

# *The Development and Evaluation of a Novel IMU system for Barbell Velocity Measurement*

*M. O'Reilly, R. Dolan, P. Hanratty, J. Pawlak, J. Eberle, D. Whelan*

School of Public Health, Physiotherapy and Sports Science  
Insight Centre for Data Analytics  
University College Dublin, Ireland

hello@outputsports.com

		social	
			web
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*What would your ideal S&C  
tech measure?*





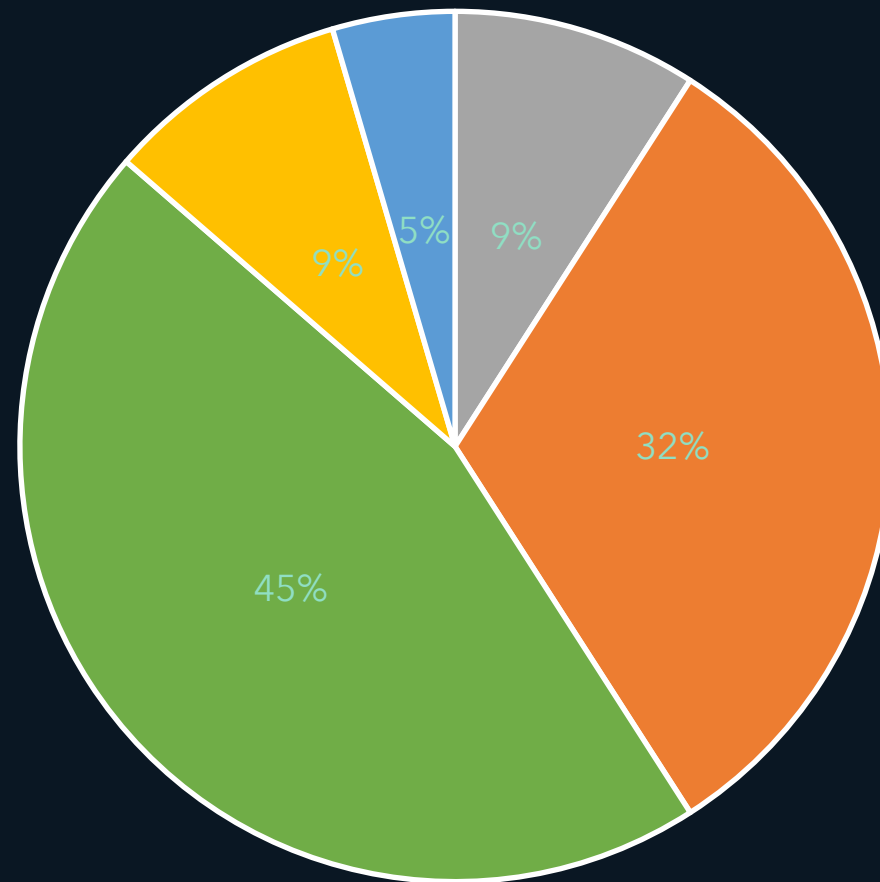
# THEIR ANSWER

# VBT

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Strength  
Technique  
Mobility  
Reactive Strength  
Balance  
Speed  
Agility

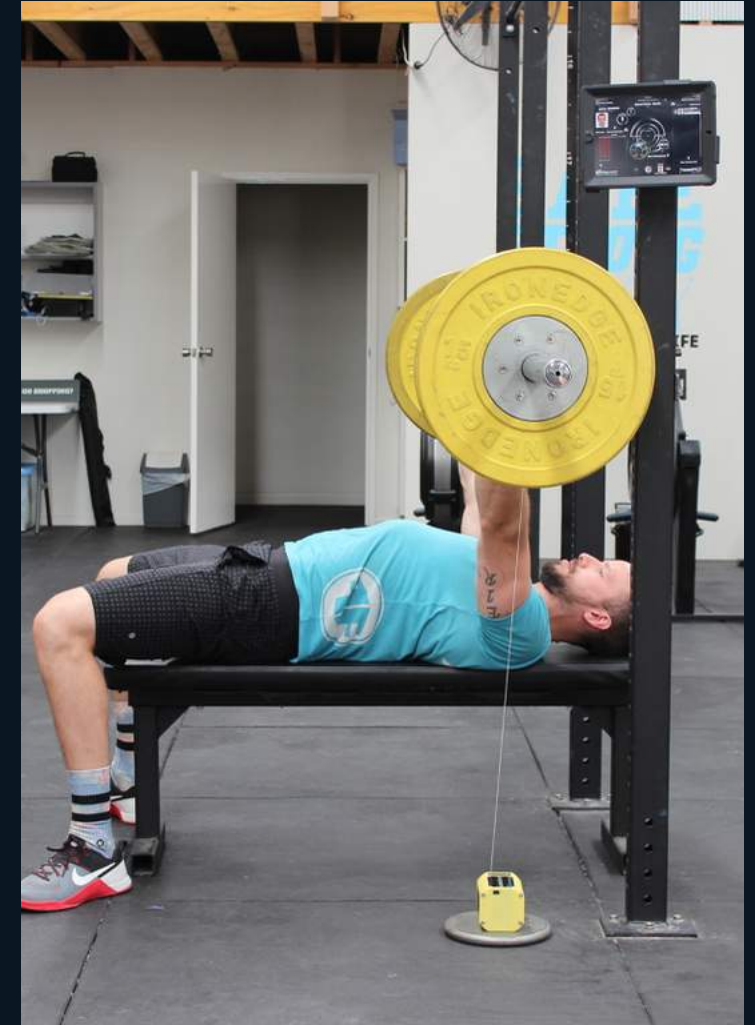
What is the most important factor to you when choosing to work with technology?



