

μ-tu: the Wireless Electrocardiogram

California State University, Sacramento College of Engineering

Ryan Smith, Manish Mishra, Travis Anderson, Brandon Steinlein, Thoung Nguyen



PROBLEM STATEMENT

Cardiovascular diseases are the leading cause of death in the United States currently. A device to improve cardio data collection can help combat these diseases by making them easier to record, review, and diagnose.

*Our project is to increase the accuracy, availability, and accessibility of data in electrocardiogram devices and do all of this in a portable form.

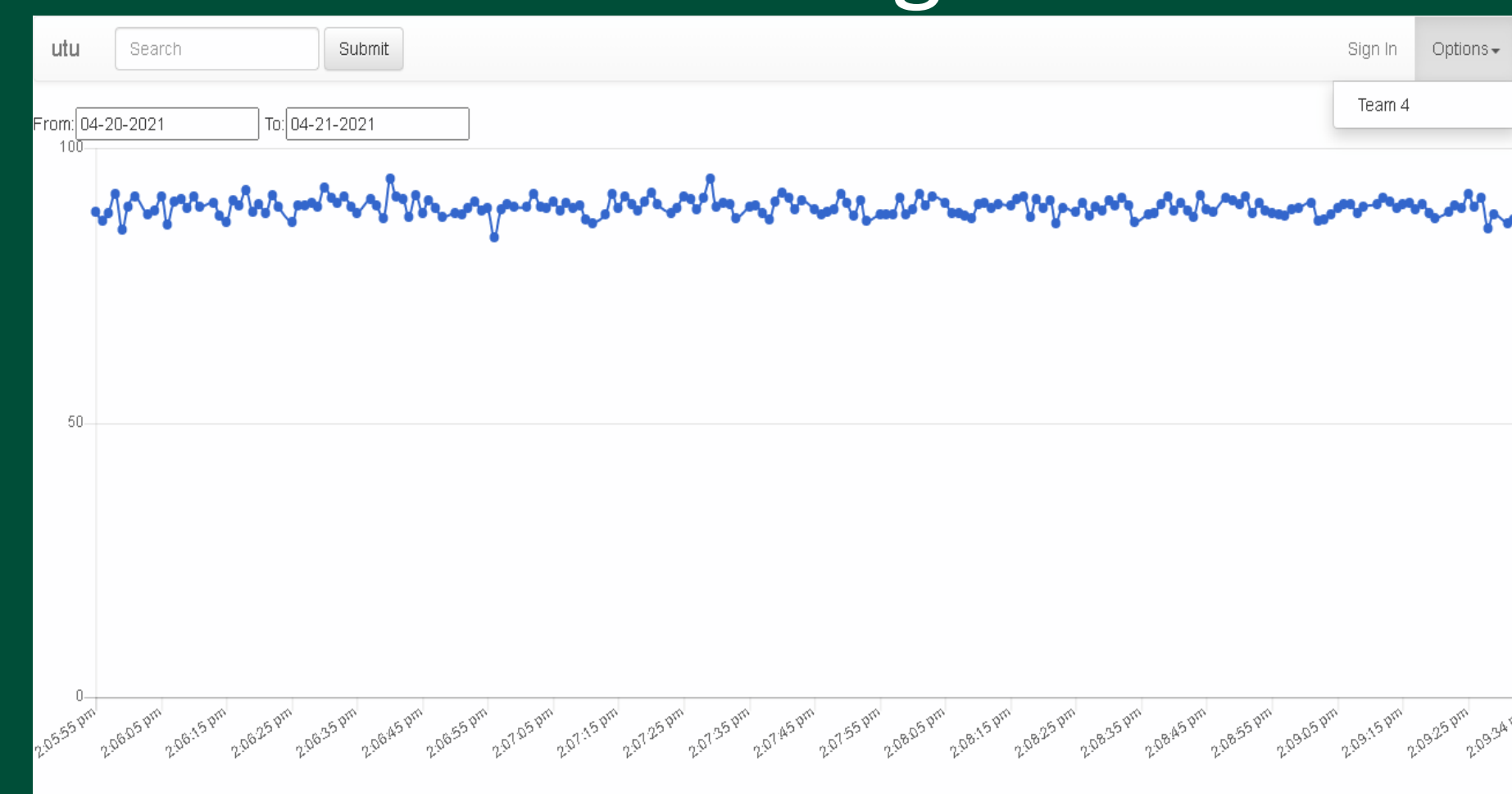


Figure 1: Cloud Interface

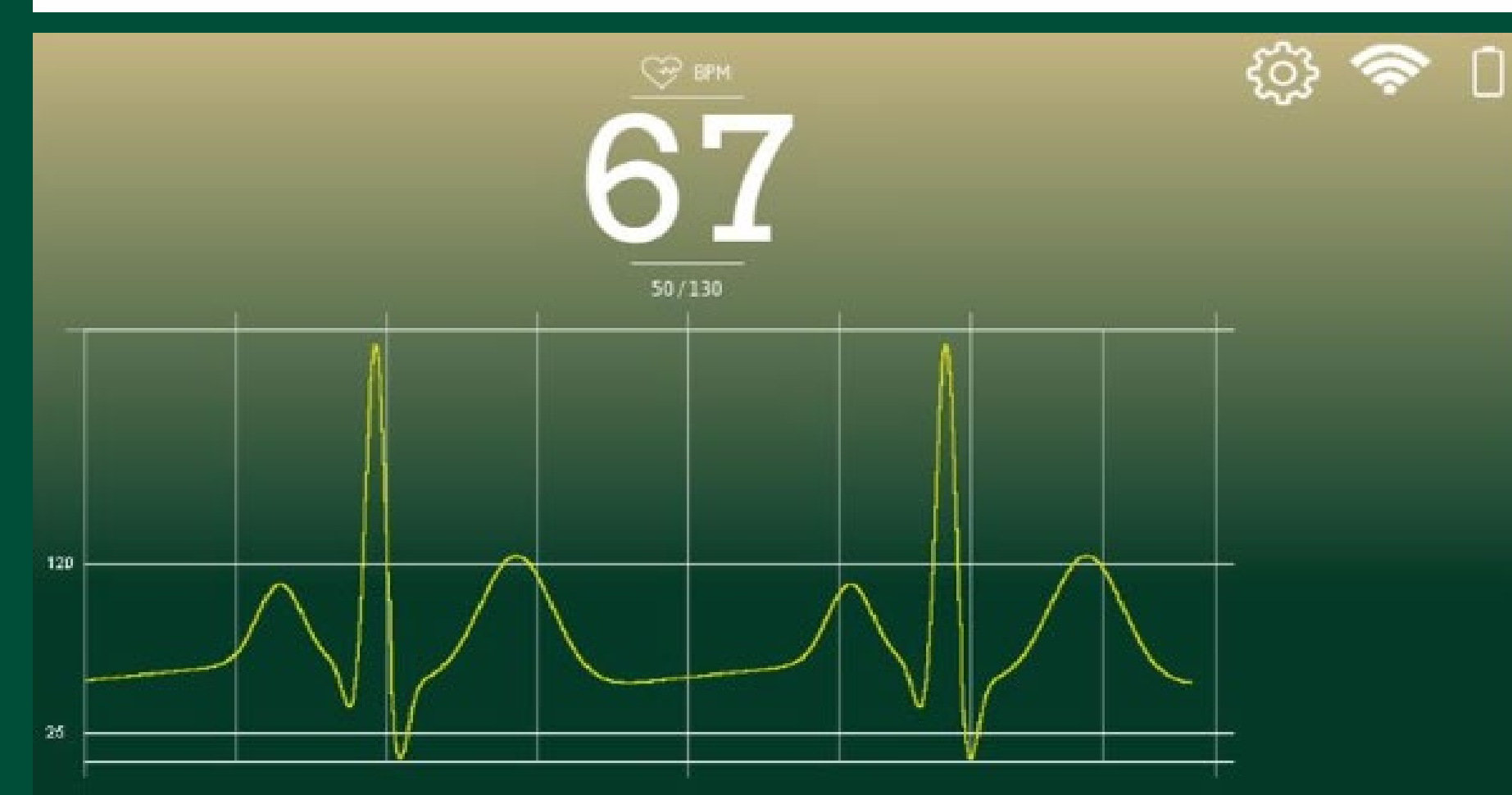


Figure 2: Device Graphical User Interface

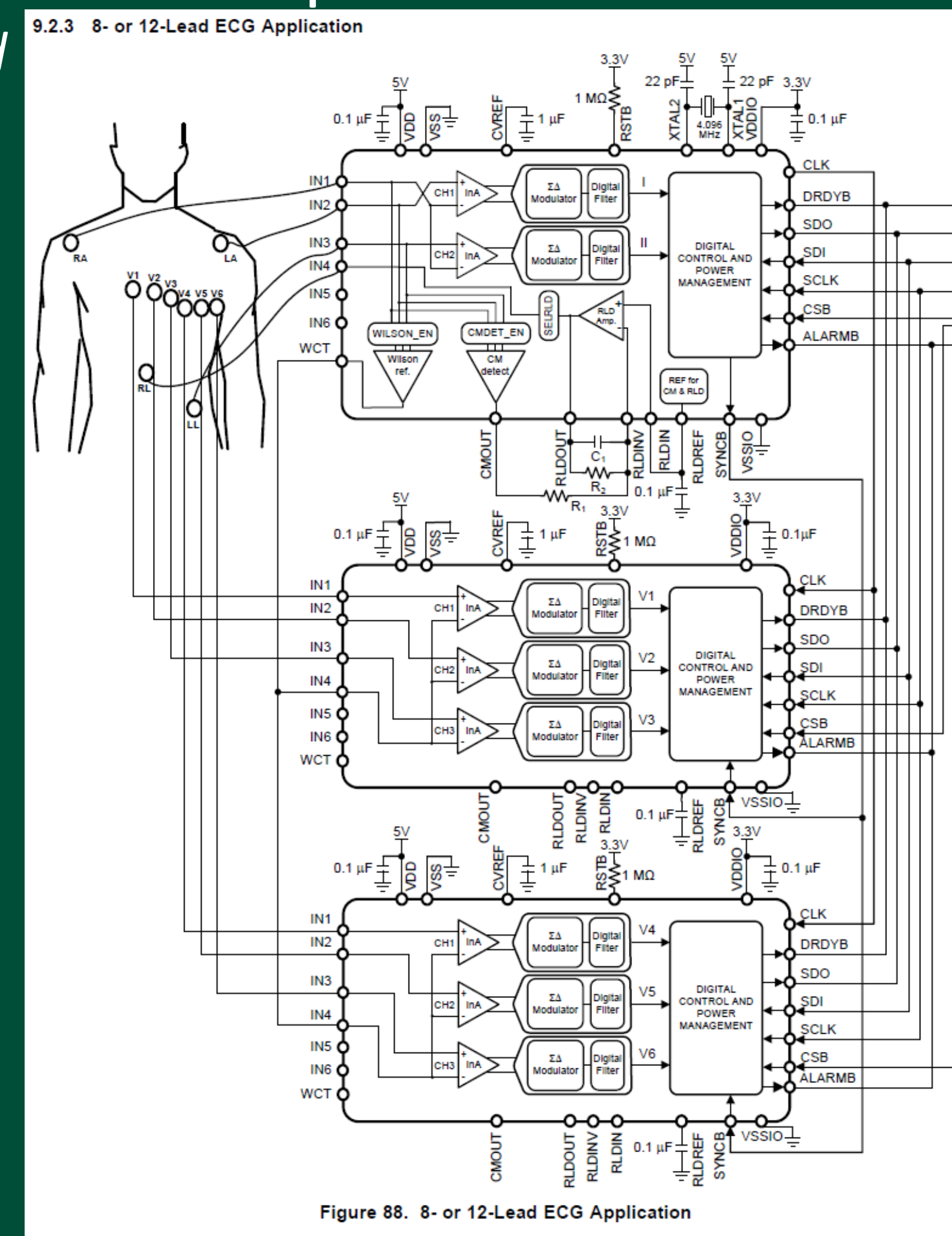


Figure 3: ADS1293 Analog front end schematic courtesy of Texas Instruments ADS1293 User Manual

