



Under Pressure: Unobtrusive Blood Pressure Monitoring in the Operating Room

Audrey Shin¹, Shiraz Shahukar¹, Michael Chungyoun², Haonan Peng³

Per Reinhall¹, David Lee M.D. ⁴, Lucas Thomas M.D. ⁴, Ryan Jense M.D. ⁴, Nate Dreesmann⁵, Martin Hey-Mogenson⁴, Chien Li⁶, Hannah Sattler⁶, and Laura Smith⁶

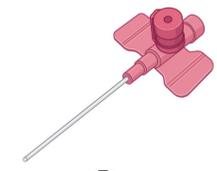
1 Mechanical Engineering, 2 Chemical Engineering, 3 Electrical and Computer Engineering, 4 Anesthesiology, 5 School of Nursing, University of Washington, Seattle, WA
6 Novo Nordisk, Seattle, WA



- Blood pressure (BP) is an early indicator of complications
- Prolonged gaps in BP reading can lead to fatalities in the operating room (OR)

Two Available Methods in OR

Primary Stakeholders:
OR Clinicians & Surgical Patients



Arterial Line

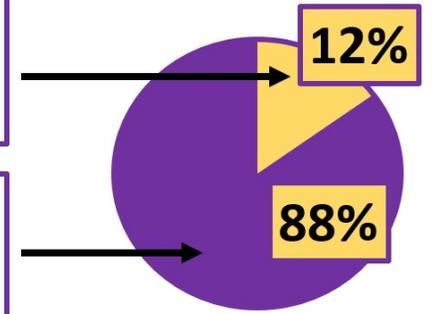
- Invasive
- Most accurate
- Continuous

Secondary Stakeholders:
Medical Companies & Hospitals



BP Cuff

- Non-invasive
- Less accurate
- Non continuous



44,000 Total Surgeries (UW Medicine)

Existing Solutions

| Core Functions \ Current Solutions | Automatic Pressure Cuff | Arterial Line | Ultrasound Patch |
|-------------------------------------|-------------------------|---------------|------------------|
| Continuously measure blood pressure | ✗ | ✓ | ✗ |
| Non-invasive | ✓ | ✗ | ✓ |
| Transportable/ Portable | ✗ | ✗ | ✓ |

Unmet Need

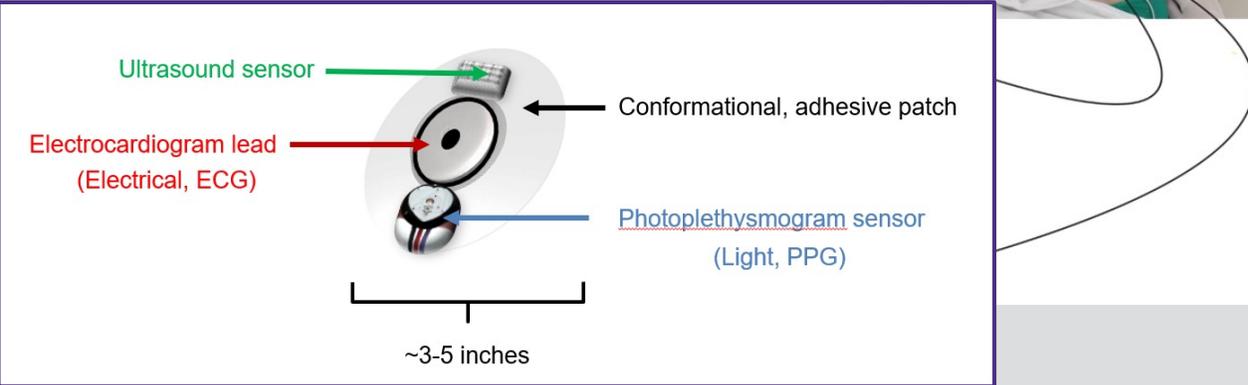
A way for anesthesiologists to measure patient blood pressure in real time, so that complications to the patient and technical burdens for the anesthesiologists are decreased in the operating room.