■ Ease of use ■ Reliability ■ Validity  
■ Cost ■ Software

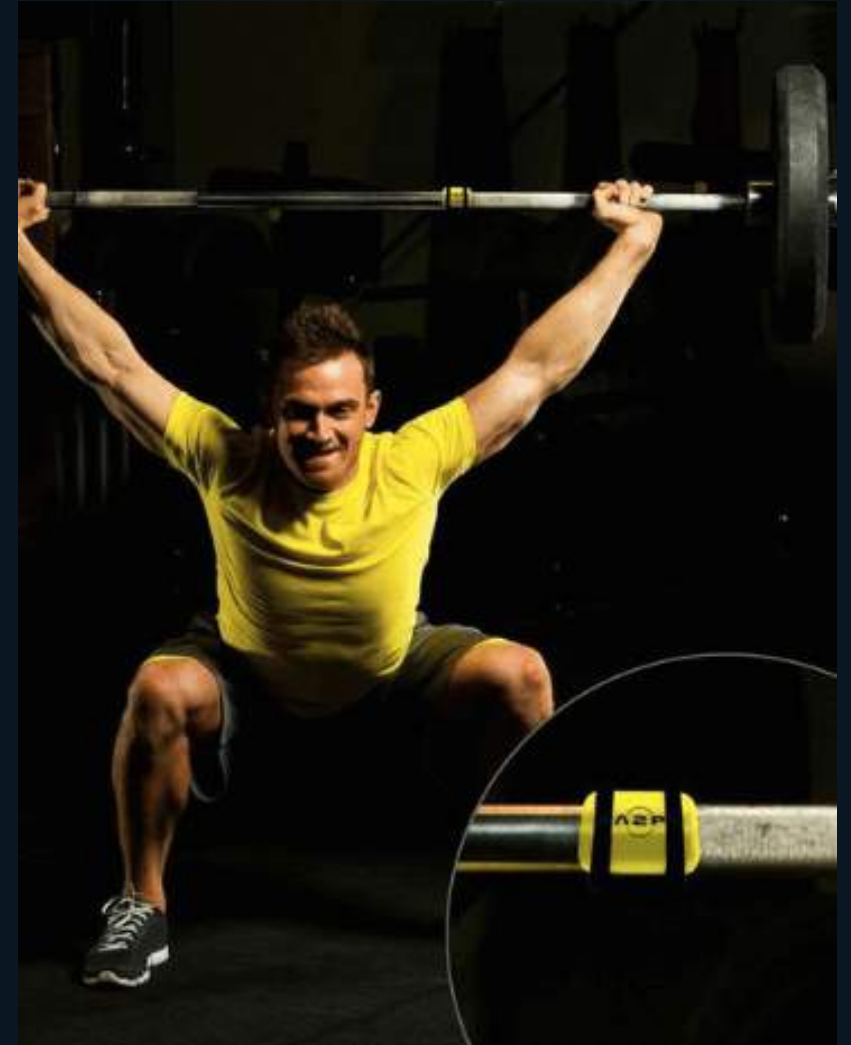
# LITERATURE - LPTs

Device	Mean-Velocity <i>r</i> -value	Mean Velocity - RMSE (m/s)
GymAware	0.96+	0.06
Speed4Lift	0.98+	0.02
T-Force	0.97+	0.07
Tendo-unit	0.96+	0.04



