

A Cost Effective Solution to Wheelchair Basketball Mobility Performance Monitoring

Aims

Develop a sensor-based system to measure wheelchair basketball athlete kinematics with a focus on **affordability, ease of use, and practicality**

Objectives

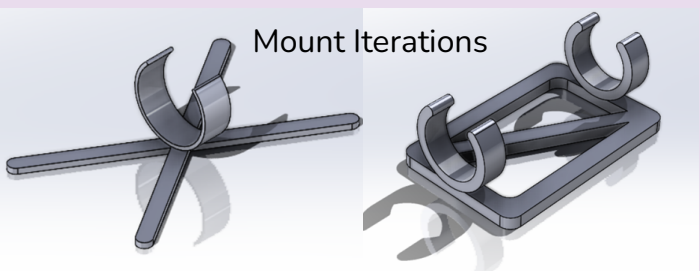
- 1) **Define** key performance metrics
- 2) **Develop** a system capable of measuring these metrics
- 2) **Derive** key performance metrics
- 3) **Validate** system accuracy
- 4) **Develop** a user-friendly data visualization platform.

Background

- 1) **Performance** in wheelchair sports is heavily influenced by **linear and rotational accelerations**.
- 2) **Existing methods** for evaluating wheelchair kinematics are often **costly and complex**.

Methodology

- 1) **Sensor Configuration**: System configured to the center of the wheelchair frame
- 2) **Algorithm Development**: Data processing and Analysis
- 3) **Testing & Validation**



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Cost Comparison Table

Shimmer3 IMU Unit	NGIMU (X-IO technologies)	Movella Dot Sensor	Designed System
£370	£250	£112	£50

Sensor Mounting to Frame

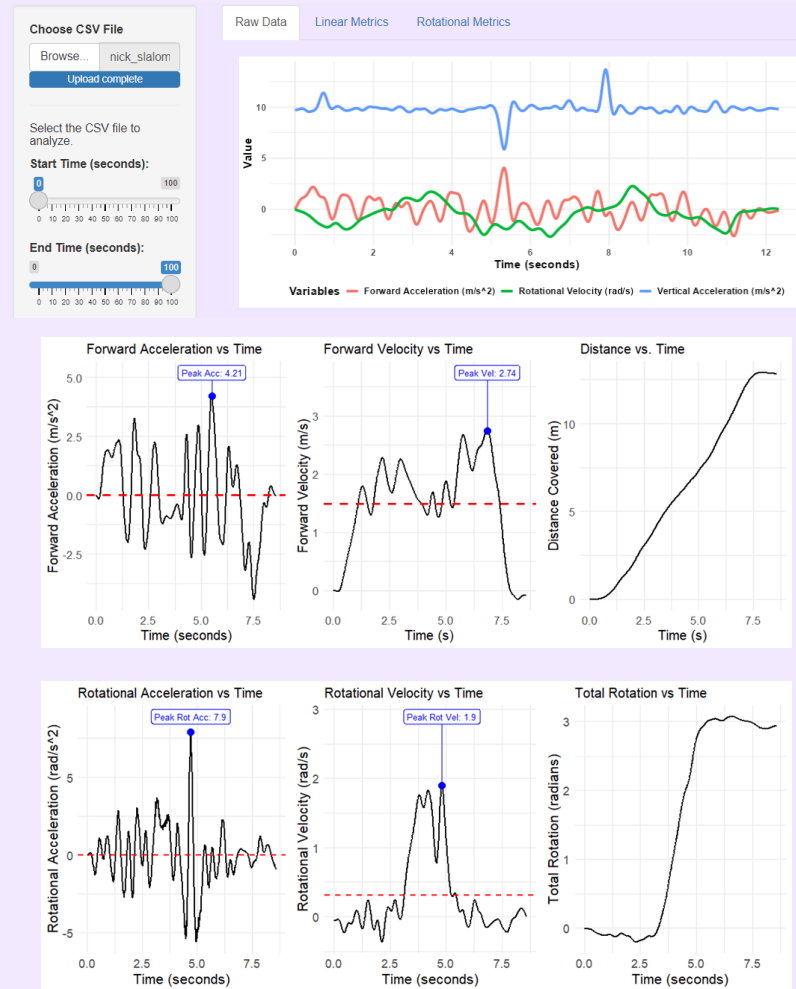


Multisport Wheelchair (Motivation)



Results

Developed App Dashboard & Performance Metrics Offered:



Conclusion

- 1) Achieved **over 50% cost reduction** compared to market alternatives.
- 2) **Lower accuracy** than high-end systems, yet relevant metrics.
- 3) **Future**: Real-time metrics, enhanced UI, compactness, and portability