

Project H

Blood Tester in USB Stick Form Factor

Sponsor: SCANADU INC.
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Short Description:

This device could be used by people who want to test a blood or spit sample for diseases like the flu or tuberculosis.

Simple heating elements can be used to power chemical reactions that copy DNA. These reactions have names like LAMP reaction, EXPAR and Rolling Circle Amplification. If you select this project, you will be developing a system that can heat a DNA sample and then analyze it.

The main task: Design a PCB that contains a microcontroller, heater, piezoelectric pump, thermocouple or thermistor, LEDs, USB or USB, and a light detector.

An optional secondary task: Add an extra DNA analysis system to the circuit. This extra analyzer would be a simple potentiostat. We have several reference designs that you could use to get your project started.

Expectations:

Scanadu will assist the student team with selecting components for the device. The students who volunteer for this project should suggest additional sensors.

Only the heating, light, and temperature monitoring features must be fully functional by the end of the quarter. Other features can be in a rough format. A secondary milestone would be controlling the flow of colored liquid through a channel on top of the device, using a very small pump.

The students can develop software for Mac or Windows laptops.

The students will complete a circuit board layout and place an order within the first half of the quarter. The students will revise the circuit board layout based on feedback from Scanadu engineers. Semi functional software should be complete by the end of the quarter. Board layouts should be completed in Eagle or Dip Trace. Eagle is preferred.

The students are encouraged to design a 3D printable enclosure using Solid Works.

Resources:

Scanadu will pay for all of the required materials. Parts orders can be placed at DigiKey, Mouser, and PCBexpress via Scanadu. Reimbursements over \$80 must be pre-approved. Technical mentoring will be available from five Scanadu engineers. The budget for this project should not exceed \$1000.

Communication:

Scanadu will coordinate weekly Skype calls or in person visits. Students who volunteer for this project should pretend that they are consultants and try to respond quickly to email.