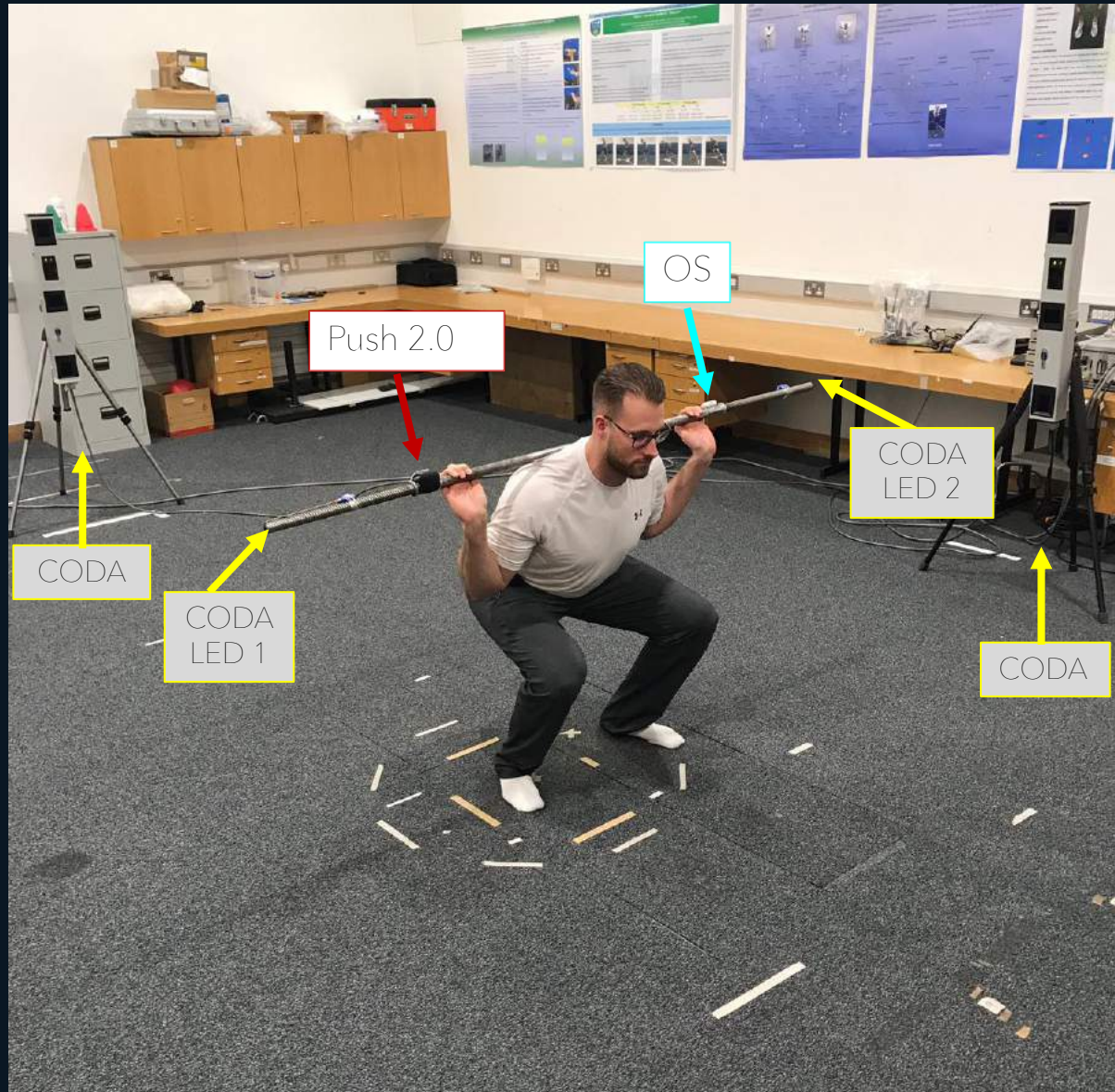
# LITERATURE - IMUs

Device	Mean-Velocity <i>r</i> -value	Mean Velocity - RMSE (m/s)
Bar Sensei	~0.92	0.10
PUSH 1.0	~0.86	0.09
PUSH 2.0	?	?
Beast	~0.77	0.21
Myotest	~0.61	.23





# DATA-CAPTURE





# DATA-CAPTURE

28 Participants

Bench-Press and Back-Squat

4 x 10 reps w/ pause

4 x 10 reps w/ no pause

Set 1 - "slowest-possible"

Set 2 - "33% of max-possible"

Set 3 - "66% of max-possible"

Set 4 - "fastest-possible"

# DATA-ANALYSIS



Motion Capture  
Output Sports

PUSH 2.0 (not included due to missing reps)

Mean & Peak Velocity:

RMSE

Pearson's Correlation

Bland-Altman Analysis

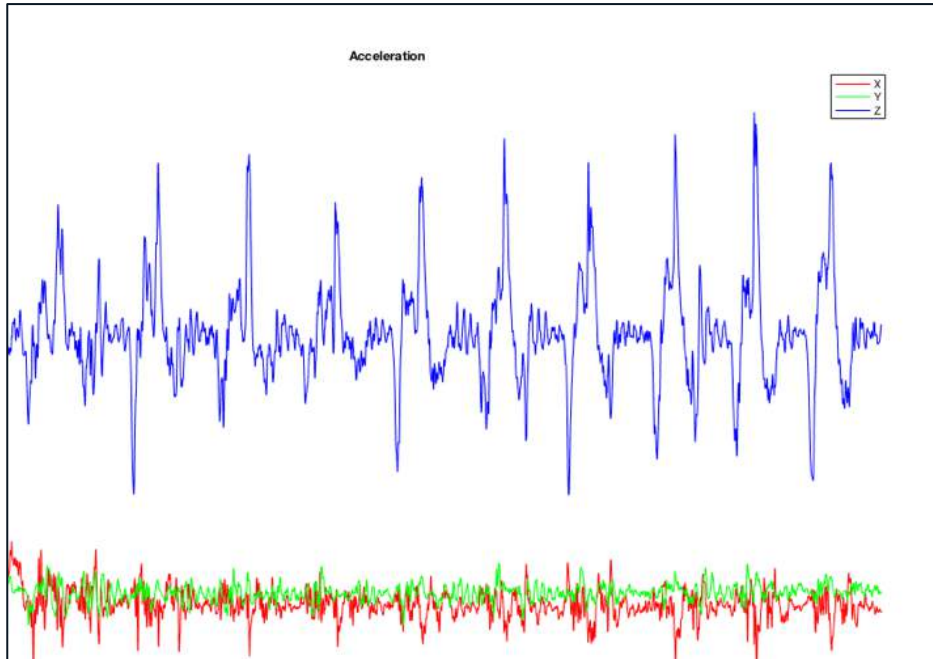
Coefficient of Variation (CV)