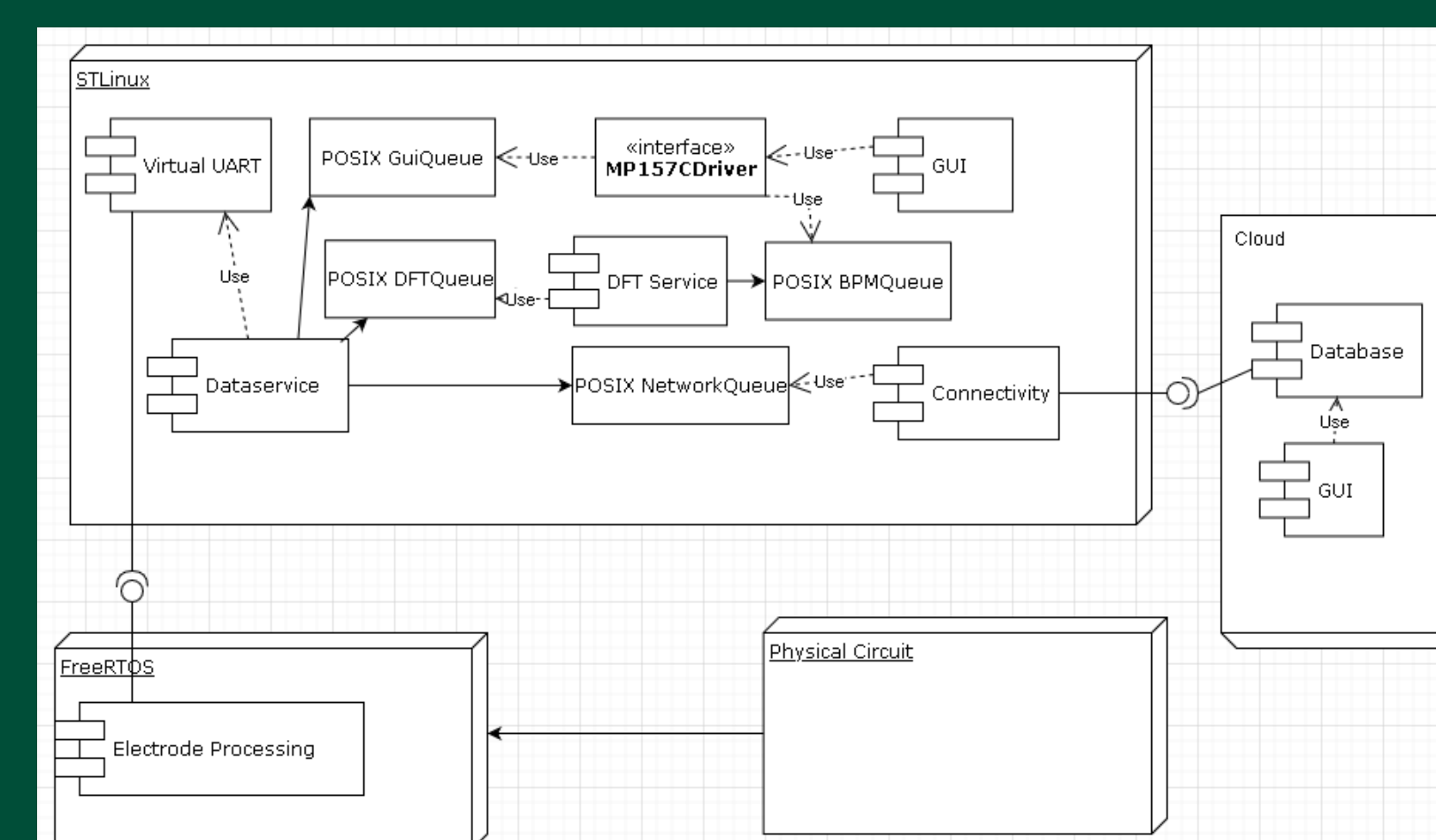


Figure 4: Software Components

BACKGROUND

Our societies greatest death toll is due to cardiovascular diseases, and it keeps rising. This is due to the time it takes to diagnose using technologies that are unchanged relics. By utilizing modern technologies such as Wireless Connectivity, Dry Electrodes, Baseline Wander Elimination and Centralized Cloud-based Data Storage Interface we attempted to create a device to reduce the time to diagnose and save lives while increasing accuracy, usability, and patient comfort.

SUMMARY OF WORK

Project μ-tu is a 6-lead Electrocardiogram device consisting of a 7-electrode configuration to establish precordial lead data acquisition of the user. The data acquired from the dry electrodes is filtered through the integrated circuit front end of the device and transmitted from a microcontroller to a more powerful processing handheld unit that further cleans up the signal for viewing through our online cloud-based interface unique to each user.

Currently the device is 83% completed due to time constraints. Further development will be approached later to bring functionality to the Bluetooth connectivity and Baseline Wander Elimination program.



Figure 5: TORSO COMPRESSION STRAP INTERIOR SHOWING 7 ELECTRODE CONFIGURATION.



Figure 6: ADS1293 Electrocardiogram Instrumentation Device.

IMPACT ON COMMUNITY

- The development of this device means an increased user participation due to comfort allotted by the dry electrodes and the simple setup.
- User participation and general usability can increase the effectiveness of at-home monitoring.
- Access to historical data through the cloud interface gives primary care specialists a head start when in emergency situations therefore increasing the accuracy of diagnosis and therefore treatment planning to the benefit of the patient.
- With the ability to actively eliminate baseline wander, not only will the users be able to perform regular day to day tasks, but it will also increase accuracy of the electrocardiograph in real-time. Saves emergency medical professionals valuable time during treatment.