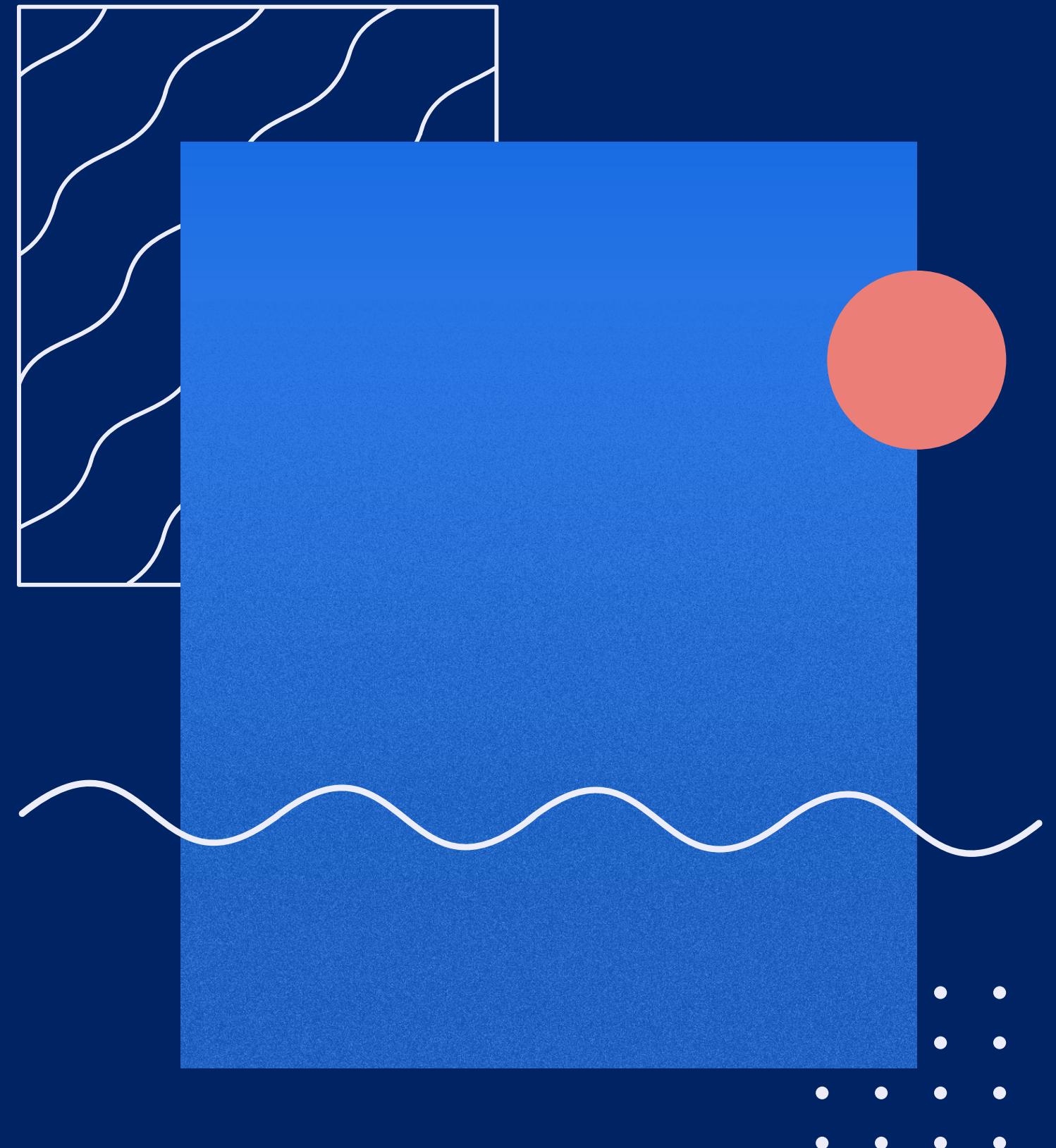