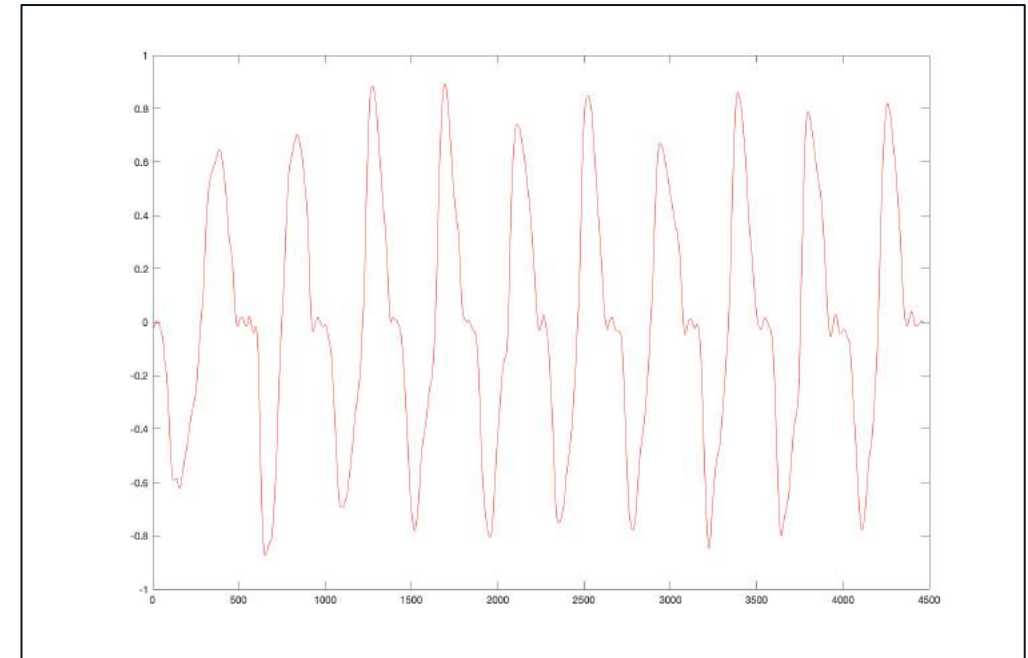


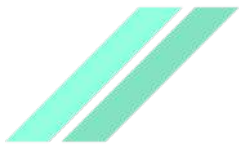
# ALGORITHM DEVELOPMENT

Raw accelerometer and gyroscope data

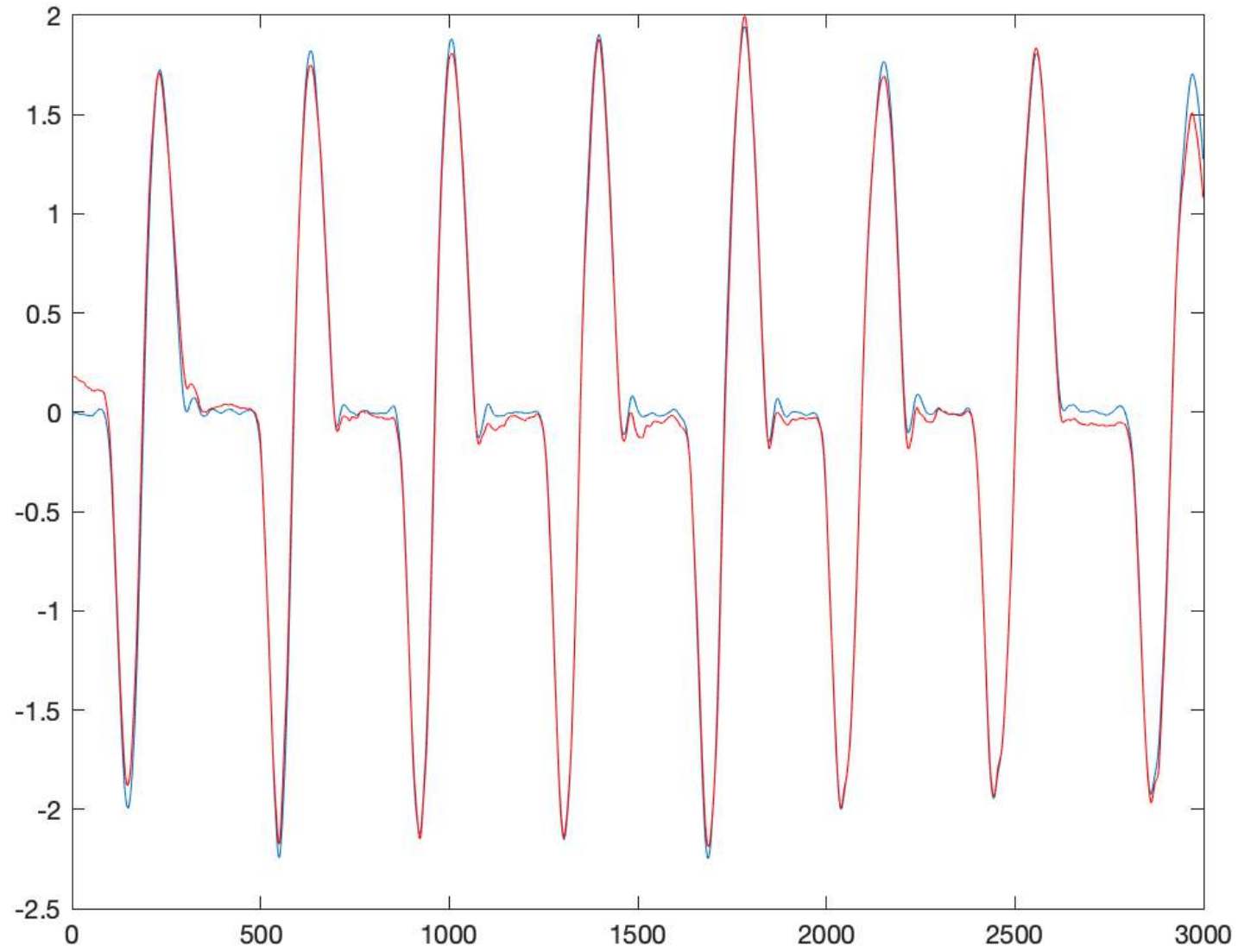
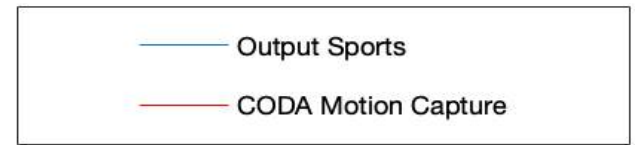


