

A blue-toned photograph of the Georgia Tech Campanile, a historic red brick building with a tall, ornate spire and decorative stonework. The word "TECH" is visible on the side of the building.

ECE 4012 : Proposal Presentation

The AiR Drummers

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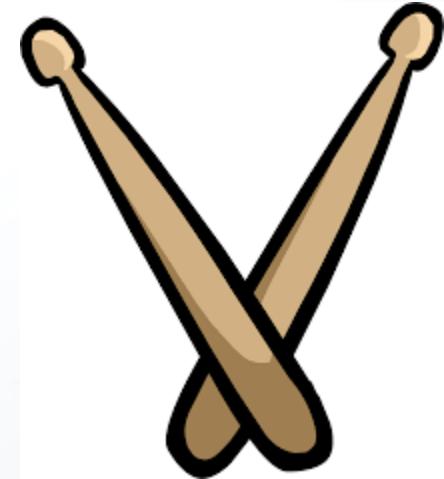
Background

- Virtual Reality Headsets
- VR applications for instructional purposes, gaming, etc

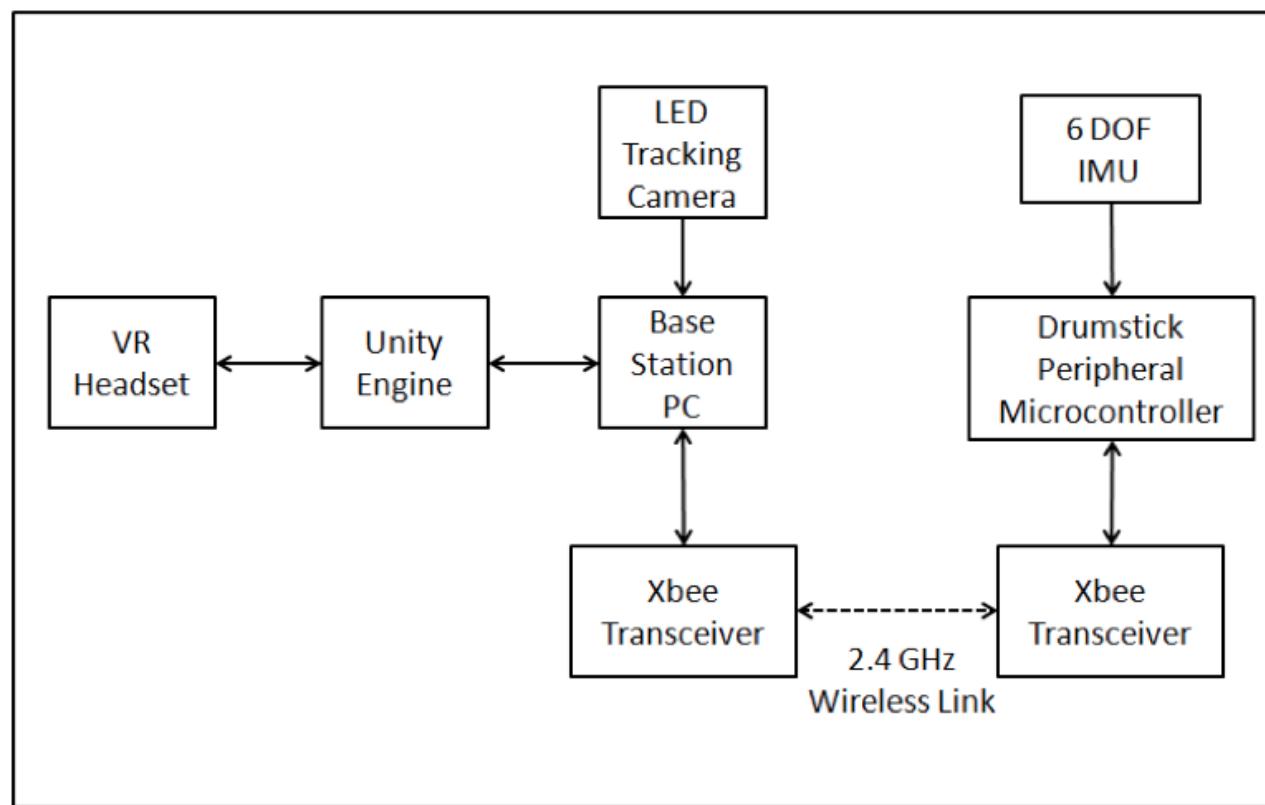


Project Objective

- Inexpensive, portable interactive VR system
- Drumming experience - learn, play
- Designed for amateur drummers & VR enthusiasts @ \$515



Design Approach



Hardware Implementation

- Custom Drumsticks
 - 3D printed
 - inserted with PCB & IMU
- Constraints
 - Weight
 - Seamless design



Hardware Implementation

- Interfacing
 - PCB creation
 - Serial port communication
- Constraints
 - Real time operation
 - Wireless communication



Hardware Implementation

- IMU & Pixy Integration system
 - Used for Drumstick calibration
- Constraints
 - IMU drift correction
 - Pixy 2D



Hardware Implementation

- Haptic Feedback*
 - provide drumstick collision feedback
- Constraints
 - Find appropriate feedback
 - Using collision time, visual & audio O/P to provide feedback
 - Hard to implement in real time



Software Implementation

- Drumset Simulation
 - making 3D drumset model in Unity
- Constraints
 - getting the actual size, shape & feel of drumset



Software Implementation

- Drumstick VR rendering in Unity
 - Using data from IMU & Pixy to simulate moving drumsticks
- Constraints
 - Implementing a feedback system to correctly simulate moving sticks



Software Implementation

- Interface communication
 - Connecting Unity with microcontroller to get sensor input
- Constraint
 - Never done before



Software Implementation

- Vision System - Pixy
 - Using Pixy detection to correct IMU drag
- Constraints
 - Pixy limited to 2D
 - Coordinating Pixy & IMU output



Cost analysis

No.	Product Description	Quantity	Unit Price (in \$)	Total Price (in \$)
1.	Oculus Rift	1	350	350
2.	Pixy camera (CMUcam5)	1	80	80
3.	Microcontroller (Arm Cortex M3)	1	15.65	15.65
4.	Inertial Measurement Unit (ITG3200/ADXL345)	1	39.95	39.95
5.	XBEE Trace Antenna	1	24.95	24.95
6.	Drumsticks	2	5	5
7.	Leap Motion - alternative to (2)	1	80	80 (alt)
Total - (Cost of Oculus Rift)				165.55
Total				515.55

Status

- Oculus Rift setup
- Simple Unity application with Oculus rift integration implemented



Schedule

