

OPTIMISING PERSONAL MEDICAL INSIGHTS BY INTRODUCING A SCALABLE HEALTH INFORMATICS APPLICATION

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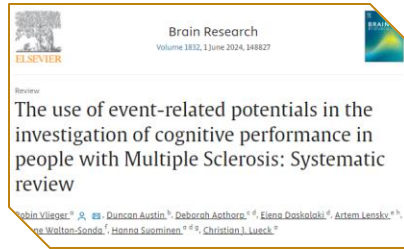
^a The Australian National University, ^b University of New England, ^c University of Turku



Australian
National
University

BACKGROUND

“Our Health in Our Hands” (OHIOH), a strategic initiative by The Australian National University (ANU)



Integrating Multiple Inputs Into an Artificial Pancreas System: Narrative Literature Review

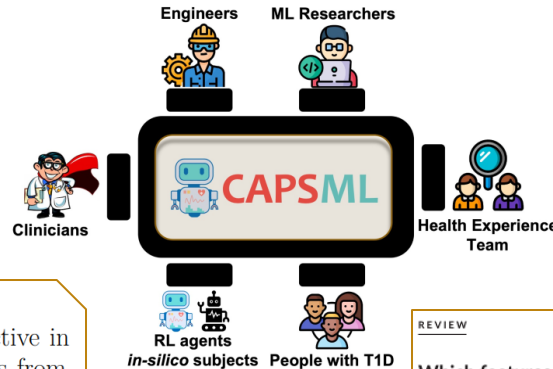
Chirath Hettiarachchi¹; Elena Daskalaki¹; Jane Desborough²; Christopher J Nolan^{3,4}; David O'Neal^{5,6}; Hanna Suominen^{1,7,8}

Evaluating Effects of Resting-State Electroencephalography Data Pre-Processing on a Machine Learning Task for Parkinson's Disease

Robin VLLIEGER^{a,1}, Elena DASKALAKI^a, Deborah APTHORP^b, Christian J. LUECK^a and Hanna SUOMINEN^{a,c}

Robust Feature Engineering for Parkinson Disease Diagnosis: New Machine Learning Techniques

Max Wang¹; Wenbo Ge¹; Deborah Apthorp^{1,2}; Hanna Suominen^{1,3,4}



Which Features of Postural Sway are Effective in Distinguishing Parkinson's Disease Patients from Controls? An Experimental Investigation

Wenbo Ge^a, Deborah Apthorp¹, Christian Lueck^{1,5}, and Hanna Suominen^{a,1}

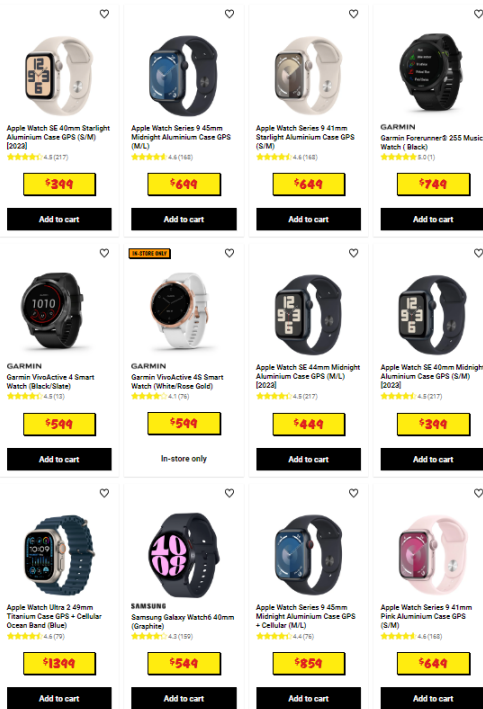
REVIEW

Which features of postural sway are effective in distinguishing Parkinson's disease from controls? A systematic review

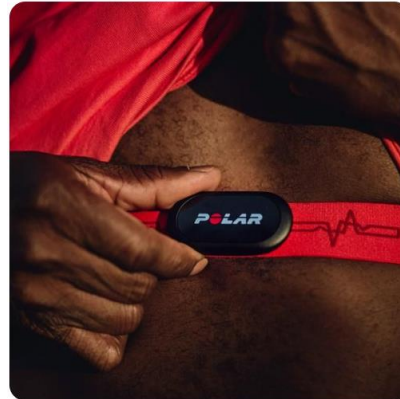
Wenbo Ge¹ | Christian J. Lueck^{2,3} | Deborah Apthorp^{1,4} | Hanna Suominen^{1,5,6}