Total market volume: \$1.25 billion / year Total Growth Rate : 10.1% by 2026

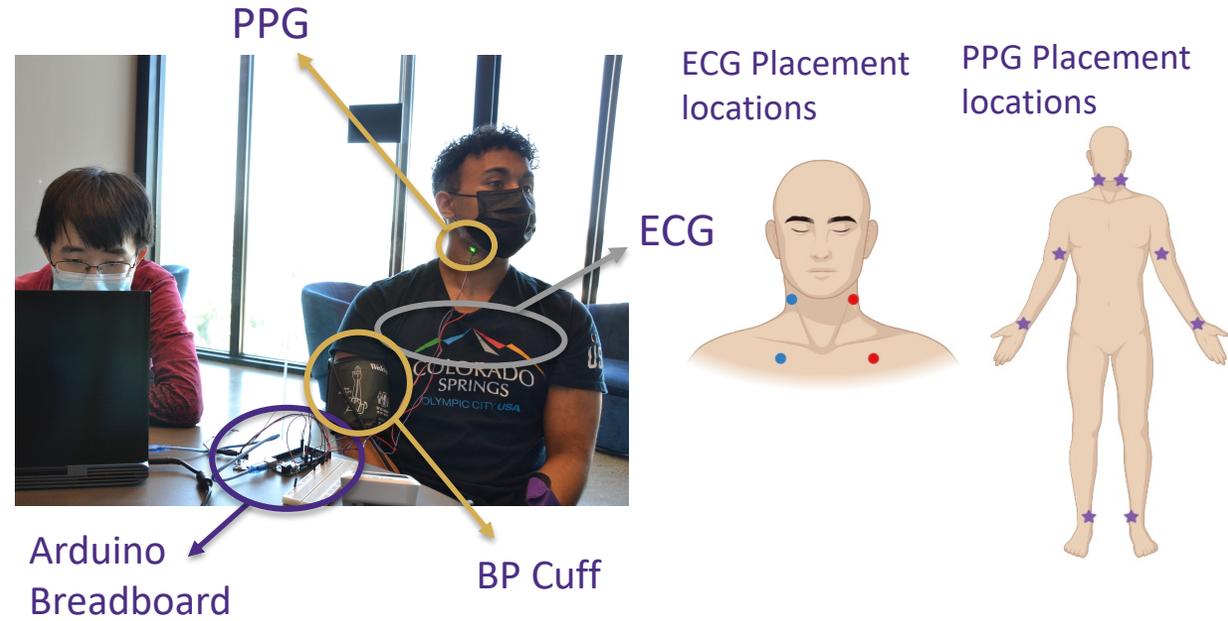
| | |
|--|--|
| Customer: 31K anesthesiologists in the US that place arterial lines every year | |
| Pains: New technology, additional sensors | Gains: Efficiency, accuracy, ease |

Design Concept

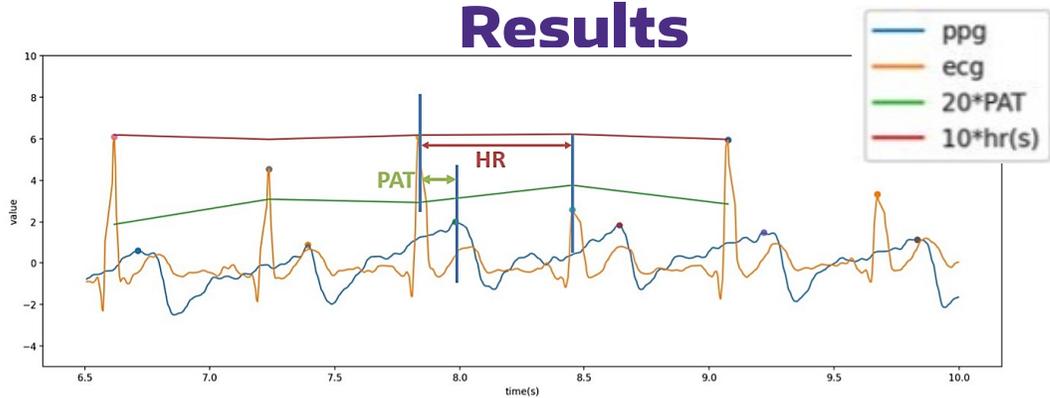
A smart 3-sensor device placed on the carotid artery of the neck



Prototype



Results



$$sBP = \alpha_1 \ln(PAT) + \alpha_2 HR + \alpha_3$$

Ground truth BP from BP Cuff

PPG & ECG Waveforms from sensors



Systolic BP Equation (Least Square Regression)



Calculated Systolic BP

Future

Post EIH Course: Summer 2021

Onwards

Finalize Prototype

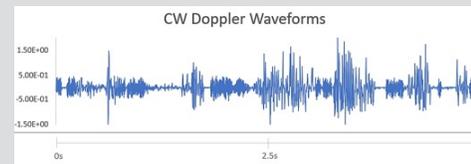
- Integrate Neural Network Training
- EIH Summer Incubator
- Design and 3D Print Sensor Housing

Clinical Trials

- Test prototype against A-line on patients in the OR
- Optimizing sensor placement

Ultrasound Sensor

- In-house manufacturing of ultrasound transducers



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