been diagnosed with this condition. It is classified into four stages based on severity:

Academic research project  
July 2019 – April 2020

# Prediction Methodology for Diabetic Retinopathy

The below table shows various grades of disease severity and the proposed methodology to detect and grade it using both numerical and image-based data

Severity level	Class label	Disease Severity Level	Findings	Sample Retinal Images
0	0	Grade - 0: No apparent retinopathy	No visible sign of abnormalities	
1	1	Grade - 1: Mild – NPDR	Presence of Microaneurysms only	
2	2	Grade - 2: Moderate – NPDR	More than just microaneurysms but less than severe NPDR	
3	3	Grade - 3: Severe – NPDR	Any of the following: <ul style="list-style-type: none"><li>▪ &gt; 20 intraretinal hemorrhages</li><li>▪ Venous beading</li><li>▪ Intraretinal microvascular abnormalities</li><li>▪ no signs of PDR</li></ul>	
4	4	Grade - 4: PDR	Either or both of the following: <ul style="list-style-type: none"><li>▪ Neovascularization</li><li>▪ Vitreous/pre-retinal hemorrhage</li></ul>	



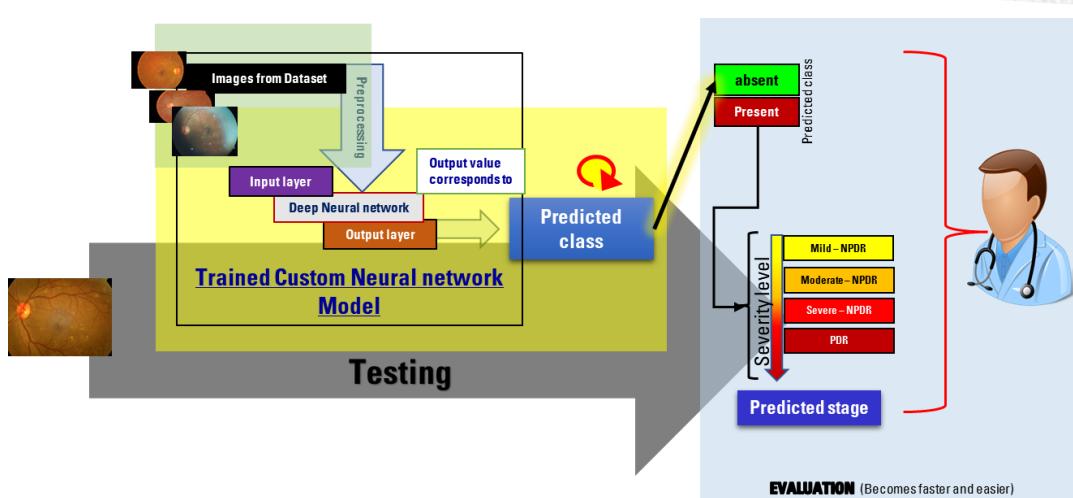
# Working Glimpse / Results

I have developed a neural network for Diabetic Retinopathy detection, optimizing hyperparameters and comparing pictorial and numerical data accuracy using a novel machine learning approach. Thus, achieving an average accuracy of 72.6%.

Find More Details about the Research and Paper at : <https://doi.org/10.30534/ijeter/2020/155872020>

Paper title : "Screening of Diabetic Retinopathy and its stages using Deep Neural Networks on Retinal optical Images"

Authors: Ankit Kumar, Dr. Jharna Majumdar



Binary stage 1 using NN of custom architectures		Kernel size	Activation function	Number of epochs	Max Accuracy achieved (%)	Loss achieved
Network architecture used	Changed network version name					
7 CONV layers, 4 dense layers	Version 1	7x7	ReLU	40	91.45	0.0835
	Version 2	3x3			80.38	0.524
	Version 3	2x2			80.18	0.529

	Class 1 - Predicted	Class 2 - Predicted	Class 3 - Predicted	Class 4 - Predicted
Class 1 - Actual	52	9	14	2
Class 2 - Actual	23	143	10	25
Class 3 - Actual	3	1	28	2
Class 4 - Actual	7	4	7	41