INTRODUCTION



<https://www.jbhifi.com.au/collections/health-fitness-wearables/smart-watches>



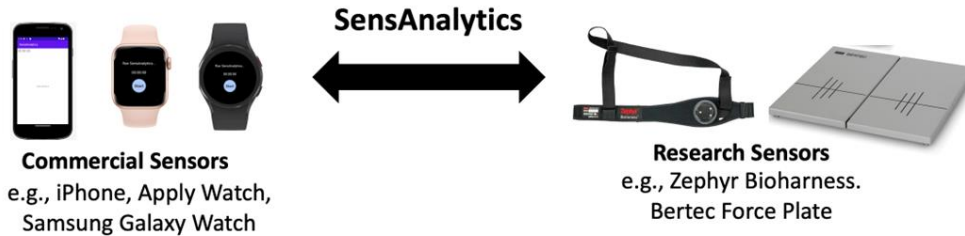
<https://www.polar.com/au/en/sensors/h10-heart-rate-sensor>



<https://www.bertec.com/products/force-plates>



METHODS



How to use SensAnalytics?

1. Selecting the sensor
2. Specifying an Analysis Type:
 - Individual or cohort
3. Data Upload: CSV (<200MB)
4. Preprocessing, Feature Extraction, & Visualisation
5. Analysis

The screenshot shows the SensAnalytics web interface. The sidebar menu on the left includes icons for a medical cross, a DNA helix, a document, and a flask, with the text "OHIOH" below them. The main content area is titled "SensAnalytics" and contains an "About" section, a "Select Sensor & Parameters" section with a dropdown menu showing "Apple Watch 7", and a plot titled "Electrocardiogram (ECG)". The plot shows a blue line graph of heart rate over time, with the x-axis labeled "index" and the y-axis labeled "value".

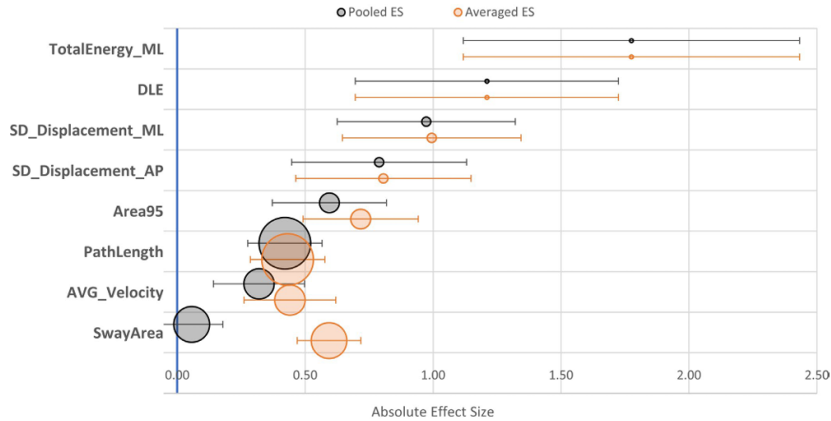
SensAnalytics

Apple Watch 7
The Apple Watch captured physiological signals such as the Heart Rate, Electrocardiogram (ECG), Oxygen Saturation, etc.

Electrocardiogram (ECG)



RESULTS



Ge, W., Lueck, C. J., Apthorp, D., & Suominen, H. (2021). Which features of postural sway are effective in distinguishing Parkinson's disease from controls? A systematic review. *Brain and Behavior*, 11(1), e01929.

SensAnalytics

About

This tool helps you visualise and analyse data captured from a variety of sensors. Use this sidebar menu to select sensors and set parameters. The visualisation and analysis will appear on the right. The tool supports both individual and cohort level analysis.

Select Sensor & Parameters

Sensor: Balance Board (Bertec Force Plate)

Analysis Type: Cohort Level

Choose a CSV file

Drag and drop files here
Limit: 200MB per file

Browse Files

- control4_EC.csv 5.4KB
- control_EC.csv 0.4KB
- control3_EC.csv 0.4KB

Showing page 1 of 3

Sampling Frequency (Hz)

SensAnalytics

Balance Board Analysis.

The balance board captures information regarding the postural sway.

Data Preprocessing and Feature Extraction Complete!

