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MD Mouse: Integrated Blood Pressure Device

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MD Mouse

EBME 370 Senior Design Team 15

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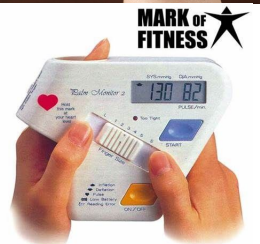
Background

- Hypertension is an extremely common condition
  - **3 million cases in U.S.** [3]
  - **1 billion worldwide** [3]
- **High blood pressure**
  - Significant risk of disability, stroke, or heart attack [1]
  - Leads to cardiac disease
  - Comorbidities such as Covid-19 [2].
- Measuring in medical practice often does not characterize blood pressure well over time
- Self-monitoring devices are also largely inaccurate
  - Need for accurate personal device

Current Methods

Blood Pressure measurements in the doctor's office

Various at-home blood pressure monitors



The Need

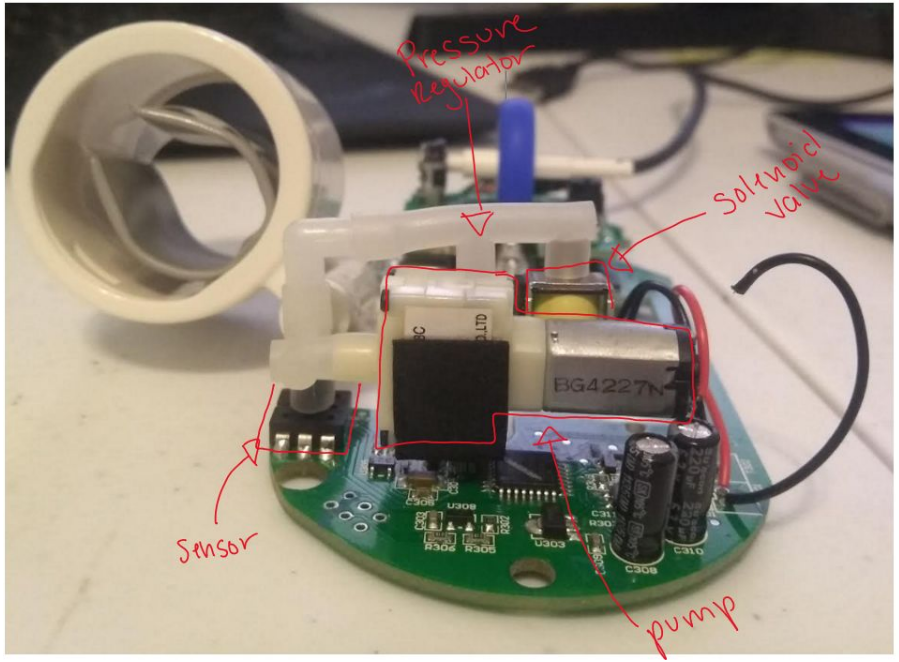
A blood pressure measurement device that is:

- Accurate
- Easy to use
- Efficient
- Able to be used at home or work

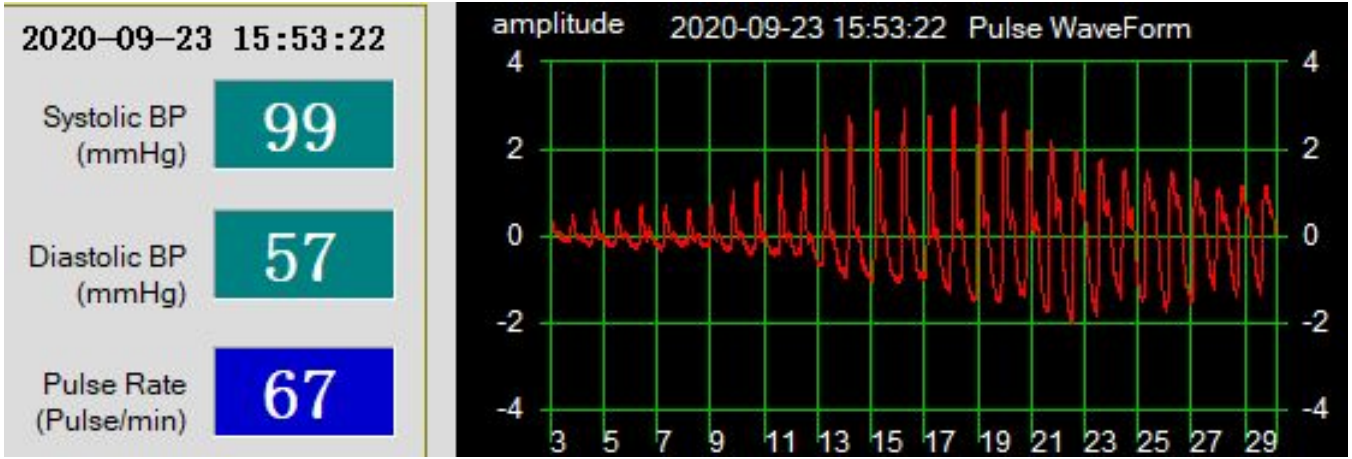
Technical Specifications

- The device must measure blood pressure with an accuracy of ±5 mmHg
- The software must clearly display systolic pressure, diastolic pressure, and heart rate
- The cuff must fit a left index finger with a circumference of 1.5-3.5 inches (3.7-8.8cm)
- The device should take no more than 1 minute to take and transmit a reading for display