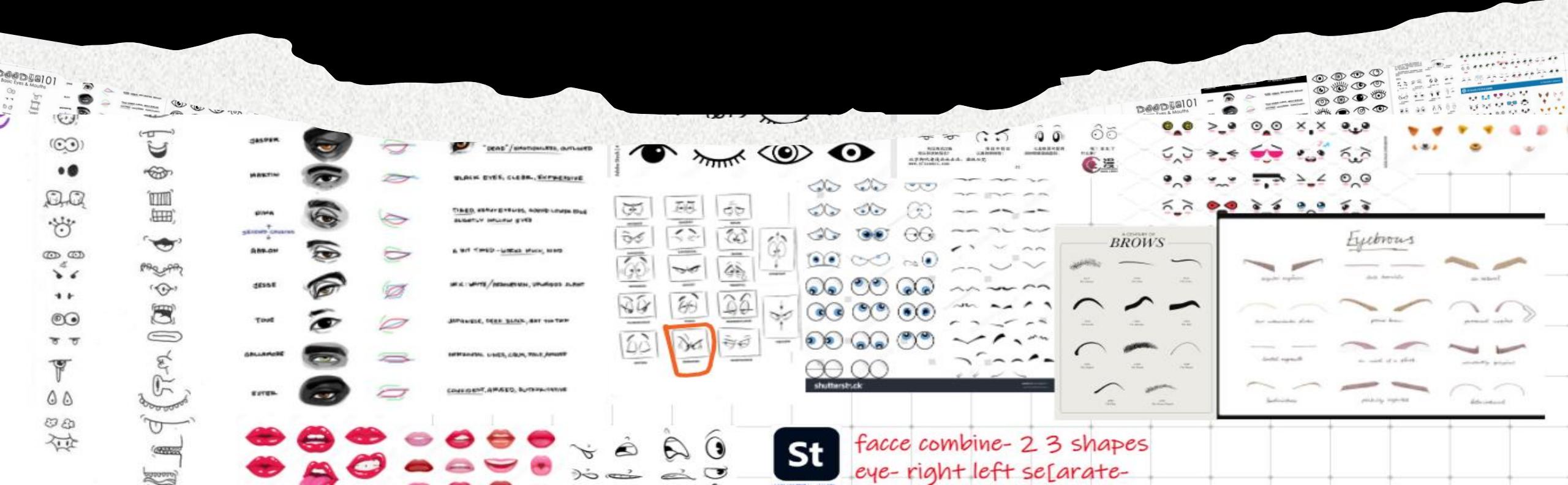
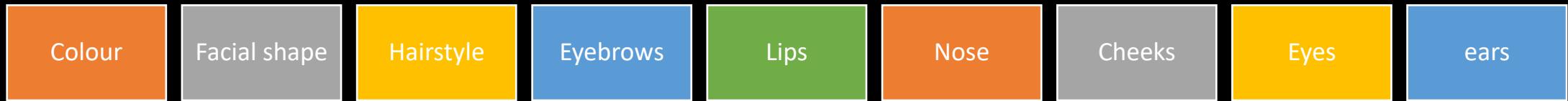
# Facially

Amidst the Crypto HYPE, the NFT HYPE emerged. I experienced significant gains and losses through NFT trading, leading me to the realization that the house always wins – specifically, the NFT project creators, as they are not engaged in a zero-sum game. Thus, the Facially NFT project was conceived.

Facially is a generative AI NFT project allowing users to mint NFTs with unique facial features like eyes, emotions, and hairstyles.

