

Machine Learning Algorithm Using Physiological Data to Detect Anxiety

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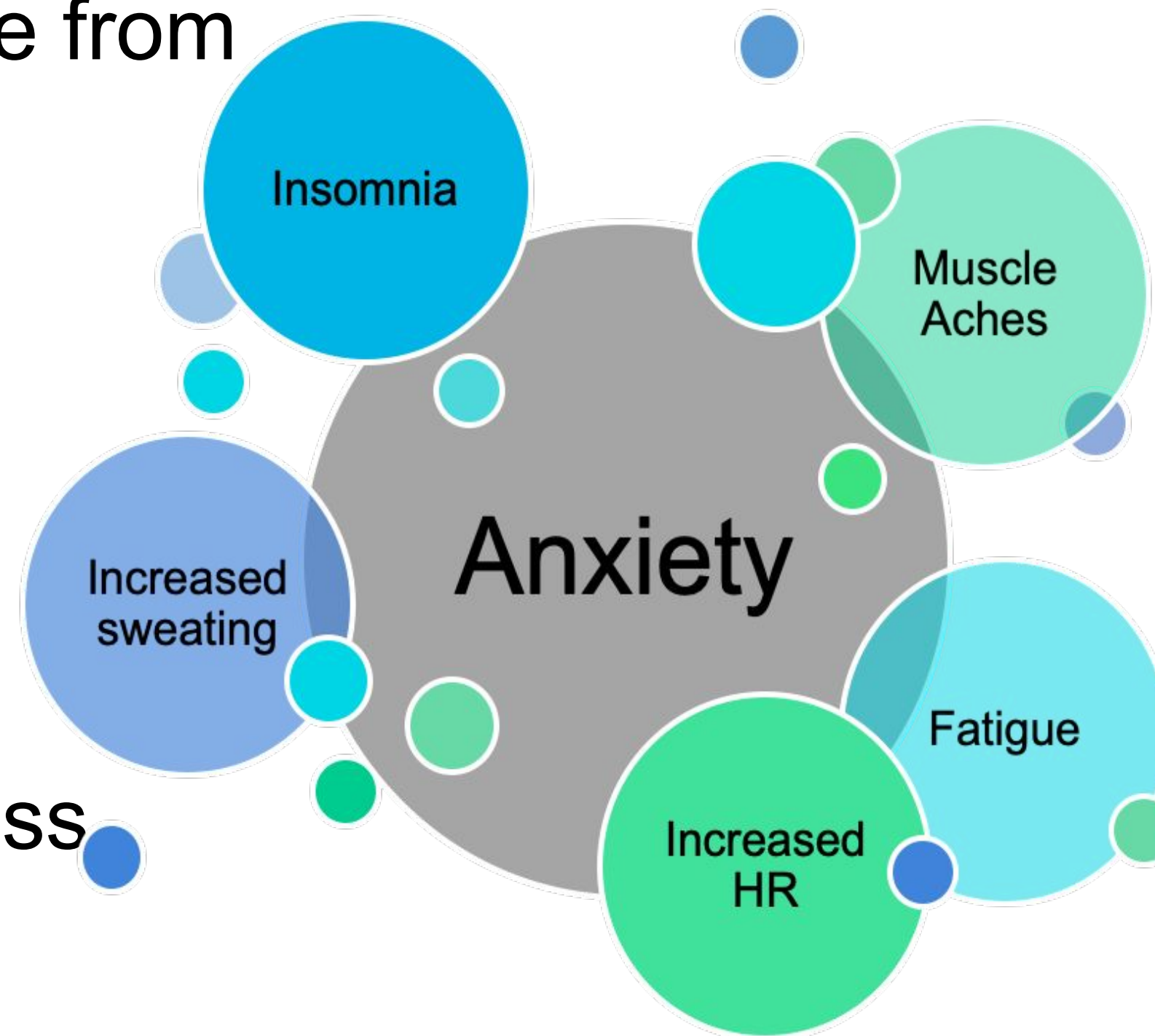
Introduction

