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I love to take projects that combine the logic of engineering with the creativity of designing Robocon

(Team Project for an international robotics competition)

RoboCon is a competition conducted by the Asia-Pacific Broadcasting Union. Students from all over Asia participate in this competition.

Theme:

Theme of the tournament is derived from the Japanese game of Tosyenko. It is a Japanese game of landing a hand fan onto a block.



The problem statement:

Robot has to throw soft flying disks at 7 platforms that have one beach ball on them respectively. Once the ball is displaced the disk must land on the platform.



My Role and the Process:

Init



Breaking down the problem statement.

I was the manual operator for the robot so I had a major role in doing end-to-end research and analysis of the problem statement.

TITLE	N.
STATEMENT BREAKDOWN.	
DONLY I BOT ON ARENA (MANUAL /AUTO)	
2) FRISBEE LOADING NEEDED (MANUAL/AUTO)	
3) BOT WORKSPACE IS RECTANGULAR	
4) ONLY 3 PEOPLE ON ARENA (OPERATOR, LEADER AUTO OPERATOR)	
5) BOT CANNOT EXCEED 1.5 1.5 X 1.8 mt (lx bxh) (UBOID.	
6) FLYING DISK IS COMPRESSIBLE	
7) RETRY FROM START ZONE	The second second
8) ROBOT Wt. < 25 kg.	
9) NO BATTERY SHALL EXCEED 24V	1
10) MAX VOLTAGE IN CIRCUIT IS 42 V	



Brainstorming sessions with rough pictorial depictions of possible mechanisms.





These drawings help me make the working prototype of the launching mechanism.



Launching Mechanism

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Encoder

Slot sensor Mount

Encoders are essential for getting rotational feedback for motors. This mount was designed to fit a 18000 rpm brushed dc motor with an encoder disk and a slot sensor. This component was designed to be 3D printed. The unique shape was chosen to fit the standard slot sensor.

Dimensions: (Designed and Rendered using Autodesk Fusion 360) Maximum Diameter - 55.60 mm Height - 17.20 mm







Creating the prototype in stages and testing each stage



Constructing and testing the base

Constructing the support structures for the launching mechanism.





Testing launching mechanism

Final Prototype:





Key Learnings:

Managing a team of 25 members to achieve a time sensitive task. First project of 6 month duration. 3D modelling and rendering using Autodesk Fusion 360.

<u>Team</u>

This project was done for the Robocon competition 2017. The team worked on this project from September 2016 to February 2017. The team of 6 members (Rishabh Shah, Apoorva Gokhale, Mujammil Patel, Viraj Sonawane, Atharv Khadtare and me) were the pit crew members with me being the manual operator. A huge thanks to my amazing team in making this happen!

Smart Dustbin (Team Academic Project under SRA)

Many things in our waste can be reused and recycled, or changed into other useful forms such as manure. For this the government has segregation plants set up. These sites collect waste and use various processes to separate out the essential waste. This is a must in a city like Mumbai.

Need for project:



Instead of throwing garbage in separate bins its collected in heaps!

What do we currently have:



The Problem:

Hand picking is deleterious to workers health and can cause diseases to spread. Separation of a ton of garbage is expensive.



The Proposed Solution:

Make a compact, low cost and efficient automatic waste segregator and install in public places and apartment buildings.



The Process:



Collecting data on most prominent issues. Paucity of dumping grounds a major issue for construction.

I collected data from government sites to quantify the impact of the proposed solution.



Idea brainstorming to choose amongst two solutions.

Torn Torning System Ringh Rig Motess 2) Genegon 3) Sensors 2) Microles Prover. 2) Low Processing Porver. 2) Low Processing Porver. 2) Simple Design 4) Fast & Chicago.	1 + Servers, Belts Rough R Rough R Rough R PRes PRes PRes Pres	IDEA 2. Manipulator + Cameras Req.) Manipulator 3) tridi Def. Camera 3) Frist Computer (CONS from a) Expersive 9) Conpeten disign 0) Objects can mile from Camera. 4) High chances of failure 5) Slow .
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Creating the actionable drawings to help in prototyping



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Key Learnings:

Generating idea maps. Using engineering drawing to design prototype. Using power tools to make the prototype. Conducting research and analysing the data.

<u>Team</u>

This project was done as a part of the Eklavya Mentorship programme conducted by the Society of Robotics and Automation, VJTI, from May 2016 to July 2016, in a team of 4 members (Aakash Vaghani, Amogh Gaitonde, Raj Mehta and me). I thank the entire team and mentors for their contribution!

Pong (Individual Personal Project)

Problem Statement:

Make a portable game using an 8-bit microcontroller.

My Process:



1

Choose the peripherals for making the game.

Choose a micro-controller compatible with all the peripherals.

Design the PCB and decide the algorithm of the game

6.

Testing the entire game for bugs in electronic and code design.

3

Choose the IDE and programming method to be used.

5

Making a prototype PCB by etching and writing a deployable code.

PCB Design Stages: (Eagle PCB design software was used)



<u>Schematic Diagram</u> Choosing components to use

Circuit Layout

Connecting components to make a complete circuit.





Etched PCB

I etched this PCB using a copper clad and Conc. FeCl₃ solution.

Code Flowchart:

This flowchart helps me write the code in an organized and chronological fashion.



Final Prototype:







Dimensions: 6.625in X 3.25in X 2in Date Created: 4 March 2017

Key Learnings:

Creating a PCB using the etching process. Creating a game using object oriented programming.

Road Safety Monitoring System (Individual Academic Project)

Problem Statement:

Create a project solving a social issue.

My Process:







A bird's eye view of the solution to be made!!







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Dimensions: 3.5 in X 2.35 in X 2 in

> Date Created: 10 April 2018

Key Learnings:

Applying Machine Learning algorithms to a live data stream. Working with databases and cloud servers.