Personal project  
Oct 2022 – Jan 2023

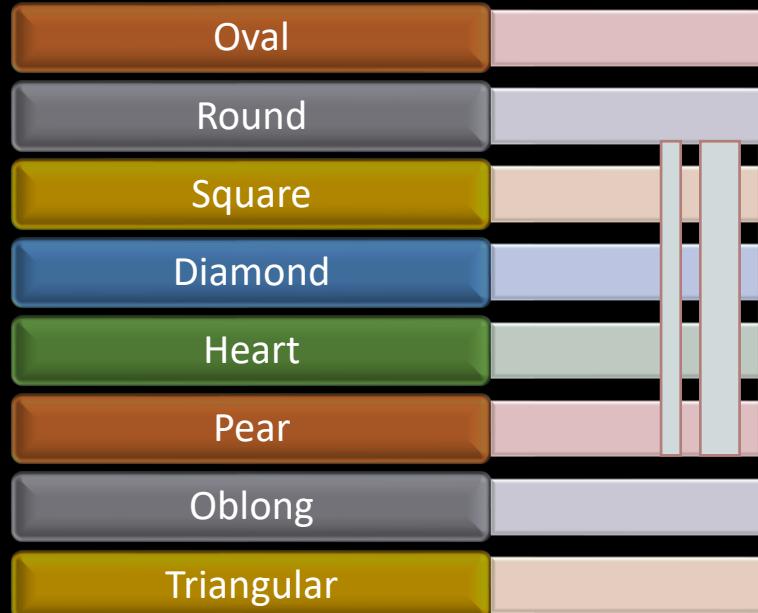
# Attributes and research



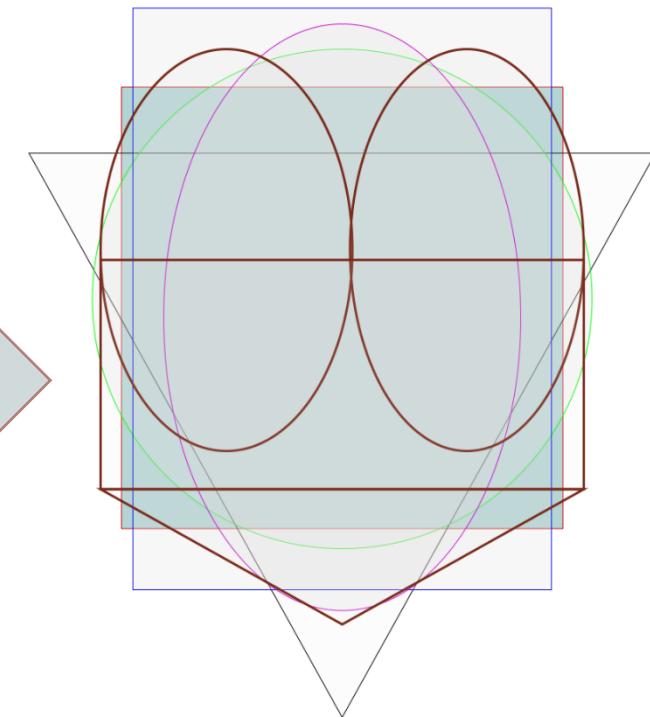
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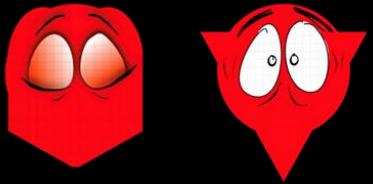
facce combine- 2 3 shapes  
eye- right left se[arate-

# The Facial Shapes

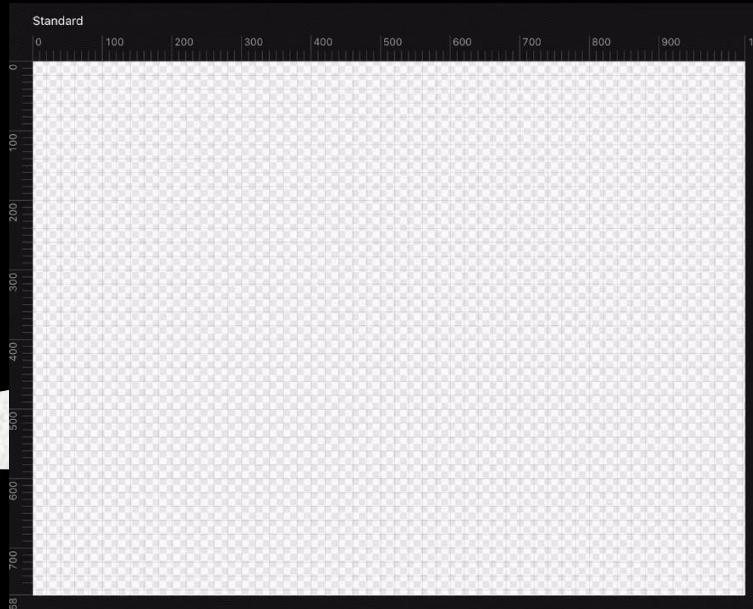
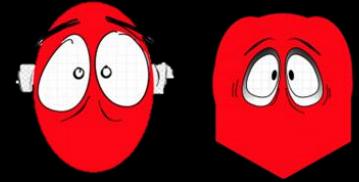


All combined to form a common Digital skeleton





# Demonstration



Owing to the oversaturation of comparable generative ART NFTs at that time, I opted to discontinue this project and redirected my focus towards envisioning my next endeavor within the realm of Augmented Reality (AR).