Background:

- ~7 million struggle from General Anxiety Disorder^[1]

Problem:

- No affordable device to provide live tracking and classifying of stress levels

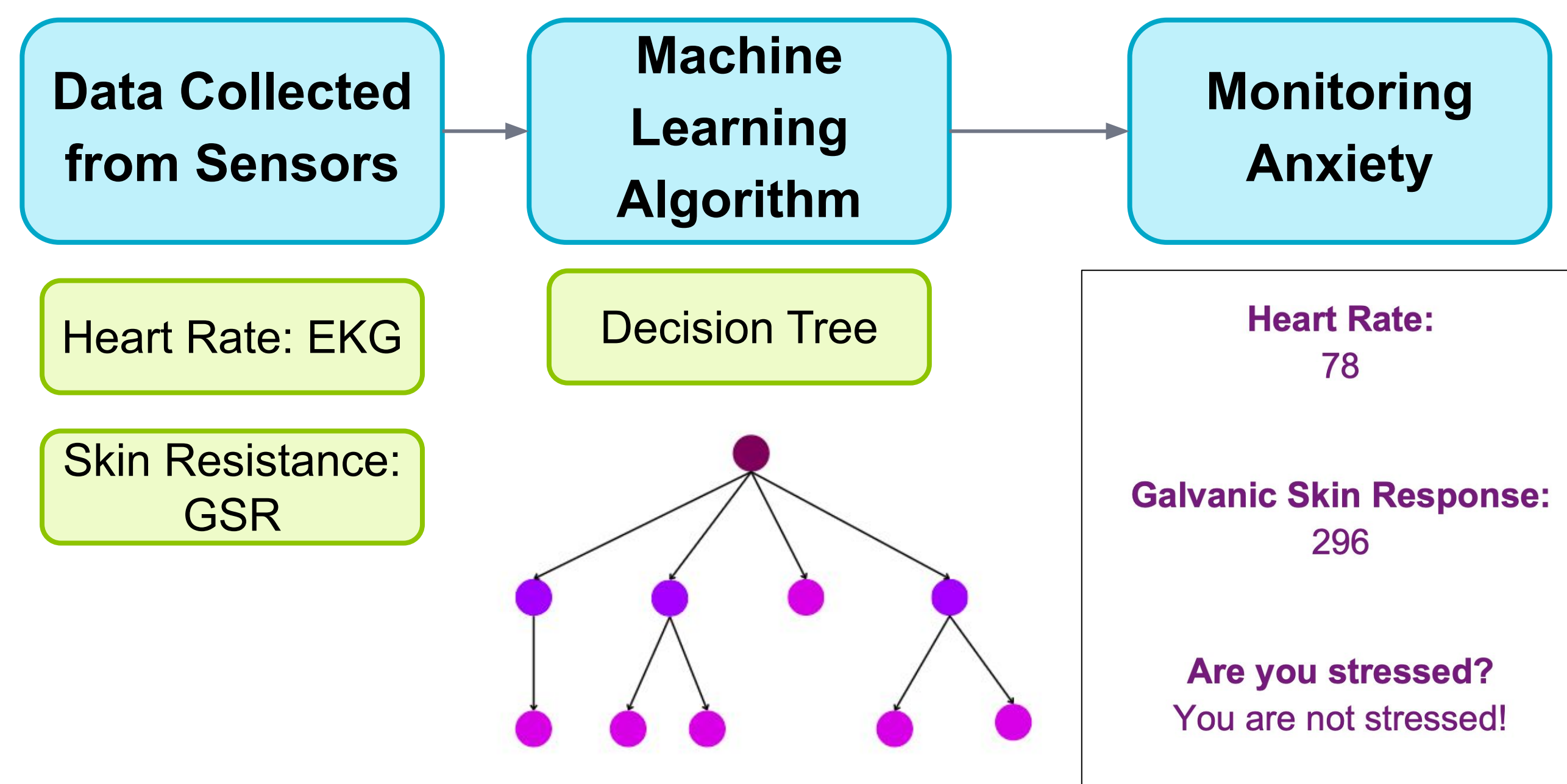


Need Statement:

- An accessible and affordable device to provide insight and support to adults and young adults struggling with physiological symptoms of anxiety

Proposed Solution

- Use a decision tree algorithm to classify anxiety based on heart rate (HR) and galvanic skin response (GSR)

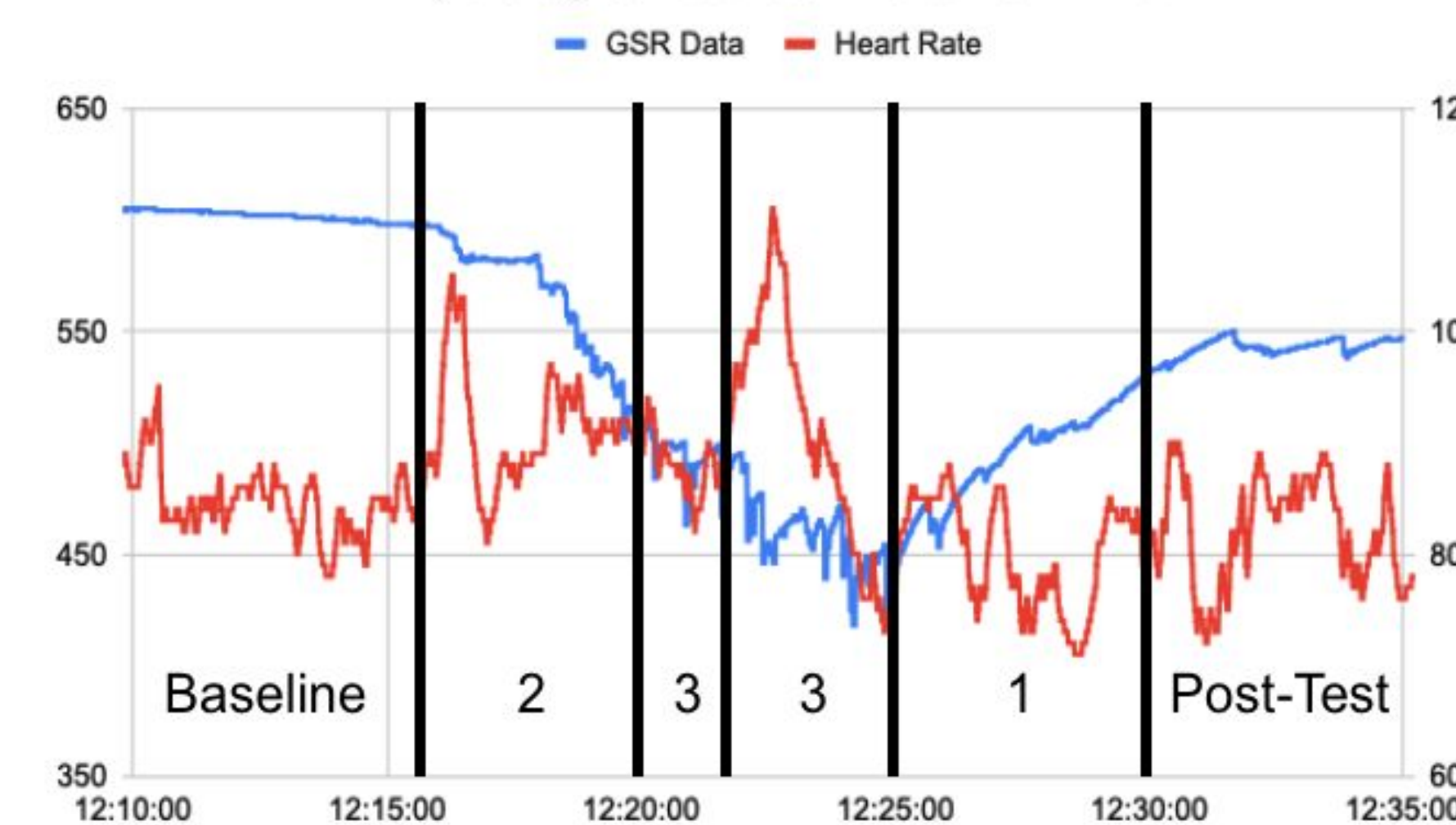


Prototype Testing & Results

Sensor Set-Up



Physiological Sensor Data vs. Time



Trier Stress Test^[2]