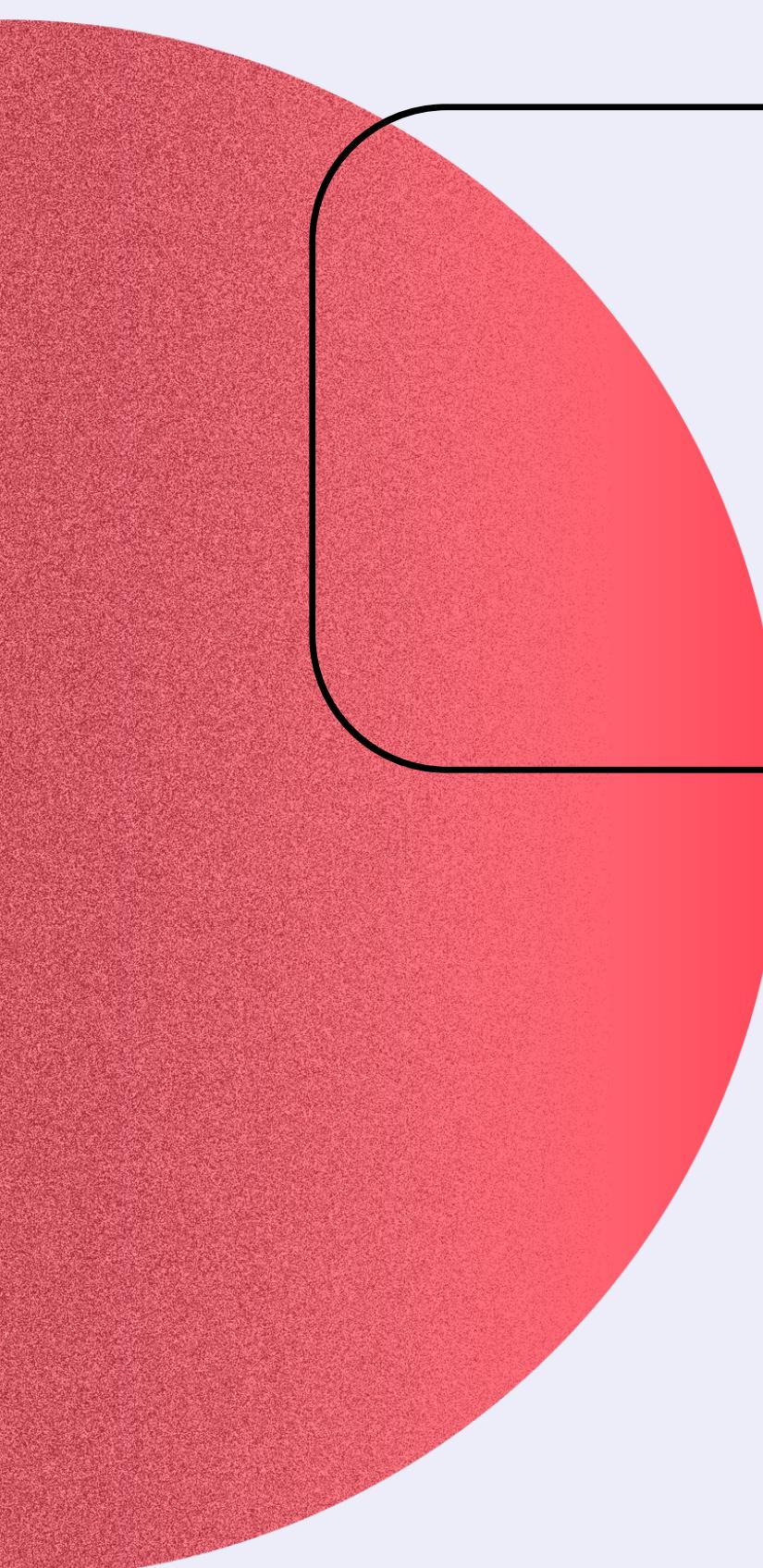