Device Design

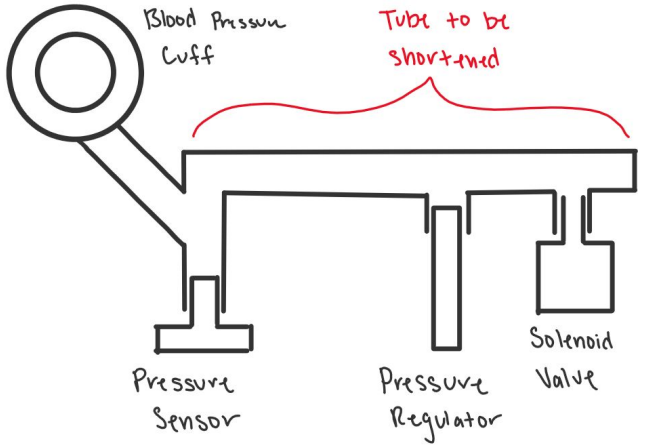


Device Flaws



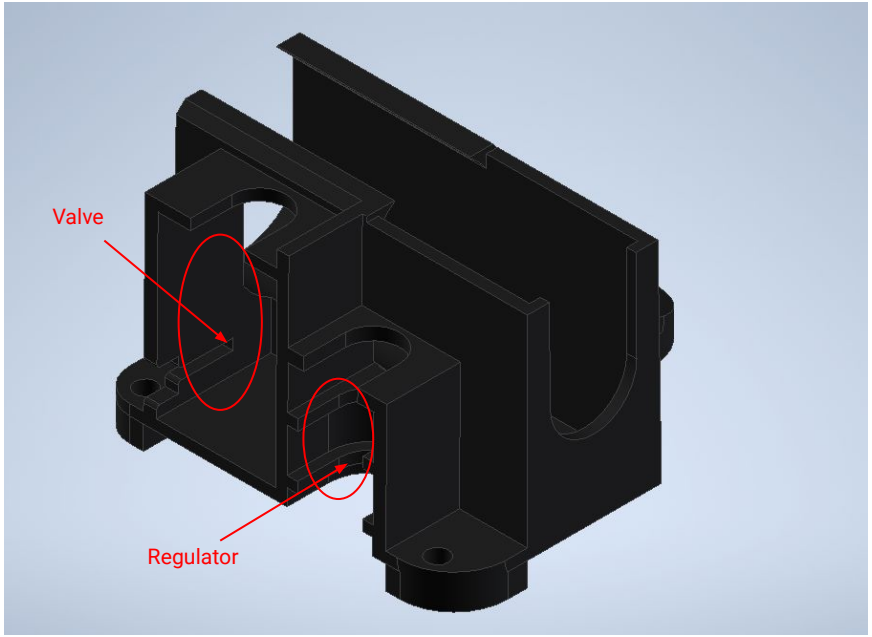
Prototype Plan

- Shorten the tube between the Blood Pressure Cuff and the rest of the components
- Eliminate 90 degree curve in tube
- Reduce signal attenuation

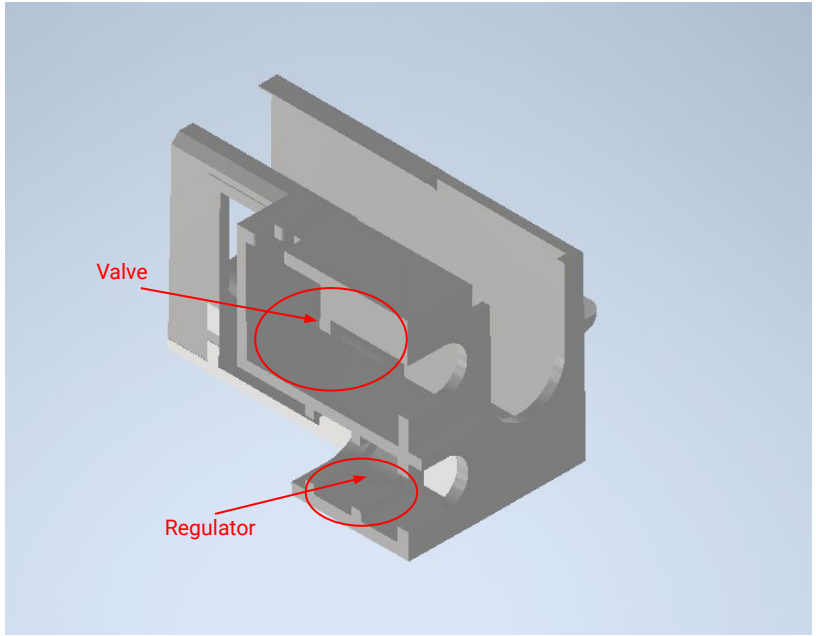


Preliminary CAD

Before:



After:



Preliminary Testing Plan

- Test before and after modifying the device
- Compare our device’s measurements to Mercury Sphygmomanometer
- Record blood pressure with device three times a day per person to establish baseline
- Artificially raise blood pressure and then take measurements

Conclusion

Summary

- There is a need for an accurate at home blood pressure monitoring device
- The MDMouse aims to fill this need, but is currently inaccurate
- We are in the process of adjusting the device in order to make it more accurate

Future Plans

- More rigorous testing
- Try filling the tube with a fluid to reduce signal attenuation
- Try altering the material of the tubing
- Add other vital sign measuring capabilities to the device

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Thank you!