
AUTO-BALL
ENTERPRISES
follows you everywhere

THE PROBLEM

Limitations of current shooting machines

- Players set predefined locations for the ball to shoot
- Fails to simulate a game-like intensity
- Restrictive and does not adapt to the player

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EXISTING PRODUCTS

DR. DISH HOME

$3,750

THE GUN 8000

$8,125

- Expensive and do not track the user
- Relies on the player using a predefined shooting pattern

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THE FLOOR GENERAL

- A solution to the shortcomings of traditional shooting machines by adding player tracking
- Allows for players to practice independently of preset routines
- Can function as a traditional shooting machine

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CURRENT MARKET

Athletes will benefit from automatic tracking feature the floor general has to offer

One million basketball players in the US and Canada spread across 40,000 teams

The Floor General will be a compelling solution for teams looking for new shooting machines or wanting to upgrade their current shooting machine

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CUSTOMER BASE

Basketball clubs

High-school teams

Collegiate teams

Professional teams

Coaches

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MAIN FUNCTIONS

- Tracks player within a 7 meter radius from the basketball hoop
- Detects user signal to trigger the swivelling and launching mechanism
- Swivels the system towards the player
- Launches ball towards the player and collects balls after a shot is taken

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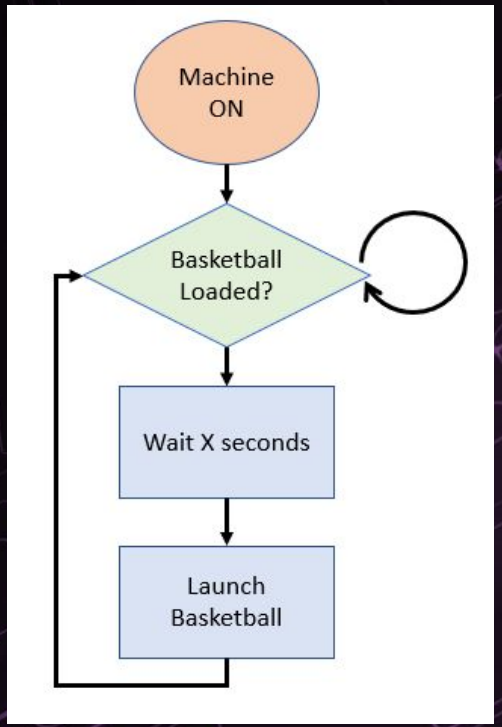
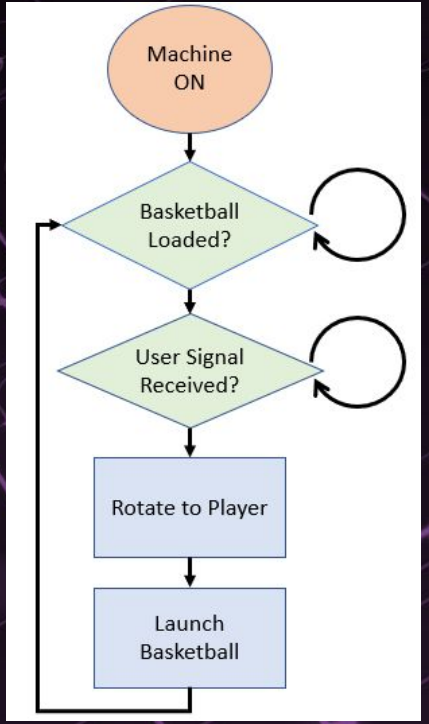
FUNCTIONAL OVERVIEW

Traditional Machine



Floor General (Automatic tracking)



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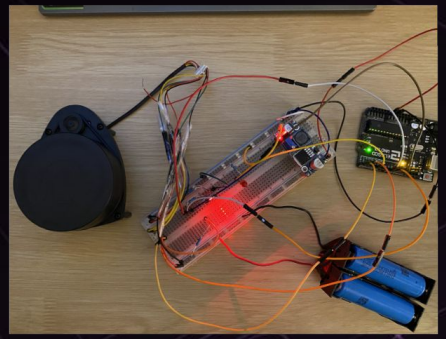
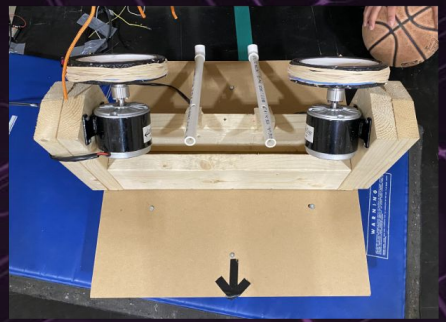
PROOF-OF-CONCEPT SYSTEM OVERVIEW