Motion capture's velocity signal



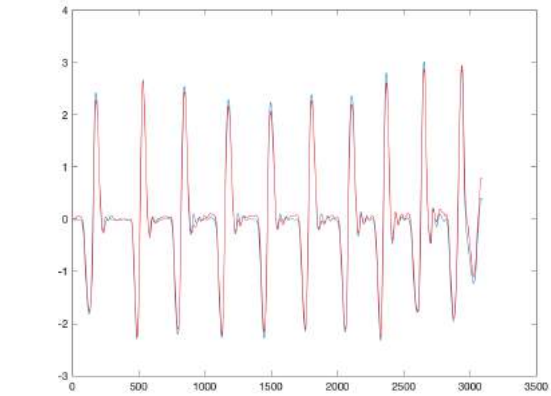
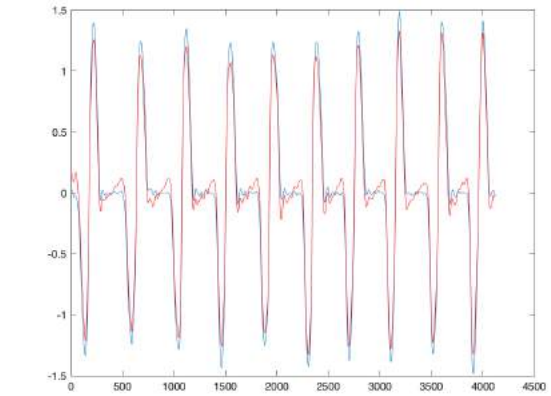
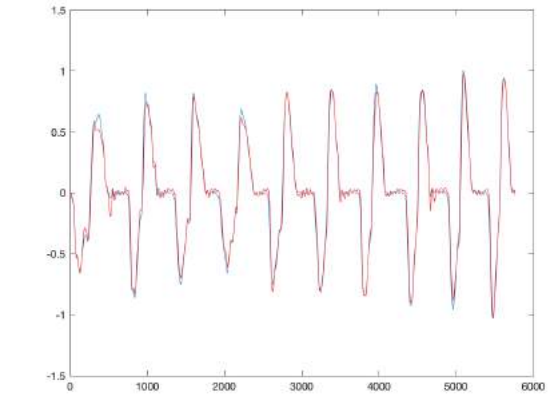
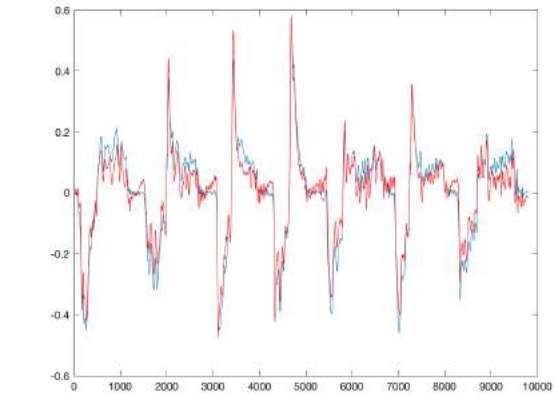
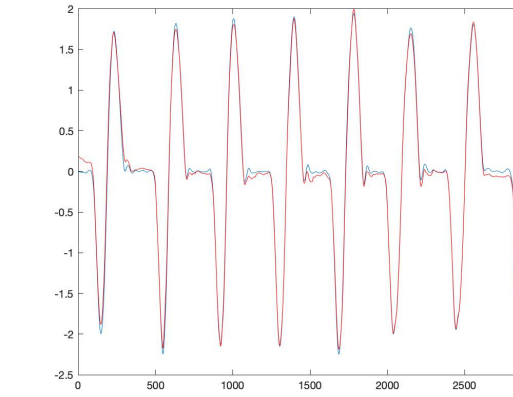
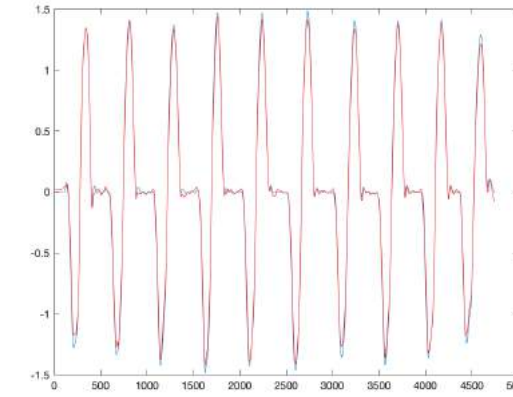