Extracted feature summary for the cohort.

subject	area95	avgarea95	area95_ml	area95_ap	area95_ml	area95_ap	marksdome	area95_ml	area95_ap	pathlength	pathlength_ml	pathlength_ap	rms_displacement	rms_dis	rms_ap	
control2_EC	0.0001	0.0001	98.7697	0.0168	0.0056	-NA	-NA	0.0001	0.0001	0.6099	0.2226	0.5888	0.0036	0.0012	0.00	
1	control2_EC	0.0001	0.0001	104.3213	0.0236	0.0075	-NA	-NA	0.0001	0.0002	0.4244	0.1538	0.3636	0.0051	0.0019	0.00
2	control2_EC	0.0001	0.0001	87.3689	0.0170	0.0065	-NA	-NA	0.0001	0.0001	0.5299	0.2209	0.4326	0.0037	0.0013	0.00
3	control3_EC	0.0001	0.0001	34.0732	0.0119	0.0073	-NA	-NA	0.0001	0.0001	0.6239	0.2140	0.5042	0.0028	0.0015	0.00
4	control3_EC	0.0001	0.0001	79.2514	0.0137	0.0080	-NA	-NA	0.0001	0.0001	0.5255	0.2332	0.4174	0.0036	0.0018	0.00
5	control4_EC	0.0001	0.0001	104.3503	0.0306	0.0076	-NA	-NA	0.0001	0.0001	0.5498	0.2983	0.4678	0.0027	0.0016	0.00
6	control4_EC	0.0001	0.0001	84.6386	0.0204	0.0073	-NA	-NA	0.0001	0.0002	0.5514	0.2033	0.4719	0.0054	0.0018	0.00

Example Scatter Plot

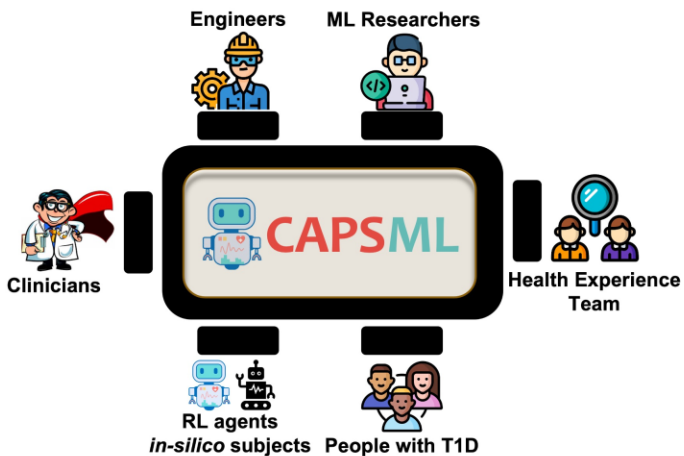
5

OPTIMISING PERSONALISED MEDICAL INSIGHTS BY INTRODUCING A SCALABLE HEALTH INFORMATICS APPLICATION FOR SENSOR DATA EXTRACTION, PREPROCESSING, AND ANALYSIS

07 08 24

TEQSA PROVIDER ID: PRV21002 (AUSTRALIAN UNIVERSITY) CRICOS PROVIDER CODE: 001209

DISCUSSION



SensAnalytics

Balance Board Analysis.

The balance board captures information regarding the postural sway.

Data Preprocessing and Feature Extraction Completed!

Selected feature summary for the cohort.

subject	accelx	accely	accelz	gyrox	gyroy	gyroz	roll	pitch	yaw	roll_accel	pitch_accel	yaw_accel
1	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
2	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
3	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
4	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
5	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
6	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

SensAnalytics

Apple Watch 7

The Apple Watch captured physiological signals such as the Heart Rate, Electrocardiogram (ECG), Oxygen Saturation, etc.

Electrocardiogram (ECG)

About

This tool helps you visualise and analyse data captured from a variety of sensors. Use this sidebar menu to select sensors and set parameters. The visualisation and analysis will appear on the right. The tool supports both individual and cohort level analysis.

Select Sensor & Parameters

Sensor: Apple Watch 7



CONCLUSION



<https://github.com/chirathyh/SensAnalytics>

This research was funded by and has been delivered in partnership with Our Health in Our Hands (OHIOH), a strategic initiative of the Australian National University (ANU), which aims to transform healthcare by developing new personalised health technologies and solutions in collaboration with patients, clinicians, and healthcare providers. We gratefully acknowledge the funding from the ANU School of Computing and the Australian Government Research Training Program (AG RTP) for the first three authors' PhD studies.

THANK YOU



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