Motion Detection System

Swivel Mechanism



Ball Launching System

Ball Retrieval System

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MOTION DETECTION SYSTEM

A LiDar sensor tracks a single player's location

- Provides angle and distance data
- 8000 samples per second are collected

Potential to augment LiDar with a to track multiple people

- Requires further research as of ENSC 440

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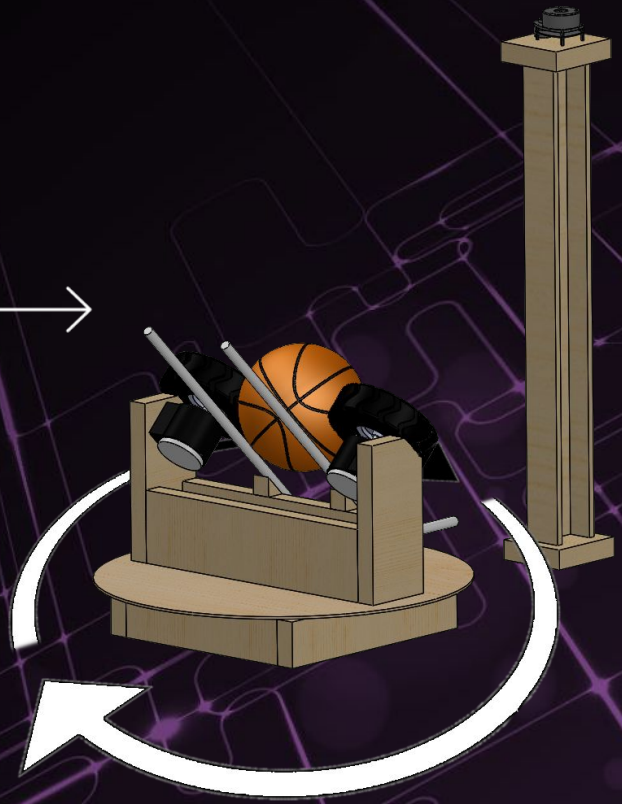
SWIVEL MECHANISM

Angle data from the motion detection system



Launcher is rotated towards the player

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BALL LAUNCHING MECHANISM

Flywheels attached to two DC motors pinch the ball and propel it forward

Launching mechanism is secured to the swivel

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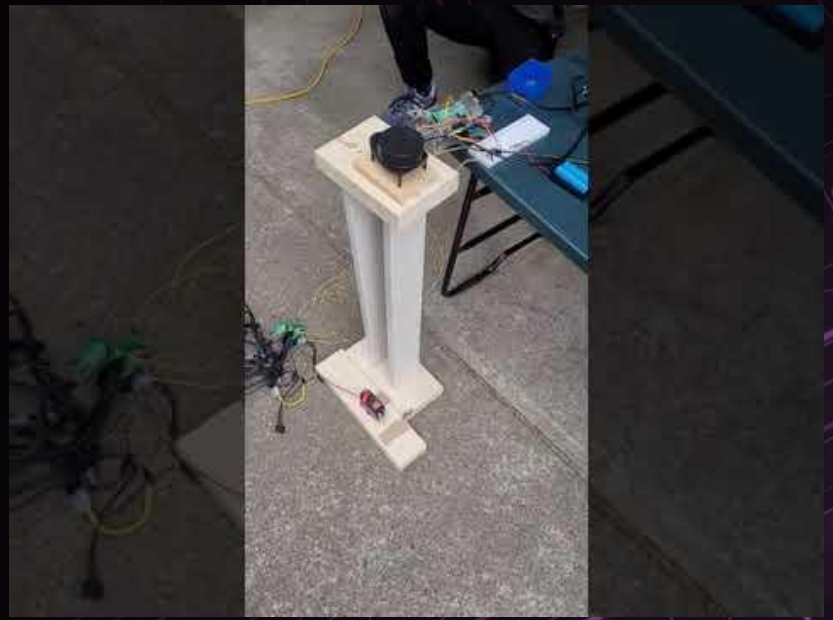
PROOF-OF-CONCEPT COMPONENTS TESTED

