

TEDY (Technology for the Elderly and the Disabled by the Youth)

Aid for Visually impaired Bowlers

TEAM D

- Arisht Jain
- Deepanshu Kalra
- Srinivas Sivakumar
- Jayanth Harilela
- Rohit Shyla Kumar

Introduction

Our Idea:

1. Implement a pin detection algorithm using a Raspberry Pi camera.
2. Develop a mobile application with audio output for the number of pins fallen.
3. Create a permanent frame system for the Raspberry Pi and the camera, which the users may take to the bowling alley on the day of practice.

Implementation

Our algorithm uses a field of Computer Science called Image Processing to make deductions based on:

- Live video feed from a Pi Camera
- Color and position of the pins in a bowling lane

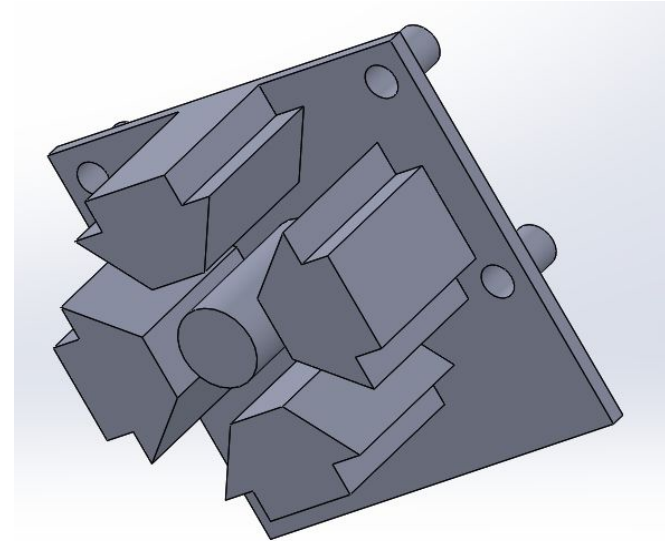
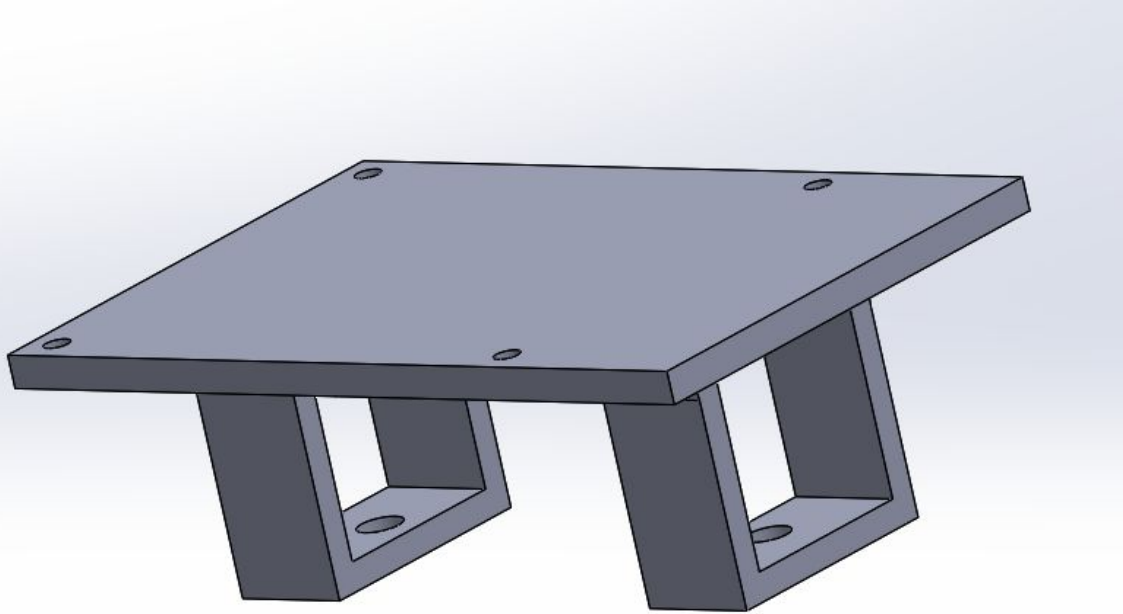
The frame uses Aluminium rods for the basic structure, which is then enhanced through the 3D printed mounts for the raspberry pi and the pi camera. Moreover, a pocket was made for easy storage and handling of the power source.

The frame incorporated a handle/ lever system to tighten and loosen the camera housing. The aim was to make the frame as user-friendly as possible.

