Bluetooth Gesture Recognizer Glove

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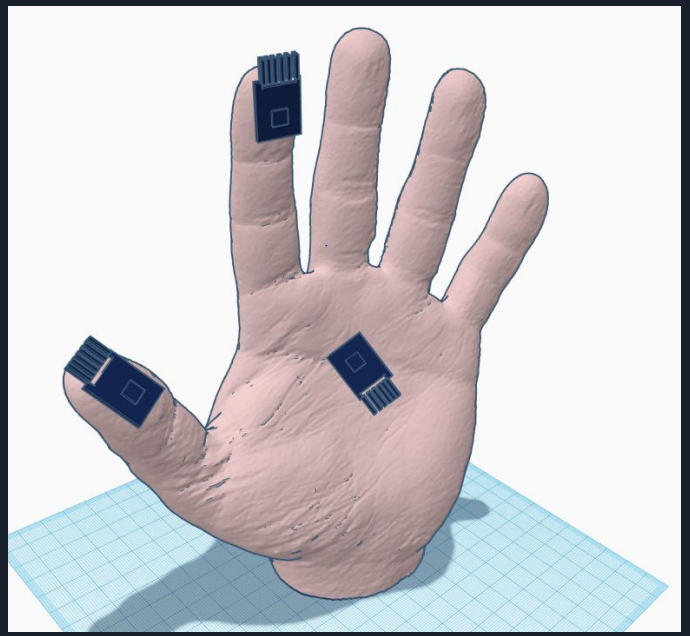
Introduction
Background and Motivation

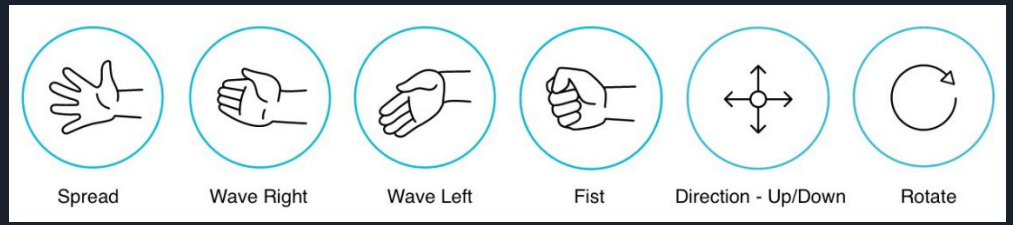
- Keyboards and mouse do not capture human behaviour effectively

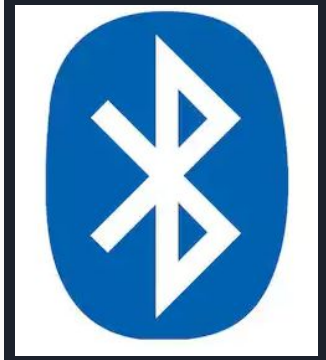
- Human hands are high bandwidth communication medium

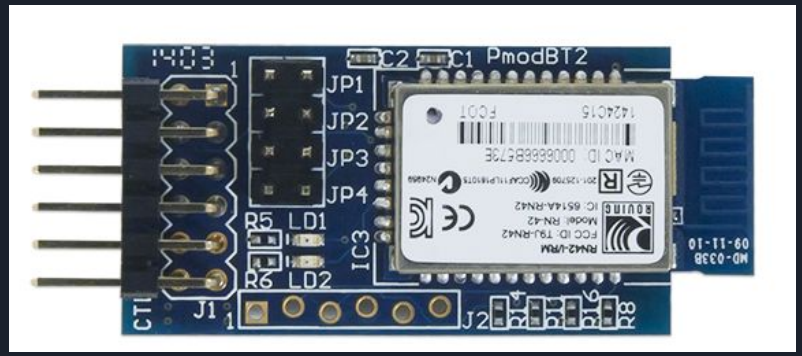
- Existing glove controllers are not very successful