LiDar tracking with Servo



Ball Launched 7m

BALL RETRIEVAL

- Net will collect made and missed shots
  - For proof-of-concept only made shots are collected

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REQUEST PASS MECHANISM

- User signal will trigger the ball launch
  - Will be implemented for prototype phase
  - An RF remote clicker to signal the launcher
  - Training a pixy 2 camera to detect hand gestures


Walnut Grove Gators
BUILDING A LASTING LEGACY

STANDARDS

- Safety of machinery - Indication, marking and actuation IEC 61310-1:2007
- Avoidance of mechanical and electrical hazards IEC 61310-1:2007
- Ergonomics of human-system interaction ISO 9241-11:2018
- IEEE Standard for System and Software Verification and Validation IEEE 1012-2016

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CRADLE-TO-CRADLE DESIGN

- Device is powered through a wall outlet rather than lead acid batteries
- Hardware components can be reused or otherwise properly disposed of in electronic waste depots
- PoC device is constructed using wood and is biodegradable
- Will be manufactured using ABS plastic

COMPETITIVE ADVANTAGES

- Ability to track players real-time
- Game-like feel to boost player performance
- Easy replacement of damaged components
- Reusability of hardware components
- Portability of the device

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COSTS AND FINANCING

Budget for proof-of-concept phase: $1100

Budget for prototype phase: $400

Budget for final product: $1500

Total Budget: $3000

Currently, all funding is out-of-pocket from all company executives

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PLAN FOR ENSC 440

- Improve quality of ball launch
  - Add higher quality wheels and couplers
  - Use distance data from Lidar to control launch velocity
- R&D of request pass mechanism
- Expand ball retrieval system to collect made *and* missed shots
- Add an option to operate as traditional shooting machine
- Work towards UI and appearance models