Human Activity Recognition

PRESENTATION BY JONNY HOFMEISTER





Content Synopsis

- What is Human Activity Recognition?
- Understanding the data
- HAR Goals
- Modeling Plan
- Results
- Next Steps

What is Human Activity Recognition?

What are the benefits and applications?



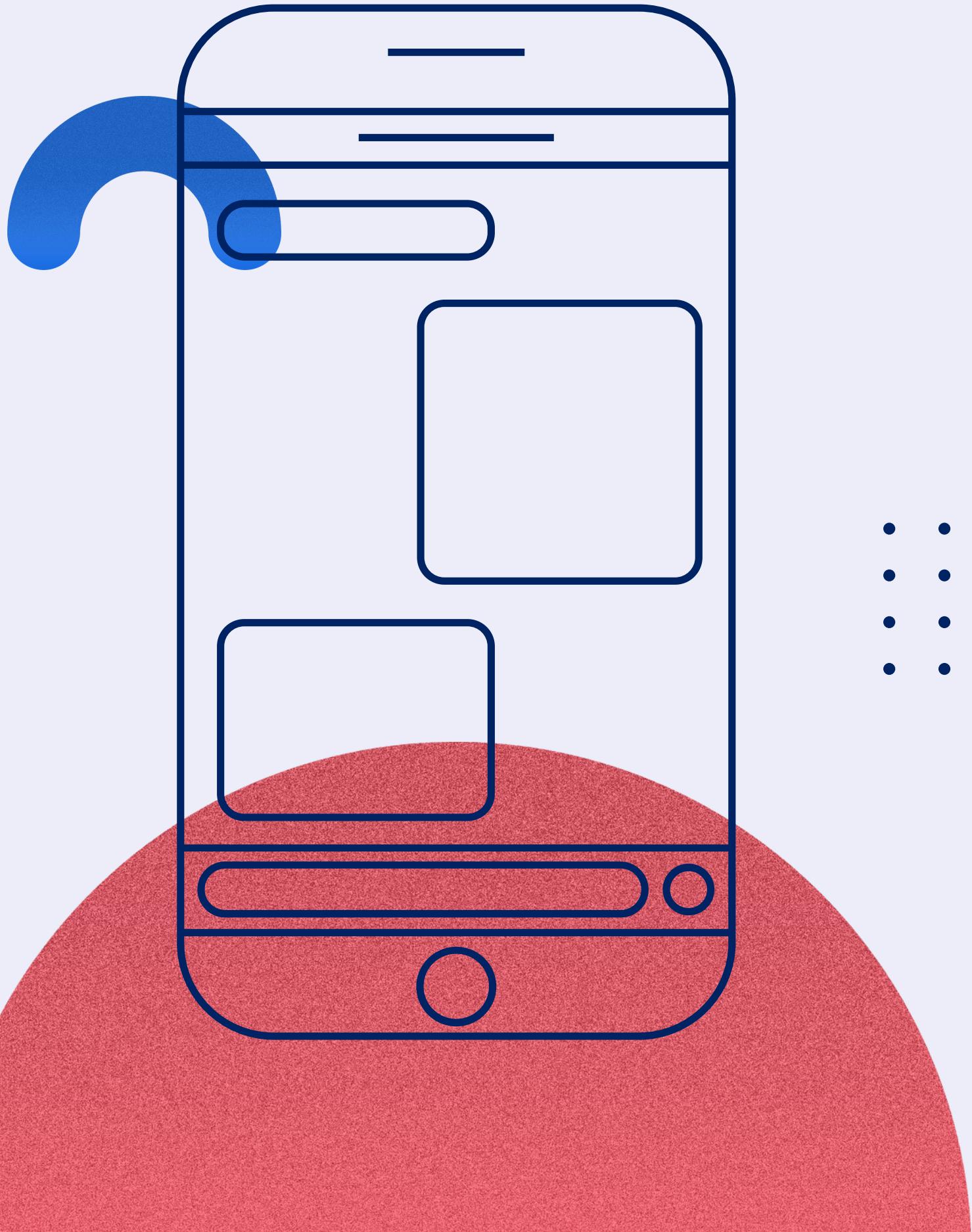
Why use smartphones for HAR?