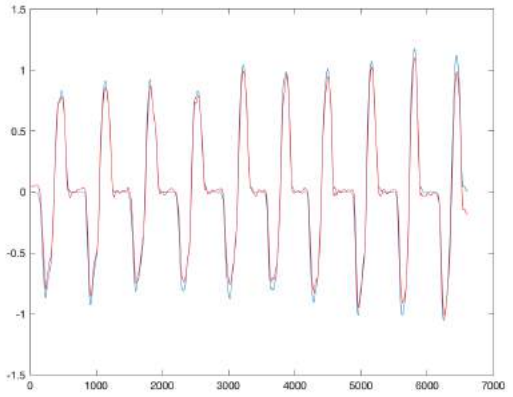
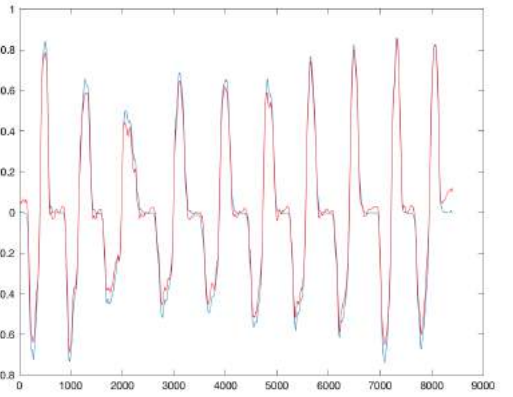
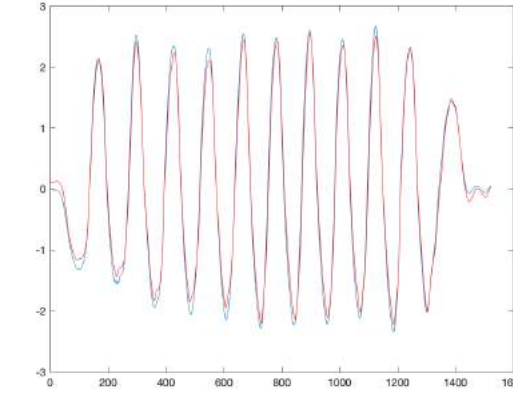
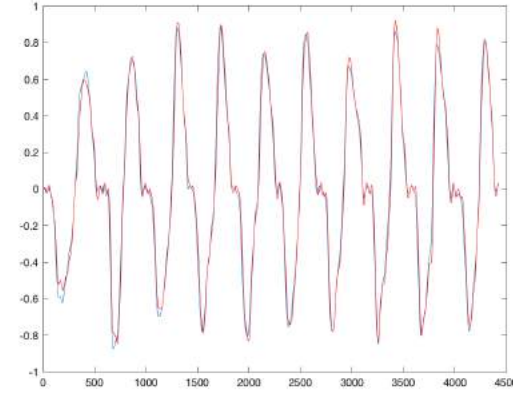
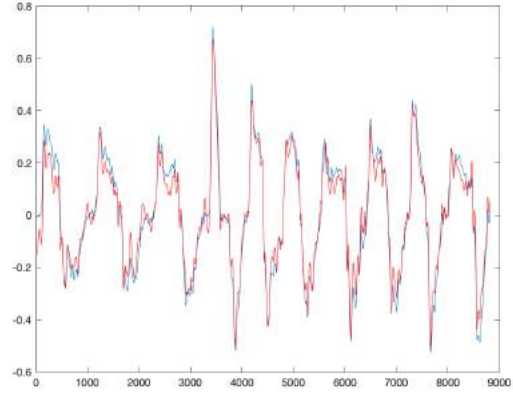
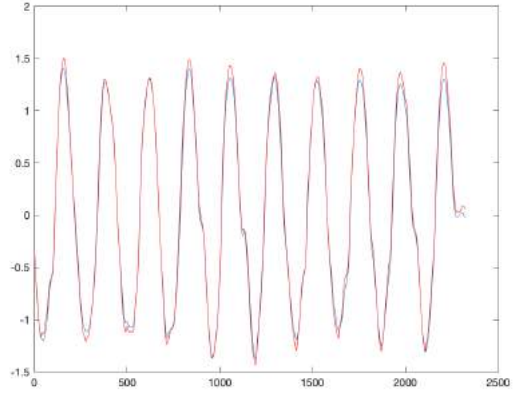
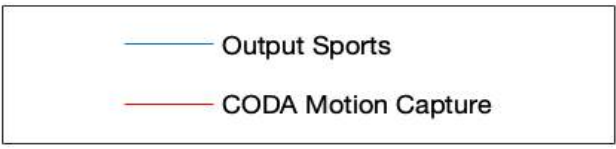