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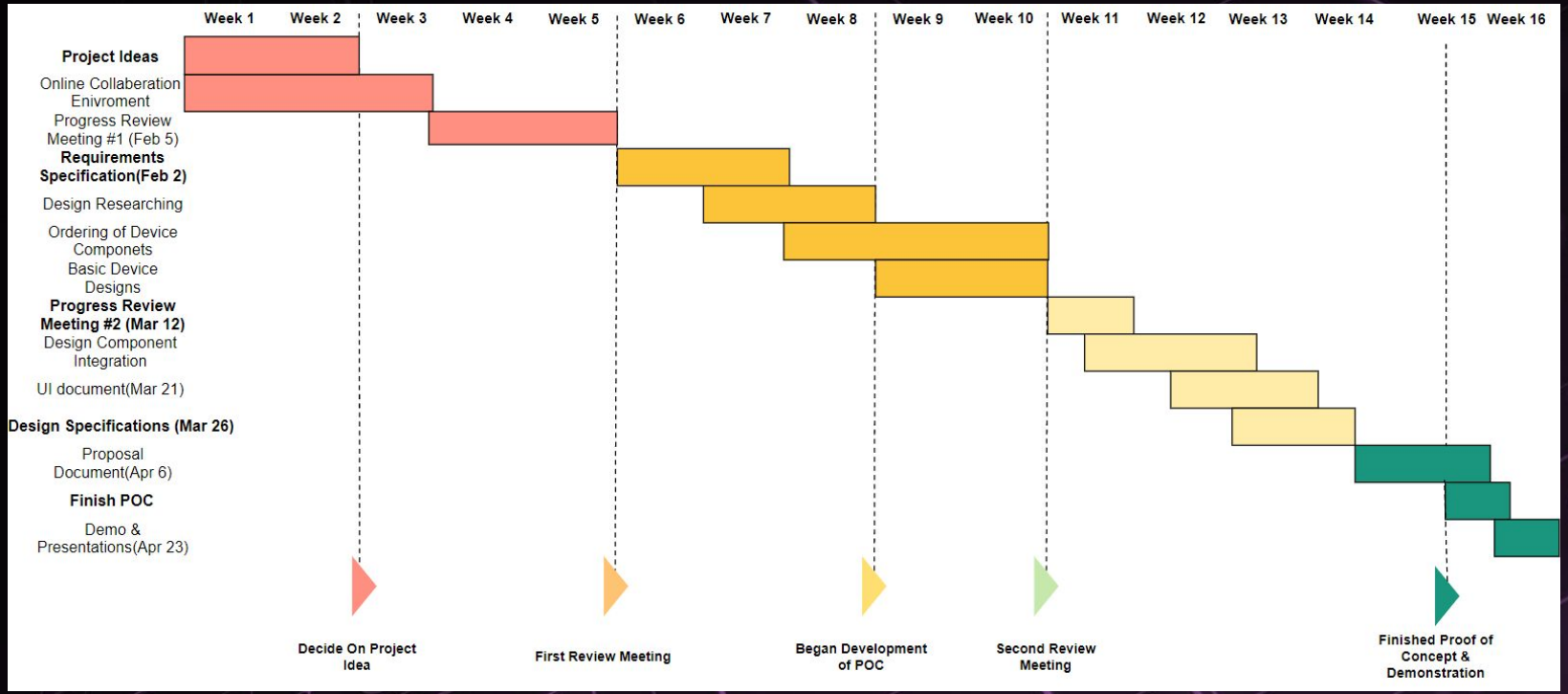
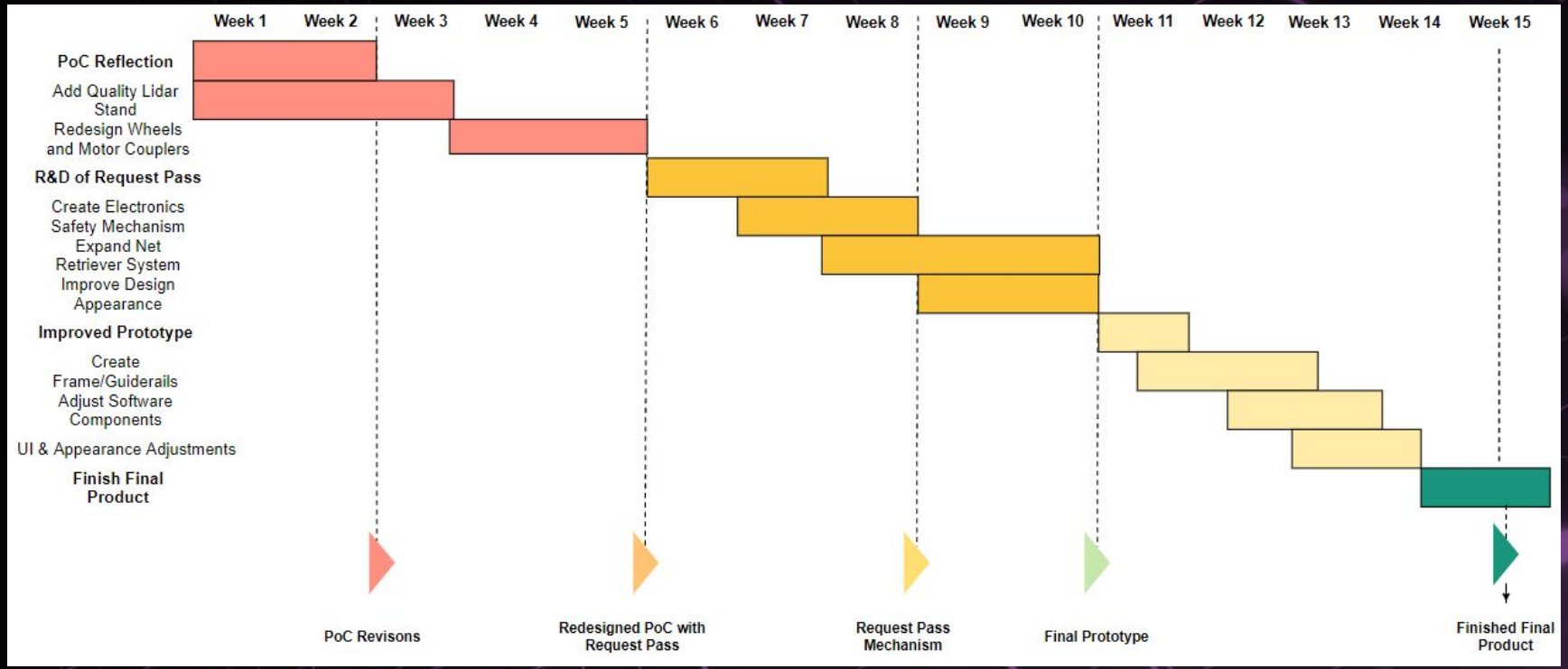
SCHEDULE - ENSC 405W



