Low-Cost USB-Based Ultrasound Probes

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Overview

- Low-cost, USB-based ultrasound probes
- FDA approved and CE-Marking approved
- For real-time acquisition of diagnostic ultrasound images
- Connect to Windows, Mac, and Linux computers
- Enables development of ultrasound systems

Examples of FDA Approved, CE-Marking Approved Probes

- GP 5 Mite Probe
- Vascular Access 7.5 MHz Probe
- EC 8 MHz Probe
- OP 12 Mite Probe

Motivation

- With the world population having no access to medical imaging (many health organizations)
- Most of these people are poor and live in remote areas.
- There is a shortage of trained medical professionals in these remote areas.
- Medical imaging devices need to be more affordable to be deployable in greater numbers
- Many specialized probes available

Current Applications and Deployments

- Endovascular tripping
- Ophthalmology
- Vascular access

Oil Open-Source Software

- Free software development kit (SDK) is available to enable fully custom applications to be developed
- Enables development of custom applications without requiring the expertise of a medical ultrasound engineer

Current Funding

- The project is supported by funding from the National Institutes of Health (NIH) and the National Science Foundation (NSF)

Objectives

- Enable more people to have access to medical imaging
- Enable low-cost, portable and customizable ultrasound-based systems to be built
- Create an open development platform for customization of applications
- Enable developers to collaborate and contribute to the platform and work toward a shared development cycle
- Enable general imaging and screening applications

Under Development

- Smartphone with a USB probe directly attached
- Laptops/Desktops

Smartphone with a USB probe directly attached

- Toshiba G900
- Palm Trek 800x
- ANDI 955 with Framex Base

- Probe is modified: Ultra-low power (< 0.5 W) vs. 480 Mb/s
- Lower data rate (10 MHz) vs. 480 Mb/s

- Optimized Software: Small screens, smartphone keyboards/touch screen

- Standard laptop/desktop supports high-resolution imaging and higher performance:
  - Many specialized probes available (endovascular,素食主义?-life, etc.)
  - RT probe available
  - Very high resolution with zoom
  - Save very large image sets
  - Patient database
  - Image annotation

USB Probe and System Cost

- Current probes cost as little as $300 each
- We are currently working to acquire a Pilot run
- Volume production would bring the price down to less than $100 in the next year
- Additional development could bring the price down under $100

- Standard laptop/desktop connects to the probes via USB
- A $200 laptop ($100 depreciation, 1.8 GHz, Windows XP) can use this system:
- Entire system can be powered by a single USB port
- Easy to set up and lower power

- Many software packages are available for Windows and Linux with a low hard part cost for the system

Case Study in Africa

- In field, we found the unit to be reliable, user-friendly, and having good image quality and clarity. It prided especially valuable for diagnosing and staging a variety of conditions, as well as in the evaluation of the masses (or planar endoscopy). - Escalon, Inc.

Drug Efficacy in DMD Patients

- Cell phone (or laptop) ultrasound used by doctor/house wherever the patient resides.
- Store anywhere (HealthVault, GoogleHealth, OpenMRS, etc.)
- Remotely view data or retrieve it from databases.

Example Low-Cost, Portable Systems

- Smartphone with a USB probe directly attached
- Laptops/Desktops

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- Mobile ultrasound to the patients' homes.
- Many specialized probes available
- With ultrasound. Physicians can then adjust the treatment plan, based on this decision.
- Physicians can then adjust the treatment plan, based on this decision.
- As a result, the patient can be treated less frequently.

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