- Baseline
- Verbal Stress
- Math Stress
- Visual Stress

Stress Level	% Change in HR	% Change in GSR
1	10.7%	3.0%
2	10.2%	1.6%
3	15.8%	5.6%

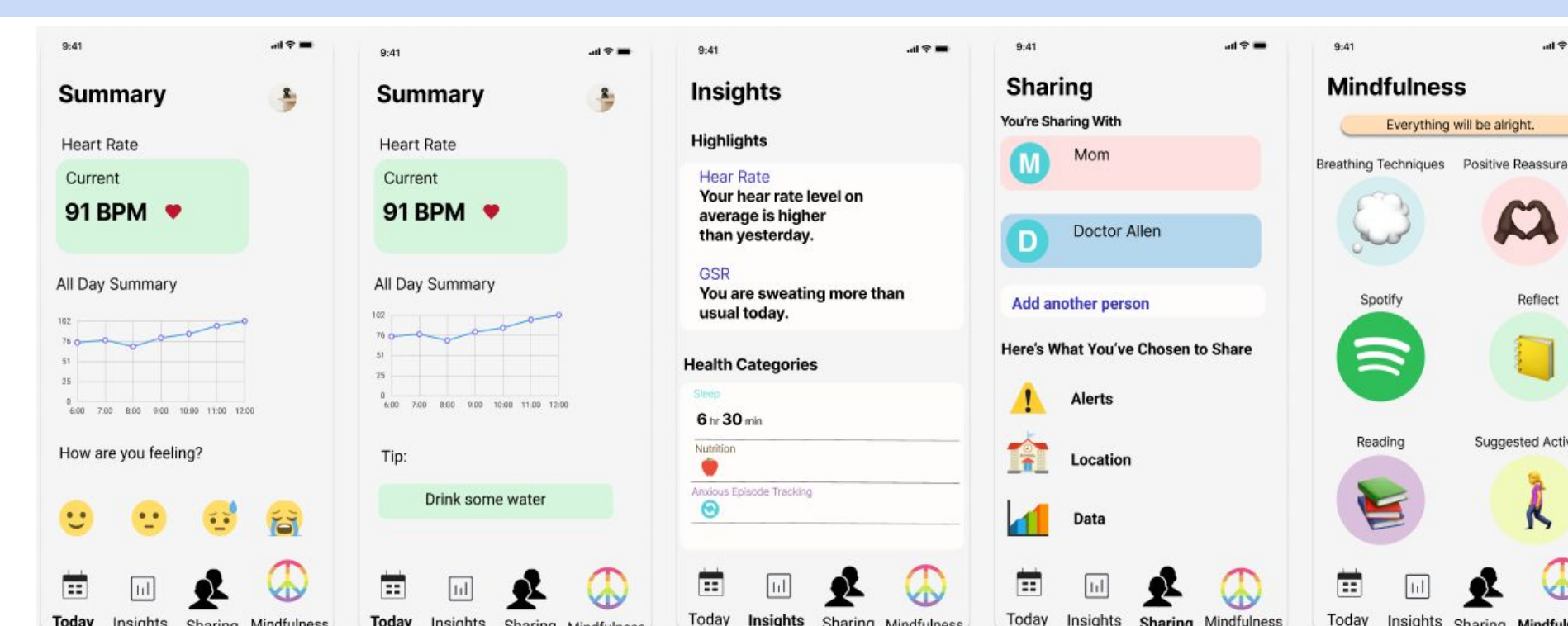
Machine Learning Testing & Results

- Classify: Stressed vs Unstressed
- Decision Tree (DT) Model:
 - Pre-Pruned Tree Depth
 - 80 / 10 / 10 Split
 - 5-Fold Cross Validation
- Dataset: WESAD^[3] & Testing

