Low-power handheld diagnostic device with a smartphone dongle

Technology #cu15024

This technology is a compact, low-power device for easy diagnostic testing using smartphone power.

Unmet Need: Simple, compact, and low-power device for multiple diagnostic testing

Current methods of diagnostic testing are time-consuming and require complex, bulky, and expensive machinery specifically designed for a particular test. In developing countries, access to the standard laboratory testing and sufficient power are major impediments to adequate healthcare. Overcoming these healthcare obstacles in developing areas of the world requires the development of simple diagnostic tests and devices that can run on low power and require minimal training.

The Technology: Compact microfluidic diagnostic device powered via smartphone audio jack

This technology is a compact, low-power, microfluidics-based diagnostic device that interfaces with the audio jack of a smartphone for rapid on-site diagnostics. This technology is simple to use and is powered entirely by an audio signal from a smartphone, allowing it to be used in regions without access to a reliable power source. Fluid (such as blood, etc.) is pumped through the device by a mechanical mechanism that creates a negative pressure chamber without the need for a power source. The technology can also be modified to work with a variety of power sources, such as USB, mini-USB, Apple-lightning connections or a small external battery. As such, this technology provides a versatile diagnostic device platform for providing streamlined, inexpensive diagnostic services in resource-limited environments.

A prototype of this technology has field-tested in Rwanda to test pregnant women for antibodies to HIV and syphilis infection in a single immunoassay with high accuracy, specificity, and sensitivity.

Applications:

- Diagnosis of HIV and syphilis
- Measurement of hemoglobin concentration
- Immunoassay tests such as pregnancy tests
- Drug testing
- Colorimetric detection tests
• Electrochemical detection of metabolites and other molecules
• DNA and RNA detection (after adding on-board battery)
• Environmental and soil testing
• Food safety testing
• Water quality testing

**Advantages:**

• Low-power
• Data transferred and device powered through a smart phone audio jack
• Allows for rapid (<15 minutes) diagnostic testing
• Allows for conducting multiple tests simultaneously
• Simple to use (<30 minutes of training)
• Compact and light-weight: current prototype is $7 \times 7.5 \times 5$ cm, and under 130 g

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**Patent Information:**

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**Related Publications:**


**Tech Ventures Reference:**

• IR CU15024

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