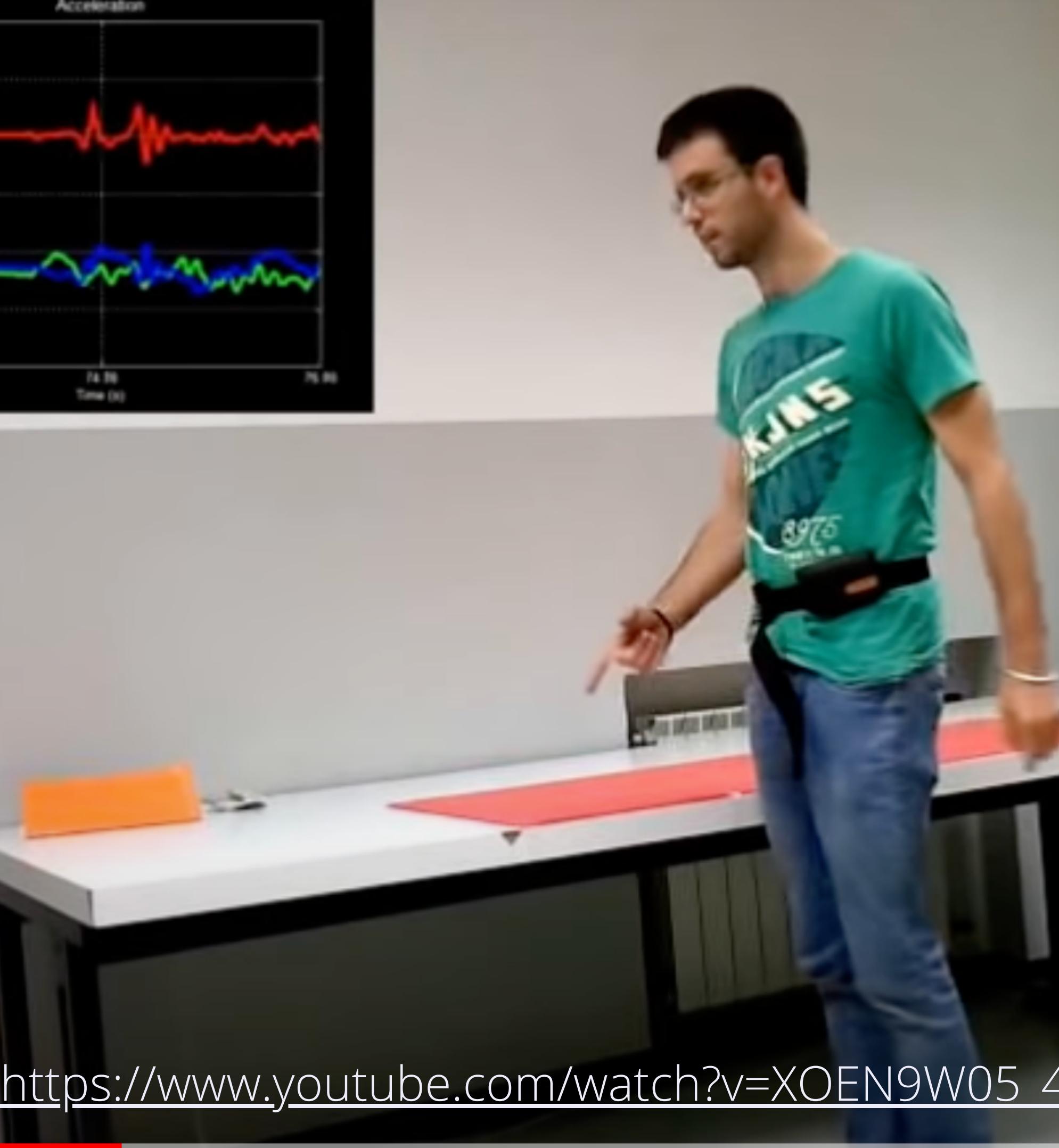
Pros:

- Accessibility
- Deployability
- Unobtrusive

Cons:

