



CUDA

Compact Unified Diagnostic Apparatus

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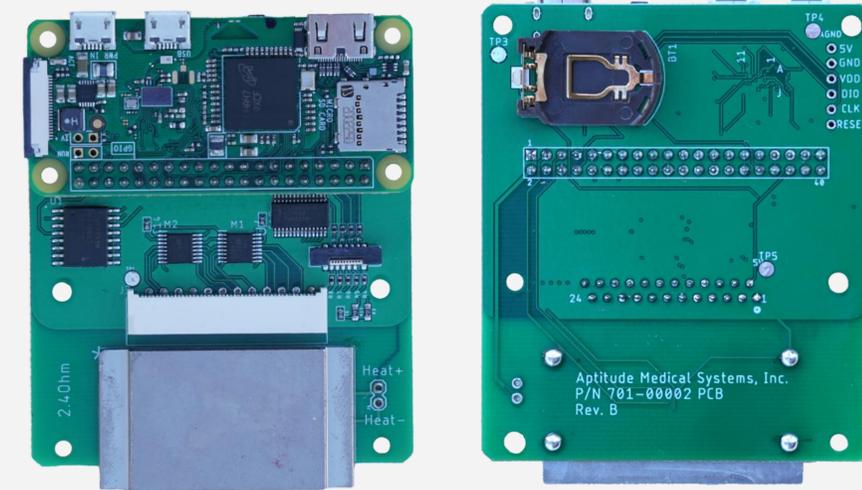
Background

Physical trauma kills more people under 36 than all other causes combined. In some cases, trauma results in a blood-clotting condition that can be life threatening. 30% of deaths caused by trauma-induced coagulopathy occur within the first hour, making rapid detection critical to saving lives. The CUDA Reader provides an affordable, efficient, and repurposable solution for portable medical testing. Our device can measure a fibrinogen sample and provide the user with results in less than a minute.

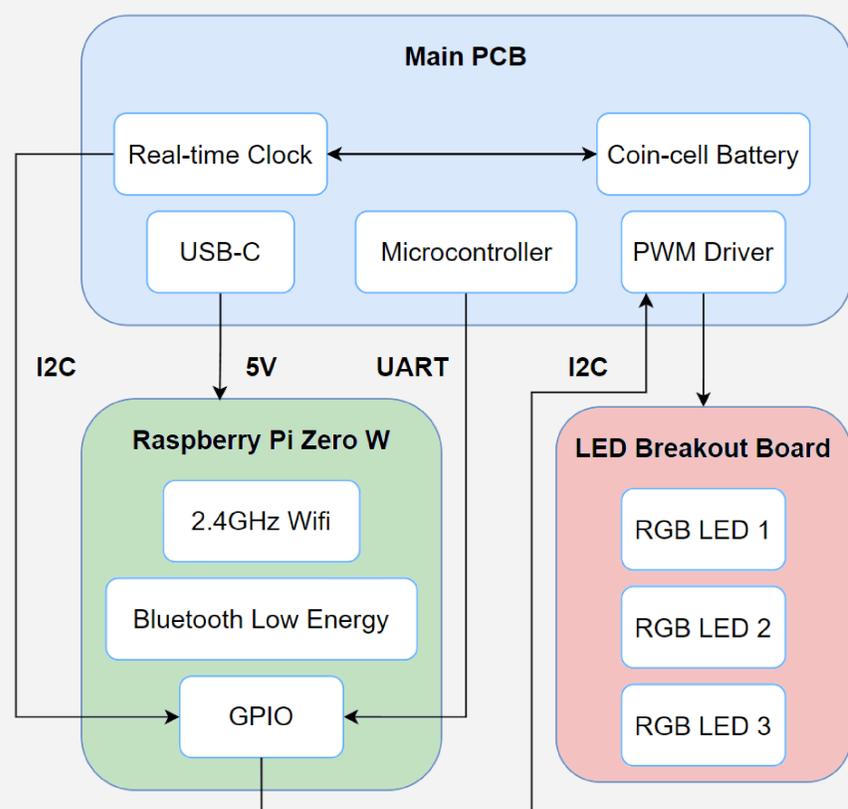
Project Overview

The CUDA team built on Aptitude's digital COVID-19 testing device, introducing a new test that helps detect hypo- or hyper-coagulation. The test works by measuring the protein fibrinogen contained in a sample. In addition, the team built a mobile app that provides care teams with a better user experience for running tests, interpreting results, and managing a large database of patients.

Final PCB



System Block Diagram



Key Components

Raspberry Pi Zero W

- Supports various serial protocols
- Performs data analysis to determine and detect coagulopathy on board
- Runs Linux OS

Microcontroller

- Serial protocol: UART
- Emulates potentiostat functionality
- Used to perform electrical diagnostics

PWM Driver

- Serial protocol: I2C
- 12-Channel PWM LED driver
- Used to control 3 RGB LEDs to display device status and results

Real Time Clock

- Serial protocol: I2C
- Used to collect test time data
- Powered by a rechargeable coin-cell battery

CUDA Test Chip

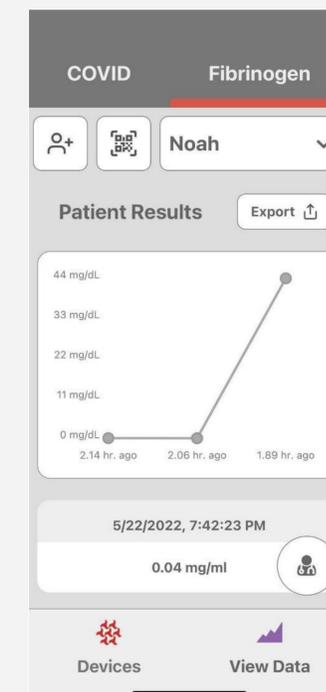
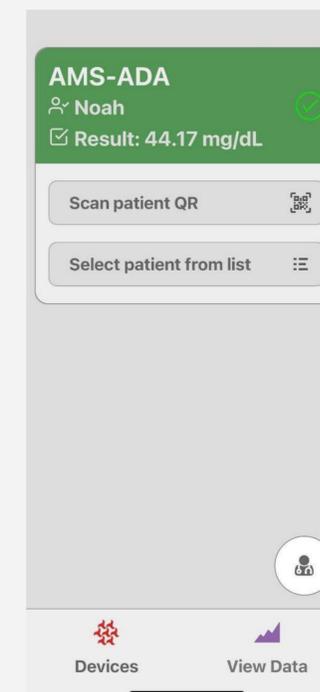
- Supports both COVID and Fibrinogen testing
- Expandable up to 8 separate tests



Fibrinogen Test

Get results wirelessly on any iOS or Android device

- Results can be stored locally backed up to the cloud
- Quickly export results with any communications app



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