Aptitude Medical Inc. | Saving Lives

Background

- To minimize mortality of traumatically injured persons, coagulopathy must be assessed and addressed nearest to the time of injury. Coagulopathy of trauma is a hypo-coagulable state with increased bleeding and a 4x increased rate of mortality.
- We integrated a temperature control system into Aptitude's coagulopathy measuring process for a chargeable handheld electronic device with future feature expansion.

Overview / Design Specs

Handheld Device Creation:

- Android Phone as interface to initiate blood readings
- MCU connects peripherals and relays through USB
- PID controlled Peltier module for thermal regulation
- EmStat Pico to interpret blood readings
- USB-C ports, including charging while device in-use Specs:
- Dimensions: 140mm x 80mm x 30mm
- Weight: 700g
- Battery Life: 5 hours





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Real-Time Coagulopathy Measurement Trenton Rochelle | Ziming Qi | Justin Hemphill



Aptitude: RTCM C ECE Capstone 2020 000000000 GPIO/CH1 POWER/GPI02 45mm



Micro-controller relays ready status + user starts the scan

Micro-controller sends the script to the EmStat Pico + receives data

WWWWWWWWWWW

Functional Flow Diagram





Thermal Test – Blood Sample

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- 25°C to 60°C in 20 seconds
- 25°C to 15°C in 25 seconds
- ±0.02°C accuracy

 Hospital measurement time: 1 hour • Our total time: Less than 2 minutes

Hardware / Key Components

ATSAMD21G18A

- 48 MHz ARM Cortex-M0
- Handles sensor data, peripheral
- control, and USB communication

Google Pixel 3a

Rooted Android phone provides the user/developer an interface with the blood coagulopathy measuring process.

Peltier Module

Solid state heat pump which transfers heat from one side of the ceramic plate to another. Heat polarity is determined by current direction.

EmStat Pico

smallest commercially available The which potentiostat analyzes the electro-chemical signals from the blood chip.

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