Introduction
IoT Aspect

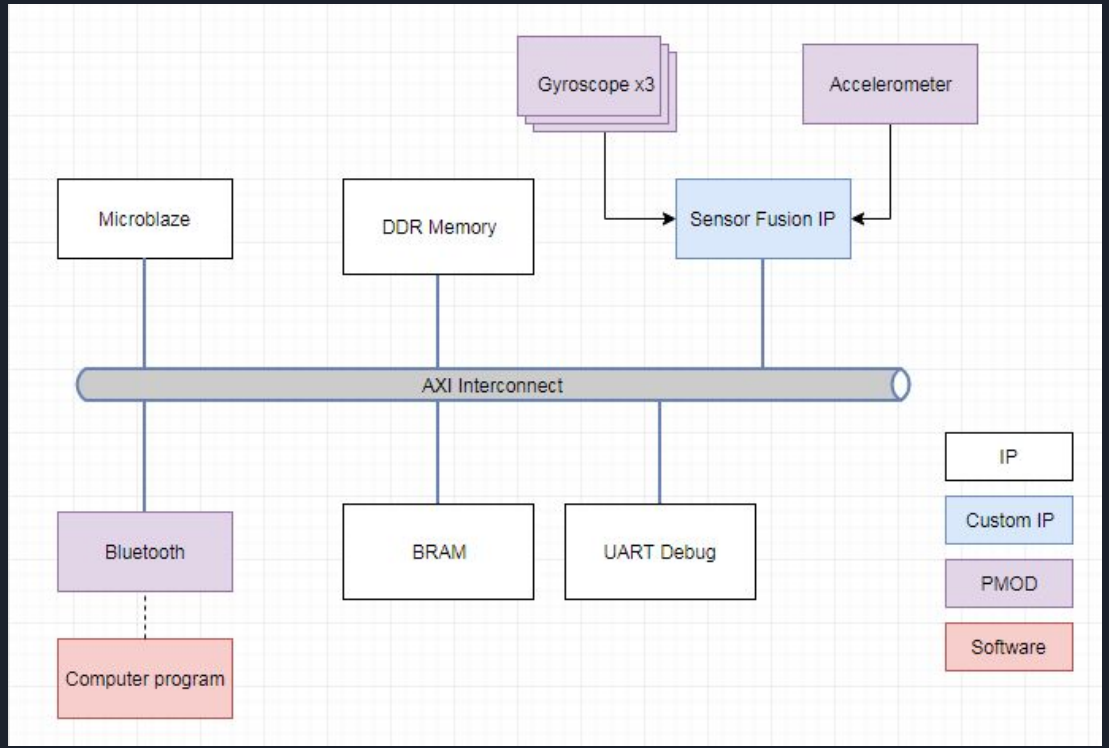








System Overview Block Diagram



- SPI interface between sensor and fusion ip
- Store program in BRAM
- store sensor raw data onto DDR Memory
- Microblaze facilitates Bluetooth communication

System Overview
Testing & Methodology

Block Name	Testing Methodology
Sensor Fusion	1. Verify sensor reading functionality via example project 2. Testbench for multiple sensor reading and SPI master interface 3. Testbench for sample angle readings to gesture prediction
Bluetooth communication	1. Use JTAG UART to monitor and verify data and bluetooth communication
DDR Memory	1. Testbench to verify read & write functionality of block 2. Test on system level to verify data storage

Risks & Uncertainties

- **Algorithm complexity:** 2 different types of sensor and 4 units in total. It is a challenge to compute all the data collected and simulate the movement and gesture correctly.

- **Accuracy of detection:** There are always noises and errors on sensor data and those may greatly affect the output. Need to build up a solid model to ignore/correct the noise collected.

Risks & Uncertainties

- **Hardware latency:** As using wires with different lengths, the latency of each sensor will be different. The simulation might have errors due to the latency and that needs to be handled.

Milestones

Milestones	Description	Date
# 1	Research and prototype sensor and glove placement	February 7th, 2019
# 2	Sensor modules ready: Read values into the FPGA and display	February 14th, 2019
# 3	*Reading Week milestone:* Microblaze/DDR setup and sensor fusion algorithm	February 28th, 2019
# 4	Finish Sensor Fusion IP. Build sample application to showcase controller. Bluetooth module setup.	March 7th, 2019

Milestones

Milestones	Description	Date
# 5	**Mid-Project Demo:** Bluetooth module ready to transmit real time data to PC	March 14, 2019
# 6	Modules integration and simple GUI design	March 21, 2019
# 7	**Final Demo!** Final inspection	March 28, 2019

Open Questions