Docket #: S12-267

Punchcard Programmable Microfluidics

This light-weight, hand-held, mechanical microfluidic device is designed to perform complex protocols in low resource settings without a power source or external control element. Developed by researchers in Prof. Manu Prakash's laboratory, the system uses an interchangeable punch card tape to both pump the fluid and direct its flow. This general purpose technology can be used in single phase and multi-phase microfluidics for diagnostic, medical device, or environmental monitoring applications.

Video:

Stanford bioengineer creates $5 chemistry set.

Applications

- **Point-of-care diagnostics** - hand-held device can be operated without power supply
- **Programmable medical devices** - accurate drug delivery
- **On-site environmental monitoring** - can run complex assays in the field with limited resources in a field setting

Advantages

- **Non-electric:**
  - completely mechanical design requires no power to operate
  - enables point-of-use field operation in harsh conditions
  - light-weight (because no battery is required)

- **Low cost** - simple, easy-to-use system
- **Programmable**
  - no external control system
  - unique microfluidic programs can be loaded onto interchangeable cards
  - protocols can be shared between users by sharing programmed cards

Publications

- Korir G, Prakash M (2015). "Punch Card Programmable Microfluidics," PLoS ONE10(3): e0115993.
- "Inspired by a music box, Stanford bioengineer creates $5 chemistry set," Stanford News Service, April 8, 2014.

Patents

- Published Application: WO2014039844
- Published Application: 20150238959
- Issued: 10,272,427 (USA)

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