Digital Stethoscope

To help healthcare professionals diagnose breathing and heart sounds, or listen to an unborn child.

Carlos Germán Solis Lopez

Capstone Proposal

The stethoscope has been used for many years, and has been very effective to diagnose certain cardiologic and pulmonologic sounds. It has also been used to listen to the heart sounds of a fetus. For many years healthcare professionals would listen quietly to patients internal organs so they could diagnose from specific sounds of such internal organs. A digital stethoscope would be beneficial to healthcare professionals.   A digital stethoscope would help a healthcare professionals record their findings, either by a micro SD card or by USB. Once the data is stored, the healthcare professionals can hear and graph the data. This would be quick and more effective since there is a visual and audio representation to diagnose such cardiologic and pulmonologic sounds. I would like to design a digital stethoscope that can evaluate a premature ventricular contraction or (PVC), also known as ventricular premature beat (VPB), is a form of irregular heartbeat in which the ventricle contracts prematurely. While some causes of such phenomena are biological; other factors such as amphetamines and caffeine can also contribute to such heart palpitation. Such phenomena of PVC are early warnings of severe cardiac complications that may develop later on in life if the subject is does not receive treatment or significantly change detrimental lifestyle habits.

It would be difficult and exciting to produce such a device to record and graph a PVC. It would be appropriate to classify this capstone as a six credit capstone design project. The projects' success depends on the effort of the team members.

Special Notes:

- Comply with documentation needed by the Klipsch School of Electrical and Computer Engineering and New Mexico State University.

- Follow The Klipsch School of Electrical and Computer Engineering code of Ethics

- The Klipsch School of Electrical and Computer Engineering will be asked to provide an adequate lab for this capstone.

- The Klipsch School of Electrical and Computer Engineering could help fund such project

- Follow standard Institutional Review Board criteria for human subjects

Budget:

Minimum estimate $350

Maximum estimate $500

This design will entail the following,

As stated above the ultimate goal of this project is to help medical professional detect cardiologically and pulmonologically problems that their patients are suffering from. In order to meet this goal the device will be similar to both an EKG and a stethoscope, recording both electrical signals and sounds originating from the heart. The device is intended to be comfortably worn by the patients throughout the day. While worn the device will record data and store it to be examined at a latter time by medical professionals. Displayed below are design parameters to that will need to be meet for the device to be successful.

EKG Design Parameters:

- Use attachable pads to detect electrical pulses from the heart.

- Design amplifier to amplify an input of electric pulses.

- Convert electrical input into digital data via ADD converter.

- Store in device with either SD card or USB compatible memory.

- Use MATLAB program to filter through stored data and detect P.V.C.

Digital Stethoscope Design Parameters:

- Transforming acoustic sound waves to electrical signals via microphone

- Record audio data on SD card or USB compatible memory

- Transmit audio data to a PC

Additional Design Parameters:

- Make it portable to be carried on one's person

- Make a program to plot results and play audio

Scope of Work:

- Create Milestones and such Deadlines

- Develop System Design and Budget

- Develop Software

- Construct Module

EE Core Content:

- Electronics

- Digital Design

- Signal and Systems

- Power

Schedule/Milestones:

Specific milestones will be developed by the Team but will include, as a minimum, the following items:

Biweekly:

Progress Report via email; include documentation of completed subtasks where appropriate

Late September- Early October:

Project Proposal and Preliminary Design

Early November:

Interim Draft Report

End of Fall Semester:

Final Interim report & Final Design Review

Advisor/Mentor:

Dr. Creusere