DREXEL UNIVERSITY
School of
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Non-Invasive Continuous Wrist Blood Pressure (NICWBP) Monitoring Device

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Continuous Non-Invasive Blood Pressure Monitor – Unmet Medical Needs

Cardiovascular disease (CVD) is the leading cause of death in the United States, accounting for 41 percent of all deaths. Today, one in three adults in the United States suffer from hypertension according the National Institute of Health. Hemodynamic pressure monitoring devices aim to track and detect pressure changes within the cardiovascular system and are capable of converting this information into waveform and numeric data. This information becomes very important in assisting in the assessment and treatment of both single and multi-system pathologic disorders. Such disorders range from congestive heart failure (CHF), peripheral vascular disease (PVD), and coronary heart disease (CHD), to hypertension, hypotension, arteriosclerosis, atherosclerosis, and even kidney failure.

There is an urgent need for better non-invasive blood pressure monitors for the early detection of significant cardiovascular diseased conditions. Intra-arterial lines (A-lines) provide accurate readings but are invasive and pose significant infection risks and are known to cause vascular damage and excessive blood loss. There is a definite need for an alternative solution to real time blood pressure monitoring.

Novel Non-Invasive Blood Pressure Technology

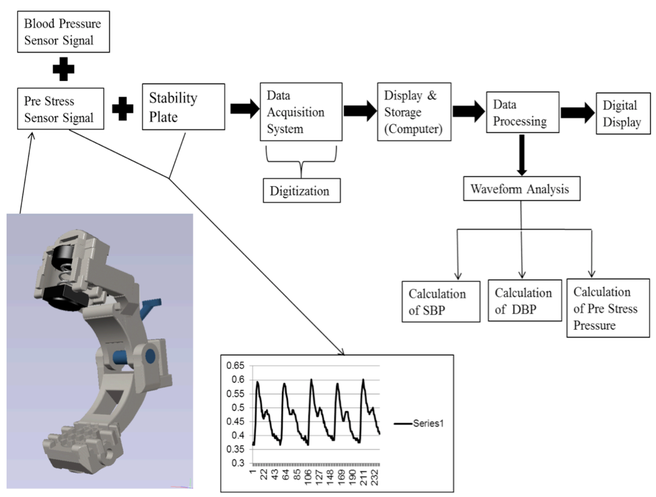

Fig 1. Conceptual Chart of Wrist Blood Pressure Monitor

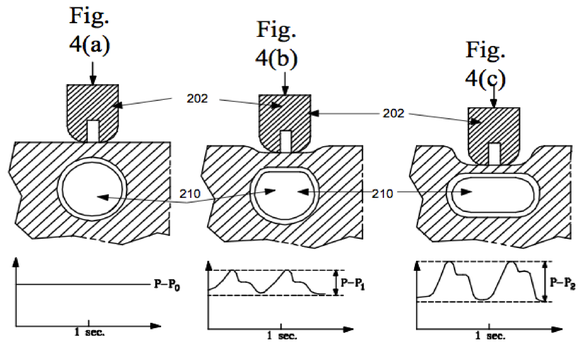

Fig. 2 Principle of Operation – Advanced In-House Applanation Technique

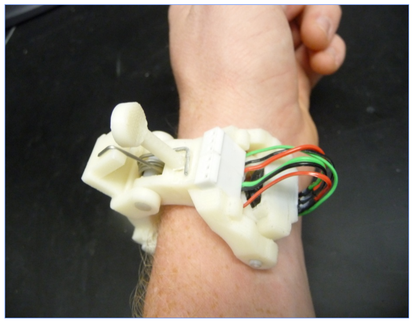

Fig 3. Early prototype of the NICWBP C-clamp outfitted with the sensing head anchored to the radius bone

Validation of Technology
Clinical Studies (Hahnemann University Hospital)

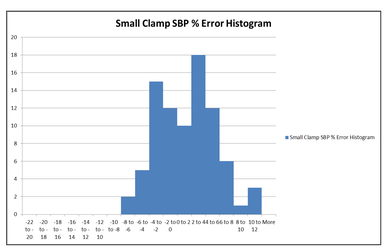

Fig. 4 Error Histogram of SBP Determination

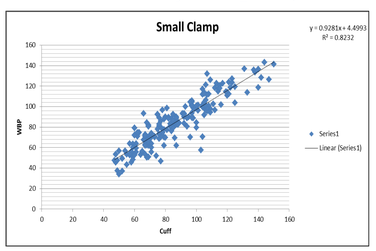

Fig. 5 Accuracy of the system

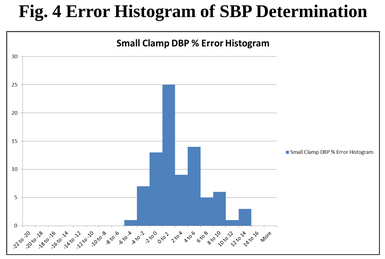

Fig. 6 Error Histogram of DBP Determination

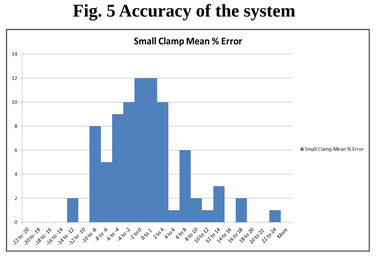

Fig. 7 Small Clamp Mean Error

Conclusion

This non-invasive continuous blood pressure monitoring device targets the distal portion of the radial artery near the carpel region of the wrists and collects arterial pressure waveforms in real time applying the concept of arterial tonometry.

NICWBP Measured Cardiovascular Parameters

- **Systolic and Diastolic Blood Pressure Values**
- **Pulse Rate**
- **Blood Pressure Waveform**

NICWBP Operational Features

- **High Accuracy of Blood Pressure Values**
- **High Repeatability**
- **Positive Clinical Study Results**

Current Market Strategy

Clinical Applications

- **Emergency Room**
- **Clinical Care Units**
- **Doctor's Office**

Consumer Applications

- **Wrist Watch**

Future Work

Identifying signatures from Blood Pressure Waveform for important cardiovascular Diseases:

- **Peripheral Vascular Disease**
- **Coronary Heart Disease**
- **Arteriosclerosis**
- **Arrhythmia**
- **Other Cardiac Conditions**