# Augmented Reality Watch NFTs:

These Fashion NFTs are crafted for Wearable, interactive, and realistic experiences. Below is the PowerPoint presentation that my teammates and I prepared for pitching to AR developers, marketers, artists, and investors.

Personal project  
Jan 2023– April 2023

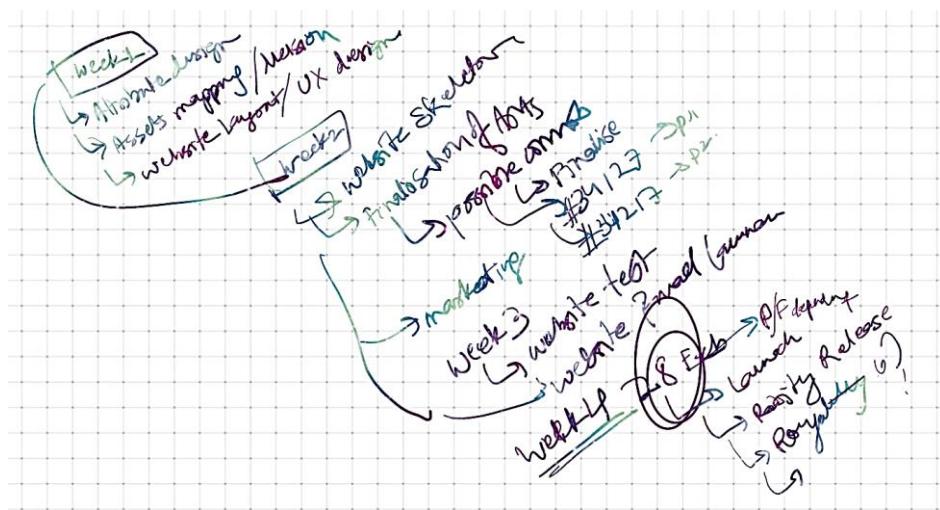
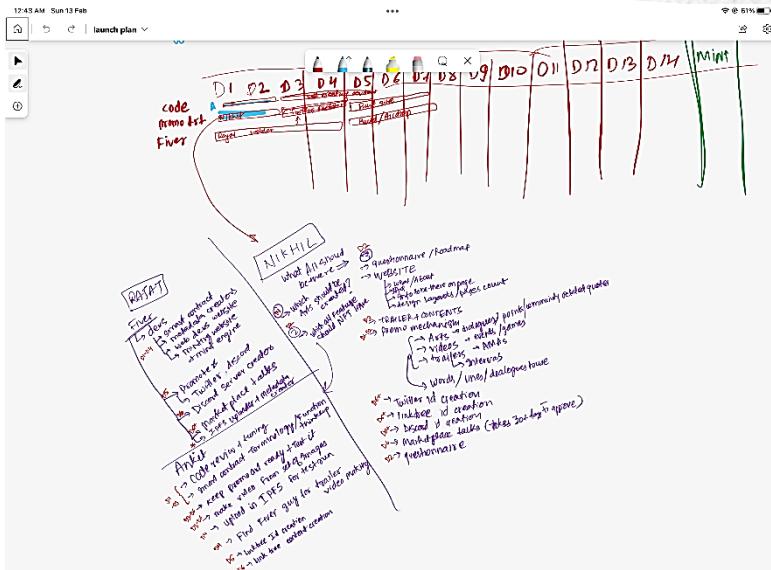
# Insights

This is the Document I Prepared to instruct The AR Watch Artist:

[ARnft\\_pitch - PPT onedrive read only](https://1drv.ms/p/s!AoGBdysGkQjJ8lI4WR4mt6jYpL9w?e=UEVov9) (<https://1drv.ms/p/s!AoGBdysGkQjJ8lI4WR4mt6jYpL9w?e=UEVov9>)

[Watch Types and 3d models.docx - Onedrive document read only](https://1drv.ms/w/s!AoGBdysGkQjJ8lGpsgHD2HEwRVuFQ?e=lo8M8U) (<https://1drv.ms/w/s!AoGBdysGkQjJ8lGpsgHD2HEwRVuFQ?e=lo8M8U>)

The effort spanned three to four months, involving the creation of a business plan, a demo app, and a strategic approach. Here is a glimpse of our brainstorming sessions and plans.