- Location





https://www.youtube.com/watch?v=XOEN9W05_4A

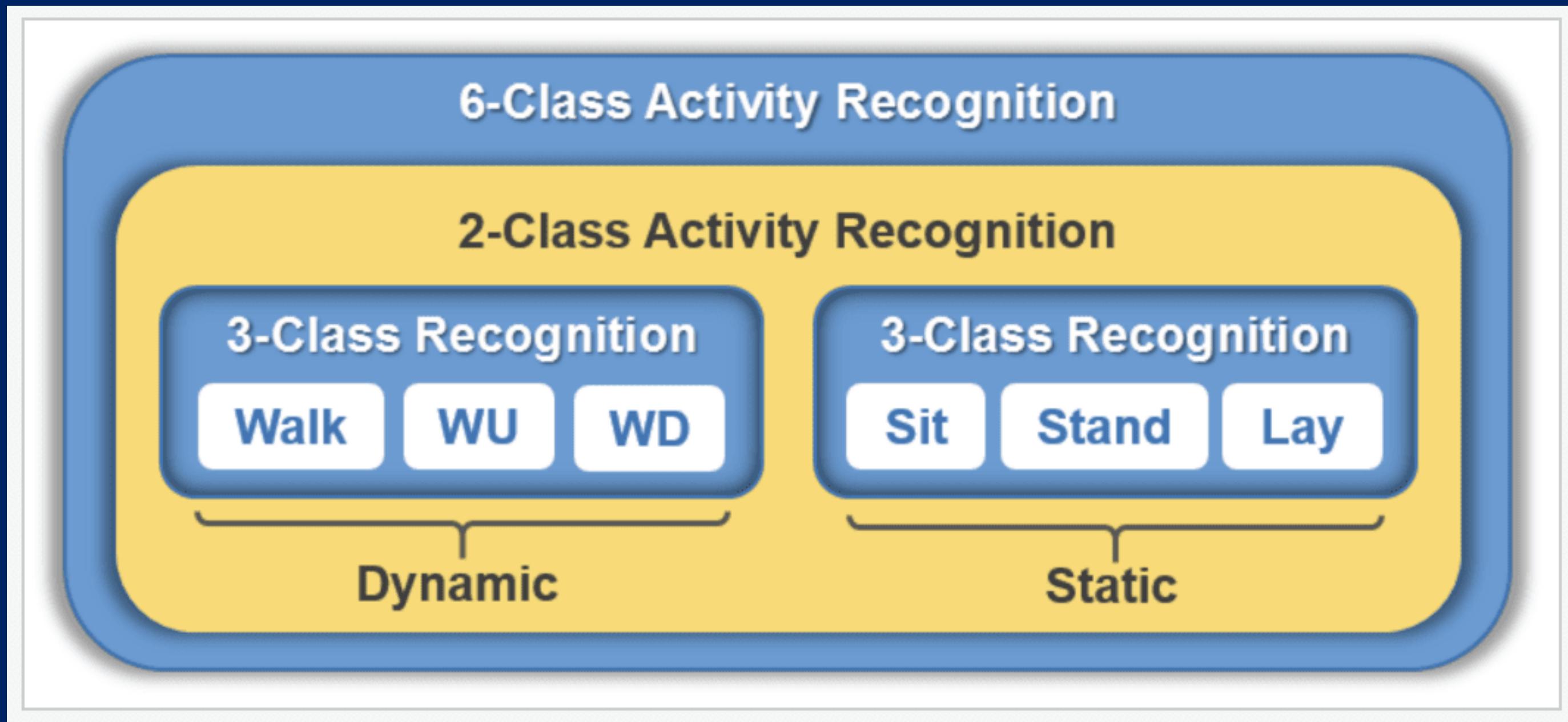
DATA SPECIFICS + MODELING GOALS

The data has been created by sampling the signals from accelerometers and gyroscopes embedded in Samsung Galaxy II smartphones. The tri-axial signals were then processed into time and frequency domain variables and feature mapped into 561 column features per 2.56 second sample row.

Manual feature selection and data construction has limited older HAR methods. We wish to employ advanced modeling techniques that can automatically perform feature selection . This provides for more robust models that can easily be adapted to new data without tedious work.