Mechanical



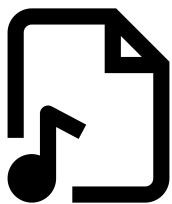
3D printed mounts



Implementation

Our Android application pairs with the raspberry pi over bluetooth to receive data as it processes the frames

We then implement a text to speech function on the phone to deliver aural alerts to the bowler on the pins that are remaining



Pin



Remaining



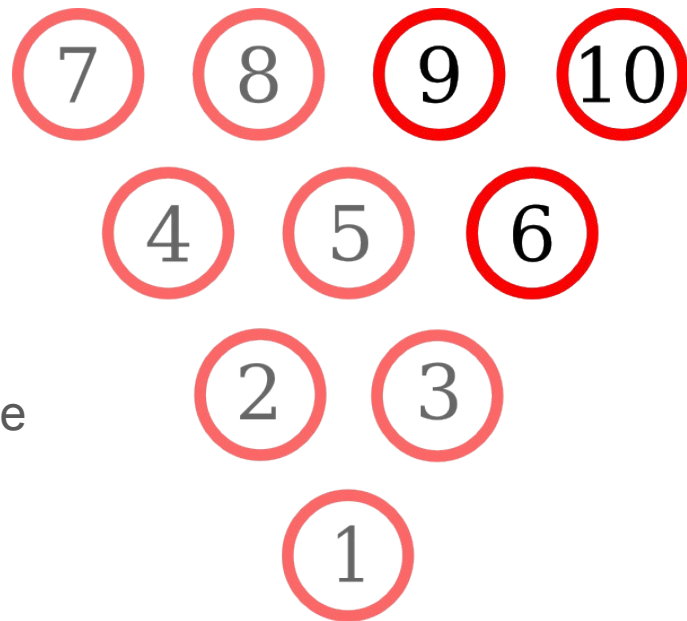
6



9



10



Mobile app

- Connects to the raspberry pi and obtains information about how many pins are left
- Provides audio feedback to assist bowlers
- Bowlers can know the number of pins other players have hit



The Algorithm

How it works

How it works

The actual image



How it works

Step 1 - Background Subtraction

Before



After



How it works

Step 2: Image Segmentation

Pin 7



Pin 3



Pin 2

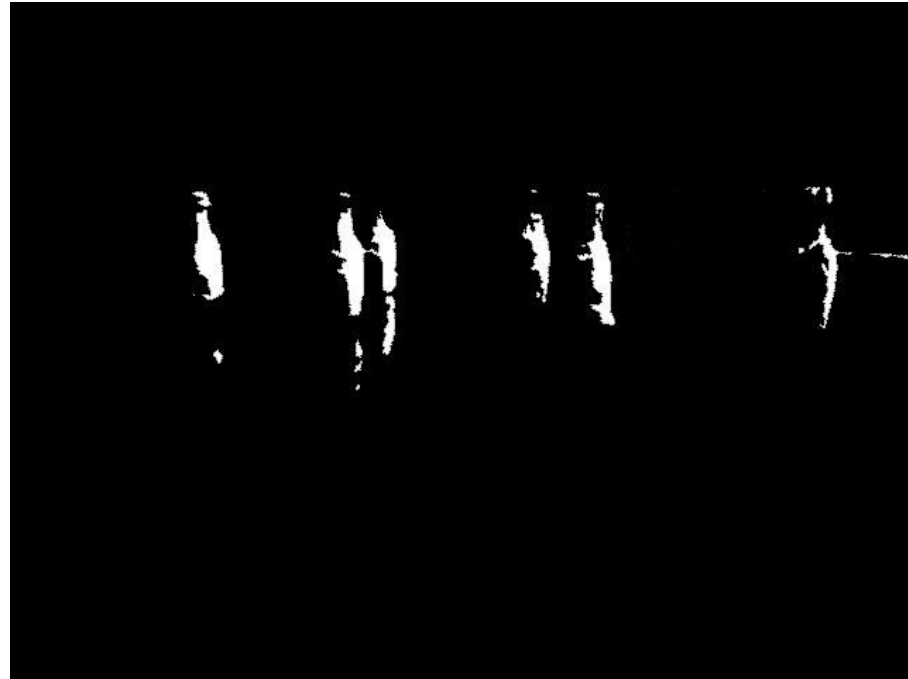


Pin 10



How it works

Step 3 - Comparison of the segmented images



How it works

Step 4 - Data Transmission and Presentation



How to use it

On tournament day,

- Helpers from the blind bowling association can take our frame and device to the alley and place it in one of the gutters by the lane as specified
- Each bowler can pair their mobile device with our product
- Let the game begin! No further setup is required.
- After the game, the frame and device can just be cleared out and stored until next time

Estimated cost of the Prototype

Material List:

Raspberry Pi Module	279
Raspberry Pi Power Adapter	61
Micro SD Card	60
Raspberry Pi Camera V2.1	173
30000 mAH Portable Power Supply	518
Nuts, bolts and suction pump	100
Total Cost	1191 HKD

DEMONSTRATION

The Next Steps

To further improve our innovation, we plan on:

- Integrating haptic feedback and data persistence into the application
- Porting the application to iOS
- Implementing a neural network system on a cloud to learn from data transmitted from the pi to enable better image segmentation through learning

ANY QUESTIONS?

THANK YOU