# SAMPLE OUTPUT DATA



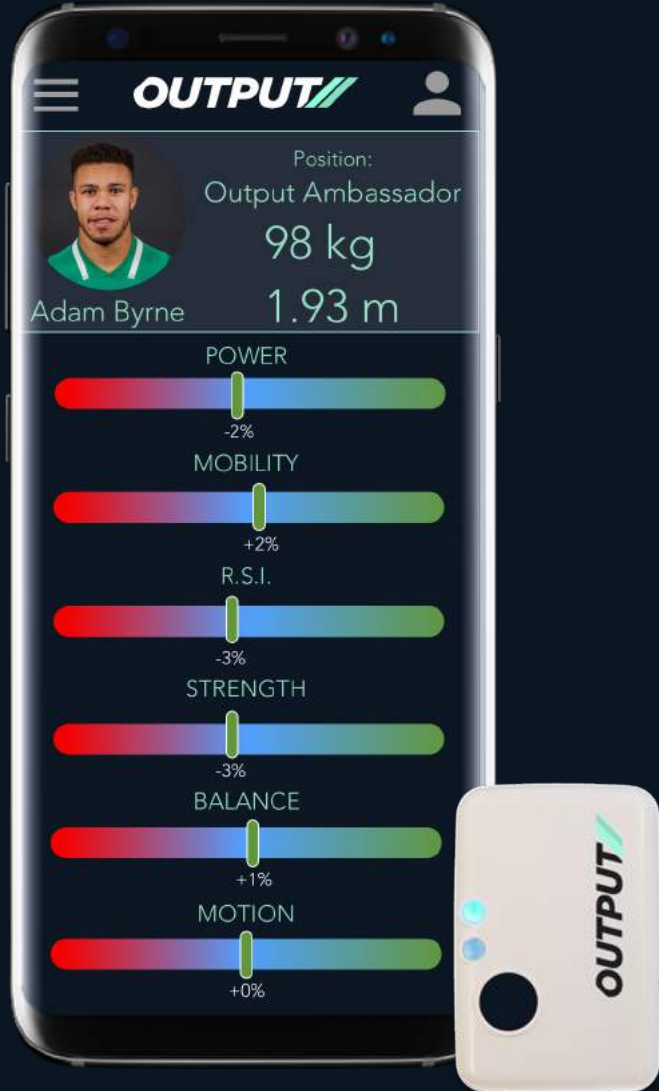


# MORE SAMPLE DATA

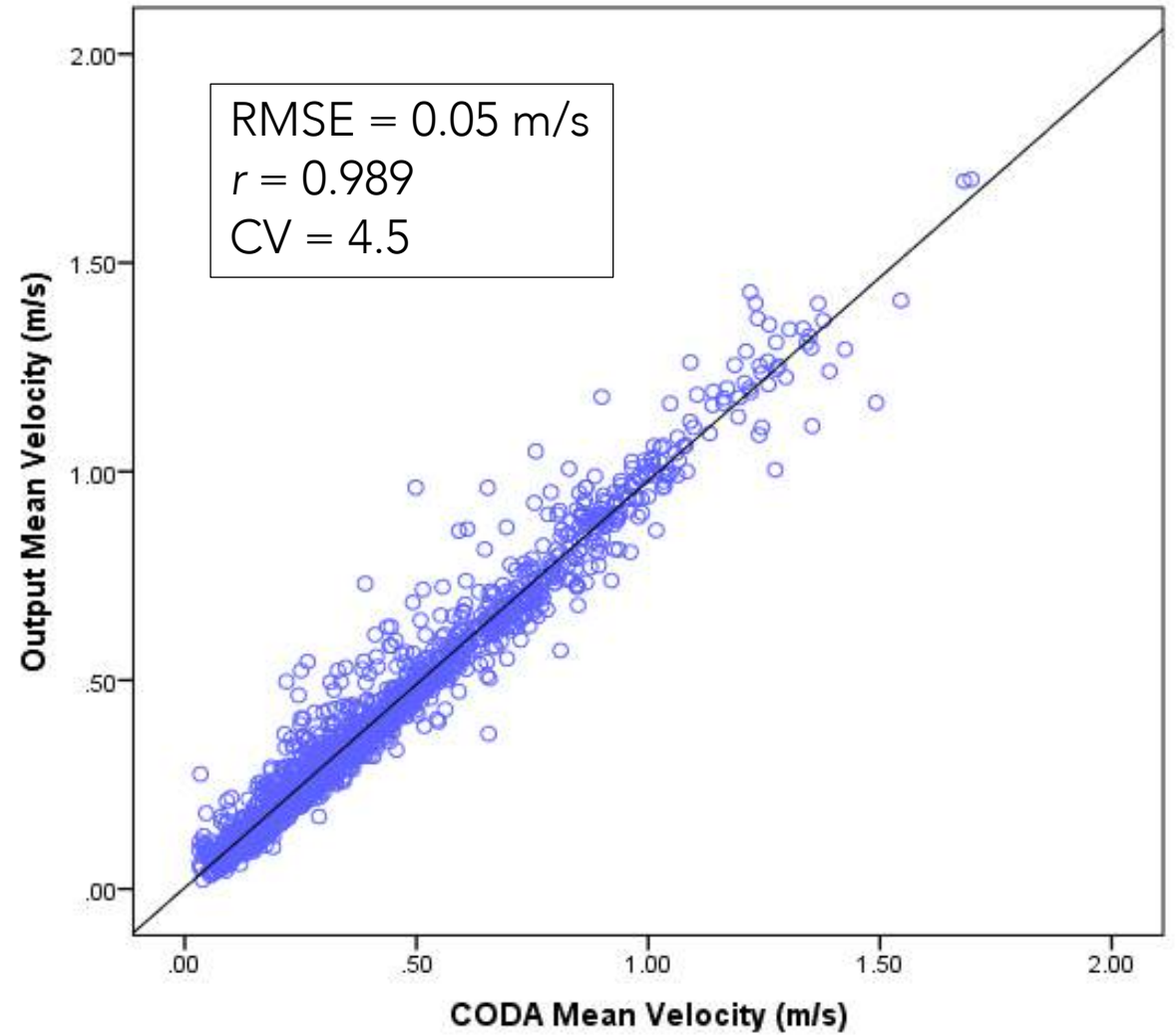




# RESULTS //

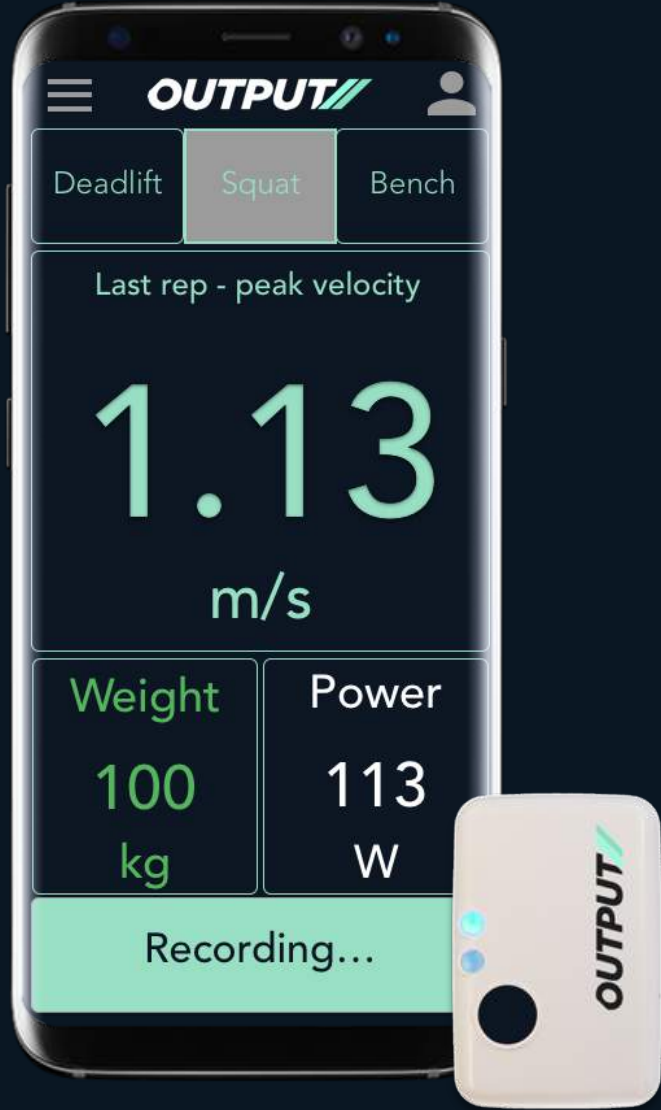


# MEAN VELOCITY

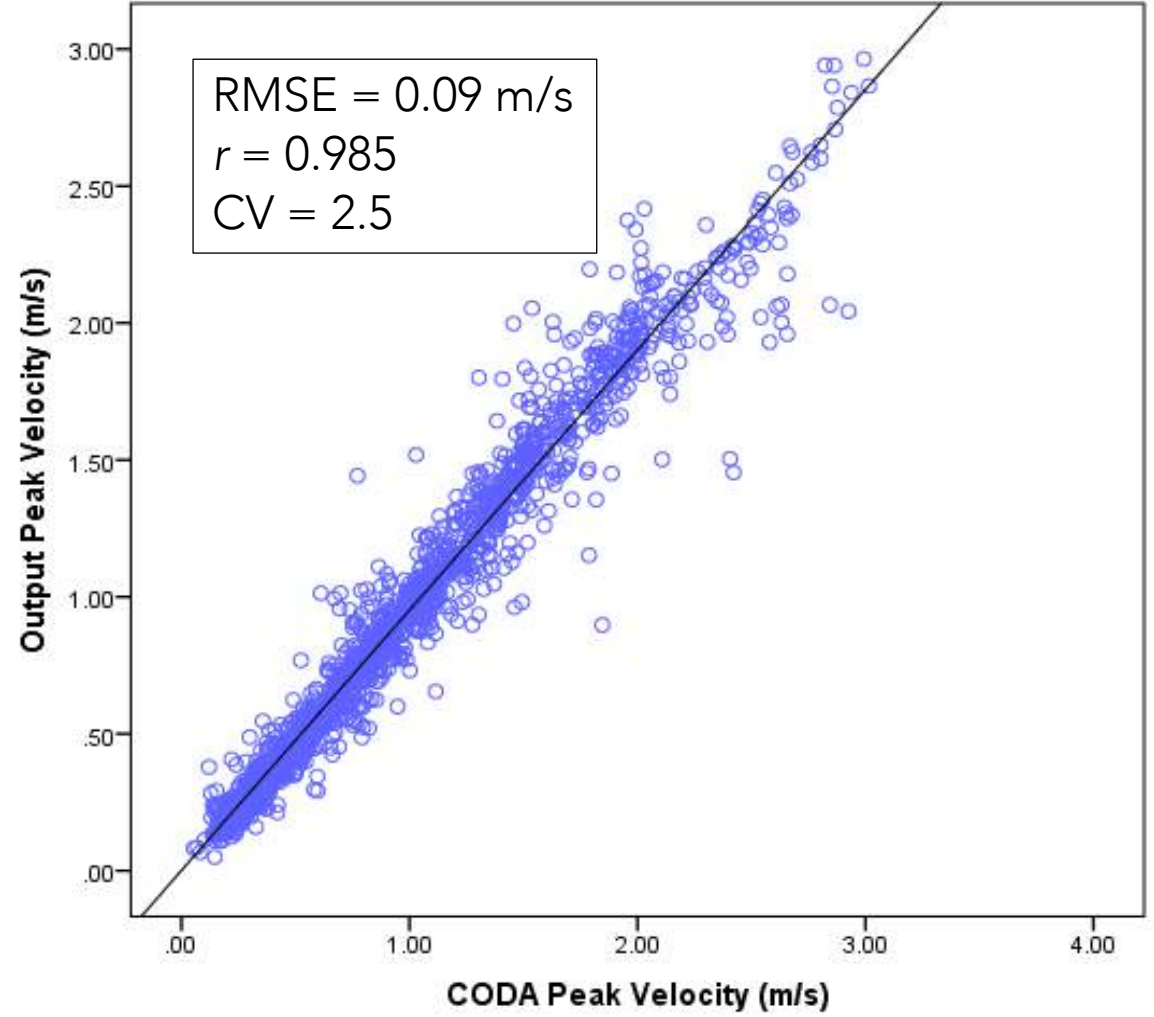




# RESULTS //



# PEAK VELOCITY





# CURRENT WORK //

Algorithm-refinement

Usability

Functionality

UX

30+ co-development partners UK/IRE

Seeking international co-dev partners

RESEARCH TO THE FIELD  
LAUNCHING WINTER 2019

EXCELLENT CONCURRENT VALIDITY WITH  
BIOMECHANICAL RESEARCH EQUIPMENT

# OUTPUT

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