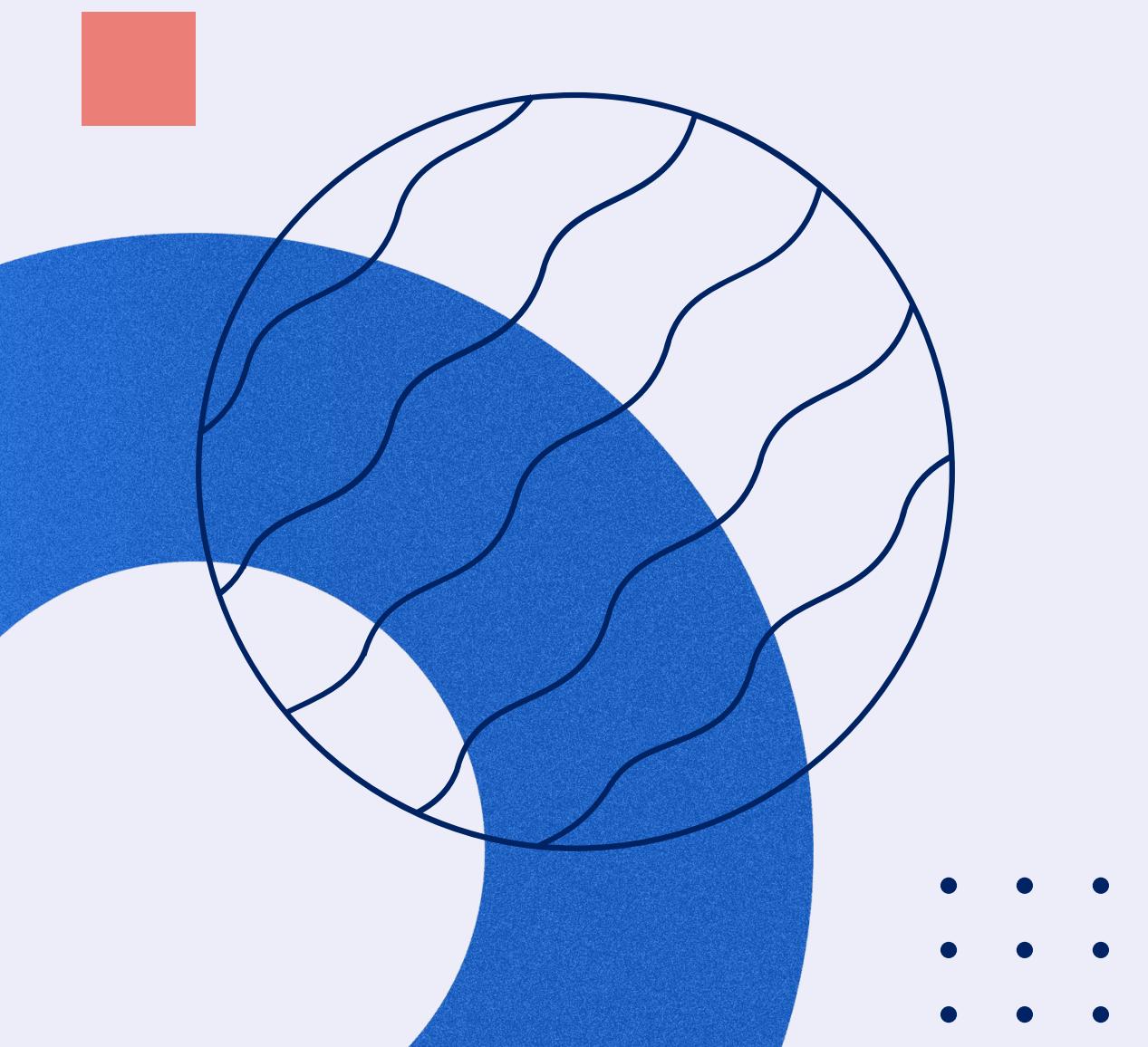
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DIVIDE AND CONQUOR



RESULTS

97% Validation Accuracy



		End-to-End HAR Confusion Matrix					
		WALK UP	WALK	WALK DOWN	SIT	STAND	LAY
True	WALK UP	418	0	2	0	0	0
		12	484	0	0	0	0
WALK	WALK DOWN	6	25	440	0	0	0
		0	0	0	466	42	0
SIT	STAND	0	0	0	9	547	0
		0	0	0	0	0	545
Predicted		WALK UP	WALK	WALK DOWN	SIT	STAND	LAY



CONCLUSIONS

This analysis serves as an excellent proof of concept for the divide and conquer method of HAR. It has proven successful enough to begin thinking about deployment and next steps.



NEXT STEPS

Improve the Dynamic CNN

- Gather more data for these labels
- Adjust CNN and data sharpening parameters.

Streamline the model

- Individual models are successful, now write a script that combines all 3 and produced end to end classification.

Generate Insights

- Extract information about activities over time, not just single row/window classifications.
- Examine ratios of dynamic and static activities.
- Combine with other health data like BP and HR.

Thank you!

Analysis by Jonny Hofmesiter

Sources / Resources

[The dataset](#)

[Deep Learning Methods for HAR](#)

[Divide and Conquer Paper](#)