Unfortunately, the project had to be discontinued due to the infeasibility of integrating WEB AR Technology with wrist tech.

# Demo App Screenshots

**ART WHERE CAPTIVITY IS FREEDOM**

DATE : 29 aug (Wednesday) @1 pm  
1st sept(Saturday) @12 noon

VENUE: open air theatre (BB Court)

**STUDIO 371**

JOIN US.....

ANKIT-9958295598  
AKSHIT-8390901474

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ANKIT-9958295598 DATE : 29 aug (Wednesday) @1 pm  
AKSHIT-8390901474 1st sept(Saturday) @12 noon  
SIMANT-9631881074  
ISHAAN -9902456450 VENUE: open air theatre (BB Court)

**MAKES ME STRANGED  
EXPRESSIBLE  
ART  
SPEAKS WITHOUT WORDS  
CREATIVE BLOOD**

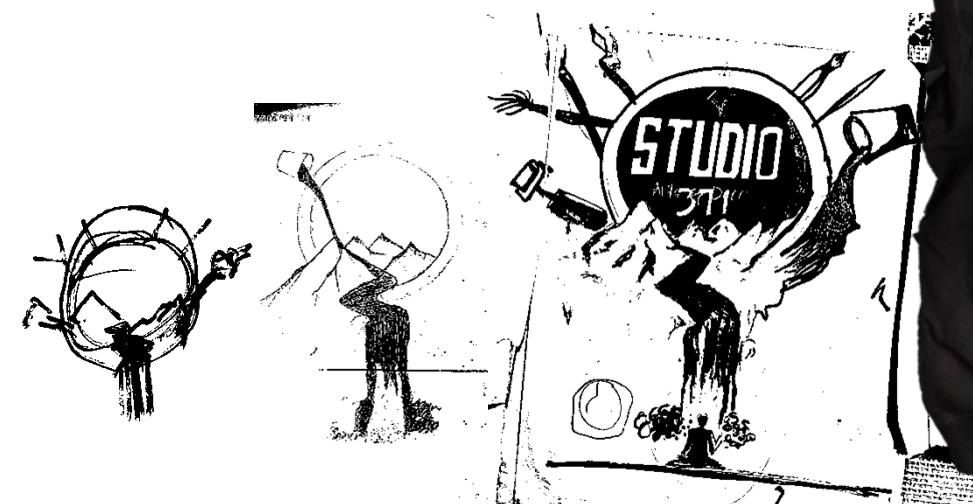
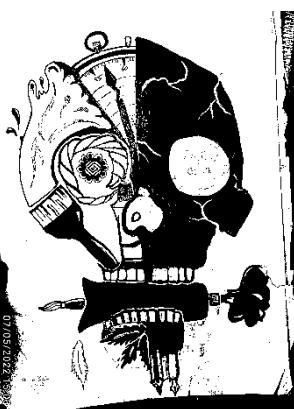
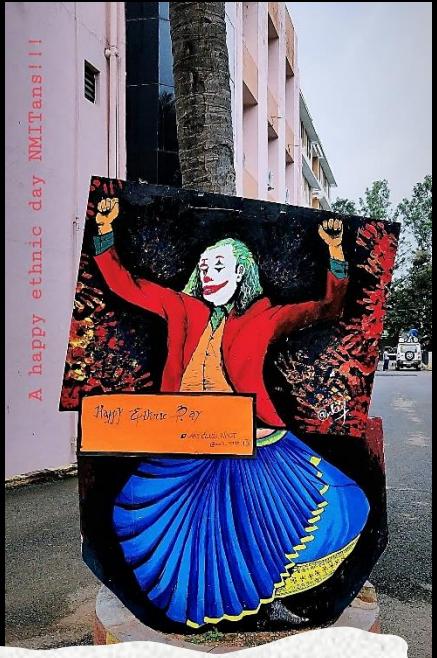
JOIN US !

# Digital ARTs

Extra- curricular projects

During my tenure as the Head of the Art Club and Core Committee at my college, I lead a lot of events and multidisciplinary teams. Here are some of my other works.

# Photography, Paintings & Apparel Design



# 3D Sculpting / Modelling Festive Decorations





# Thank you

Ankit Kumar

[akamaestro.com](http://akamaestro.com)

[akamaestro@outlook.com](mailto:akamaestro@outlook.com)