Frisbee Analytics
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Goal
- Design a Frisbee with an embedded sensor that performs real-time analysis on the motion of the Frisbee. The device will provide feedback for training purposes. It must be lightweight so as to not affect the weight and aerodynamics of the Frisbee. Additionally, it must be energy efficient and have a small formfactor. Wireless transmission will communicate raw data for the duration of a real match.

Motivations and Objectives
- Motivations
  - Sensors embedded within sports equipment can take more precise measurements and provide more relevant feedback on throwing form and technique
  - Realtime positioning provides information for live commentating
- Objectives
  - To create lightweight, non-intrusive sensor to capture dynamics of frisbee
  - To transmit the signals to a phone in real time
  - Realtime analysis with dropping frisbee vs catching frisbee

Design Challenges
- Near Realtime Communication Protocol
- Relative Localization
- Event Detection (frisbee analysis)
- Energy Efficiency

Acknowledgement
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Technical Specifications
- Device is attached to frisbee
  - Small Form Factor
  - Area around the size of a quarter
- Minimally effects on frisbee trajectory
  - Lightweight
  - Preserves constant rotational momentum
- Device has a variety of sensors
  - Accelerometer & gyroscope
  - Bluetooth Sensors
- Low power
  - Battery can last five hours operating continuously (sufficient for a game of Ultimate)

Results

Fig 1. A filmstrip of the frisbee being tossed in the air

Fig. 2 The graph of the 3-axis gyroscope of frisbee in air

Fig. 3 A graph of the 3-axis accelerometer after landing

References