Mobile Device Camera Connector

600.446 Computer Integrated Surgery II
Project 7

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Mentors: Dr. Amit Kochhar, Kevin Olds
Background/Relevance

- **Low cost solution**
  - Needed for third world use where costs are major issues
- **Useful in emergency situations**
  - Allows for rapid image sharing when doctors are not on site
- **Create a system for Android devices**
  - Current solutions only work with iPhones
Existing Solution

- Endoscope-I - iPhone

(Photo courtesy of endoscope-i.com)
Proof of Concept
Proof of Concept

*Laproscope test photos using Android phone*
Technical Summary: Current Information Flow
Technical Summary: Future Information Flow
Technical Summary: Project Information Flow

Physician(s) → Possible UI Work
Mech. Eng. Work (Deepak) → Portable Light Source
Endoscope → Adapter → Tablet Camera → UI Work (Kyle)
Back-end Work (Daniel) → Annotated Images (by both tablet and physician)
ER Patient → Optical Image
Symptoms, Observation
Patient Record → Sharepoint Database
Possible Back-end Work
Technical Summary

- **Mechanical Engineering:** Endoscope Adapter & Ergonomic Grip
  - CAD model
  - Optical lens design
  - Multiple prototype design

- **Software Engineering**
  - Front-end User Interface
    - Android IDE
    - User analysis & Storyboard
  - Back-end Database and Camera Interface
    - Android IDE
    - Sharepoint for Database (temporary)

- **Electrical Engineering:** Portable Light Source: TBD
Deliverables

Minimum:
- a working adapter for a specific Android Tablet for an endoscope
- Android application with GUI (Graphical User Interface) for adjusting tablet’s camera settings and saving pictures to the device

Expected:
- a working adapter with ergonomic grip for easy holding
- Android application with GUI for organizing images by patient identifier

Maximum:
- a universal adapter for connecting any tablet to any endoscope
- a portable light source that ensures high quality images
- Android application that uploads and offers secure viewing of patient endoscopy images
1) Android tablet with a high-resolution camera
   - plan A: borrow and use one from the Johns Hopkins Outpatient Center
   - plan B: receive money to buy an Android tablet - follow-up on Dr. Kochhar and Dr. Best
     (In Process)
   - plan C: use personal Android phone for initial testing

2) A functional endoscope
   - plan A: borrow or get an old endoscope from the Johns Hopkins Outpatient Center
     (Done for flexible scope)
   - plan B: borrow the old endoscope that Kevin Olds currently has
     (Done for Rigid Scope)
3) Access to a machine shop or 3D printer for manufacturing an adapter
- plan A: get access/training to any of the JHU Mechanical Engineering/LCSR Machine Shop
- plan B: ask the machinist in the WSE Machine Shop to manufacture our design
- plan C: ask friends who have access to machine shops to manufacture our design
- plan D: have a highly detailed 3D CAD model of the adapter to be built that we can print using the 3D printer in the DMC

4) Access to mentors
- schedule weekly meetings with Kevin Olds (Done)
- schedule monthly meetings with Dr. Kochhar and Dr. Best
- send out email updates every two weeks
- get optics / lens advice from Dr. Kang (and other contacts through Kevin)
Management Plan

Meetings
● Weekly meeting with Kevin (Tuesday 2:45pm)
● Email updates with project progress to clinicians every two weeks
● Monthly meeting with clinicians, as needed

Assigned Responsibilities
● Deepak - CAD design for adapter / light source, manufacture
● Kyle - Android application GUI design
● Daniel - Android application Camera settings and storage
Management Plan

Budget - sent to Dr. Kochhar
- Asus Transformer Pad Infinity TF700--$229.99
  or Google Nexus 10--$399.00
- Endoscope—Donated
- Light Source—Donated
- LEDs--$29.95 to $50
- Optics—TBD
- Switch-- $0.43 to $1.00
- Box-- $20 to $50
- machining / cad--TBD

Total: Roughly $510.00
Key Dates/Milestones

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<th>2-Mar-14</th>
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Reading List

- Portable Light Source


Related Patents


Irion, Klaus. "Endoscope with LED illumination."