SCHEDULE - ENSC 440



MEET THE TEAM

CCO
Karan Kakkar

CEO
Rameshwar Kannan

CDO
Simone Neufeld

CSO
Santhosh Nandakumar

CTO
Ramish Khan

CIO
Tal Kazakov

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LESSONS LEARNED

- Make better use of GitLab to track progress
- Time management in coordination with project and documentation deadlines
- Managing the workload of each team member
- Handling unforeseen problems

IMPROVEMENTS FOR ENSC 440

- Purchasing equipment and supplies
  - More expensive than anticipated
  - Plan for/minimize extra expenditure
- Version control system to manage software scripts
- Assigning weekly tasks for each group member and tracking the progress

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PROOF-OF-CONCEPT GOALS TESTED

The 3 principal goals for the PoC device are as follows:

1. The user can be tracked in real-time by the LiDar in a 180 FOV
2. Swivel and Launching Mechanism rotate in line with the user
3. Ball can be launched 7m (21ft) to the user

The concept of an automatic basketball launcher has proven upon the fulfillment of these goals

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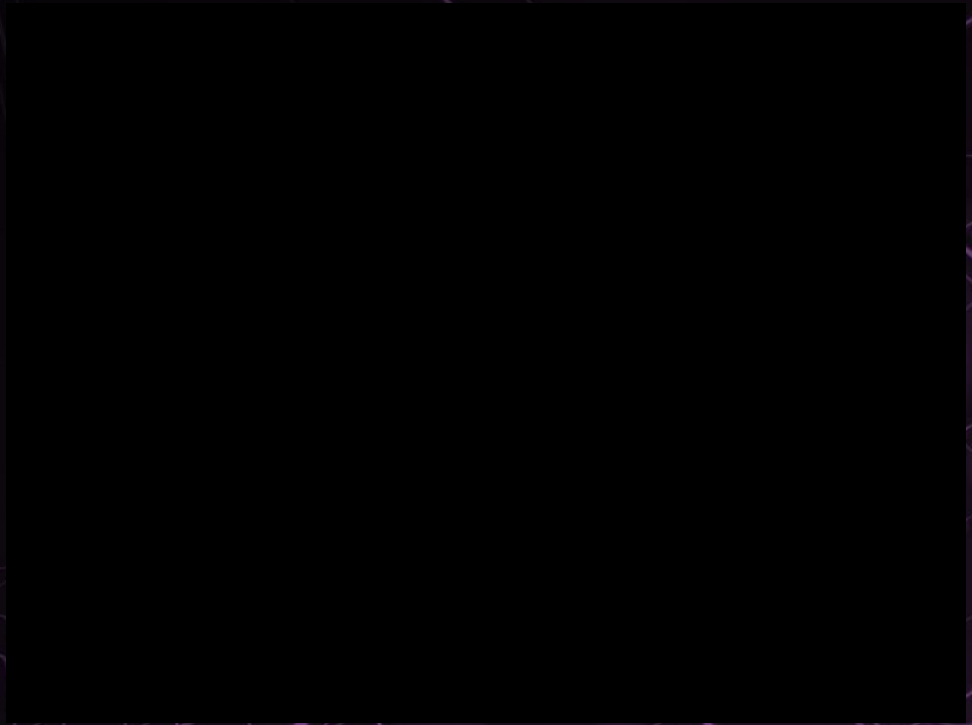
LIDAR ERROR RECOVERY VIDEO



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CONSIDERATION OF FEEDBACK

- The launching system uses two DC motors instead of one
- Arduino is replaced with a Raspberry Pi 3B
- Arduino’s processing speed is too slow to handle LiDar data
- Boost converter is used to run the high wattage motors
- Servo motor is used instead of a step motor in the swivelling mechanism

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ACKNOWLEDGEMENTS

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- Chris Hynes
- Richard Neufeld
- Dmitri Kazakov

PROOF-OF-CONCEPT DEVICE DEMO

QUESTIONS?

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