DT Validation	Accuracy
DT with WESAD Data	100.0%
DT with Testing Data	81.0%
DT 5-fold CV with Combined Data	62.9%

User Interface

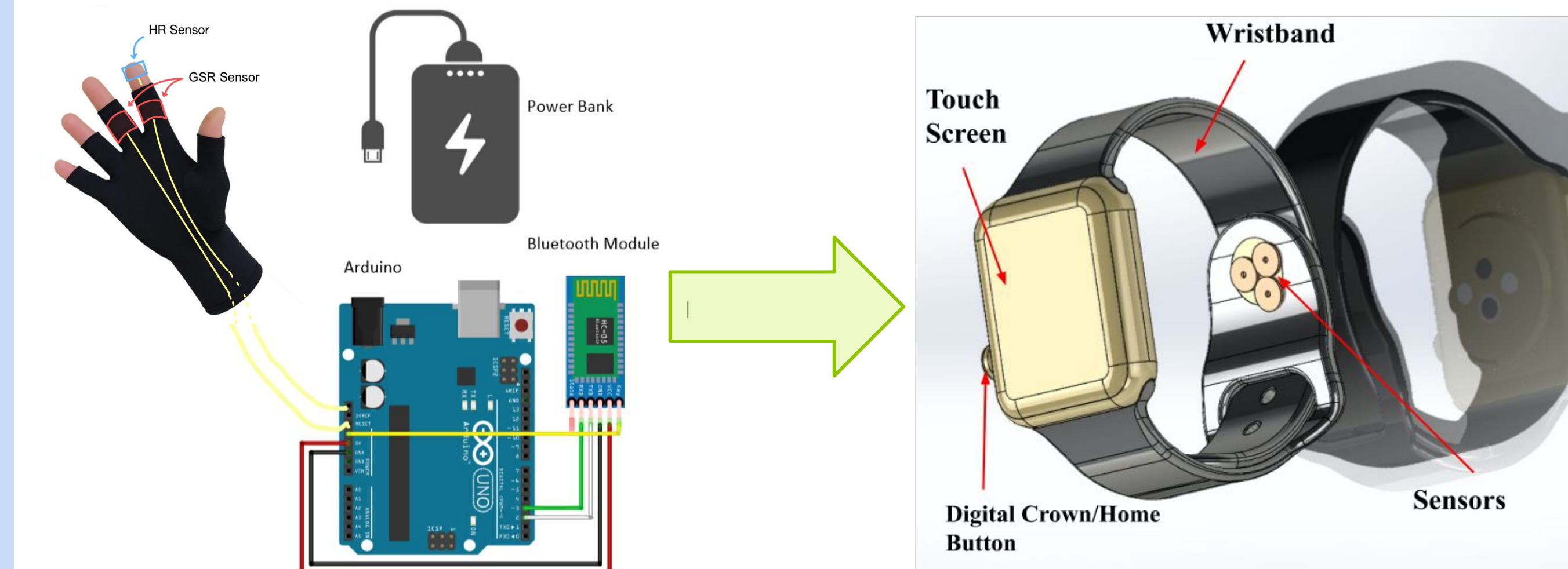
- Show user stats
- Provide tips on anxiety mitigation
- Connect via Bluetooth



Manufacturability & Cost Breakdown

Raw Materials Cost	Manufacturing Cost	Sell Price	Profit
\$30.74	\$35.00	\$100	\$35

Current Device & Future Device



Wearable with Bluetooth & Power Bank, Anxiety Classification, Basic UI

Condensed Wearable, Advanced UI

Conclusion

- EKG and GSR are useful to predict anxiety
- Machine learning algorithm & sensor wearable device instantaneously classification of anxiety

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