Camera Mounts for Usability Testing on Mobile Platforms:
The Evolution from Sled to Palette

Tony Santos, notjustprettypictures.com
David Evans Ph.D., Psychster.com

Introduction

As mobile platforms continue to grow in popularity, the lack of easy tools to conduct usability tests on these devices and their software has become noticeable. Many different camera rigs have been built to run tests on the various smartphones and tablets on the market today, but all of them require compromising realistic usage or video quality. Our goal was to minimize these compromises as much as possible.

Design Criteria

From the beginning, we agreed that the most important usage characteristic of these platforms is they're hand-held. This means to get a realistic simulation, the subject needs to be able to hold the device in their hands, and move it as they see fit. This immediately ruled out any table-mounted rigs. It is simply not realistic to force a subject to put their device down to use it.

Single piece, dual camera, hand held camera mount by Harry Brignull. The added weight from the long neck and the extra camera make one hand operation difficult.

Knowing that the test subjects needed to hold the device left two major problems to solve. Allowing the subject to hold the camera rig without it affecting their ability to use the device, the rig needed to "disappear" within a few minutes of use. It also needed to handheld without it affecting the video quality while being tilted, and jostled. Failing in solving either of these problems would severely compromise the results of a test.

Single piece, single camera, hand held camera mount by Nick Bowmast. While the camera is on an adjustable mount, the fixed neck is not as adjustable to account for the myriad sizes and form factors in the current smartphone market.

Early Designs

After doing some initial research to see how others had solved this problem, themes started to appear. All of the handheld rigs we could find online were once piece. The initial prototypes we built in this style were heavy, and the camera couldn't be adjusted for different device sizes. A stiff goose neck appeared to be the answer, but it had to be short enough to keep the rig from being top heavy, and stiff enough to only move with the rest of the rig, to maintain a steady shot.

First prototype built using microphone stand components. The gooseneck was stiff enough that it did not move, but the metal components were too heavy to use comfortably.

Initial prototypes failed to strike a balance between weight and focal length. The first prototypes were top heavy, while later early prototypes became lighter but remained awkward because the neck was too long. The design challenge became the precarious balance between necessary focal length to hold focus on items on the platform and keeping the balance of the rig similar to that of the device sitting on it.

This late prototype had a very long, but light, neck that allowed the camera ample distance to focus, but was still too long to use comfortably. The addition of a square platform allowed for using a device in landscape mode as well as portrait.

The Solution

As we built the final prototype, additional challenges presented themselves with the webcam. We chose a webcam because they were readily available and they were relatively inexpensive. Using a USB webcam also allowed us to use any recording software we wanted. Our tests were conducted using Camtasia and WebEx. The problem with web cams is that they are designed to be looking at a face sitting in a chair four to five feet away. The focus on all the web cams we tried was locked right around this distance, and this meant that the camera had to be sufficiently far away to see the glowing screen and be able to focus on text on the screen. Solving this problem revealed an important thing we had overlooked, and that was the users hands. In pulling the camera out far enough to allow it to focus, we also gained the user's hands in frame. This allowed us to see a lot on non-verbal cues (e.g. frustration, confusion, excitement) that we were otherwise missing with a tighter shot of just the device's screen.

Our final solution solved all the problems highlighted above, as well as pointed out some important aspects moving forward.

· Allowing usage in portrait or landscape orientations is important; a lot of apps run only in landscape mode.
· Webcams with lights attached don't work. The screen on most touchscreen mobile devices are too reflective.
· Don't try to capture the user's face with the rig. This kind of setup not only makes the rig heavier, trying to capture the user's face restricts the natural movements of the phone.
· Gain, Exposure, Whitebalance and Contrast are key. Using an HD webcam allowed us the best possible picture and overcame a lot of the issues created with filming a lighted object. Finding a camera that can handle low light shooting makes this easier.

References

Hand-held camera rig photos courtesy of www.90percentofeverything.com
http://www.90percentofeverything.com/2010/05/07/quick-tip-make-your-own-iphone-usability-testing-sled-for-5/
http://www.90percentofeverything.com/2010/11/15/more-mobile-usability-testing-sleds/
Psychster white-paper on mobile usability testing camera rigs available at:
http://blogs.psychsterdata.com/psychster/2011/08/usability-sleds-camera-mounts-for-usability-testing-of-mobile-devices.html

Demonstration Videos

Psychster has posted videos of their camera palettes in action on YouTube. If you have a smartphone with a QR code reader, you can view them now.
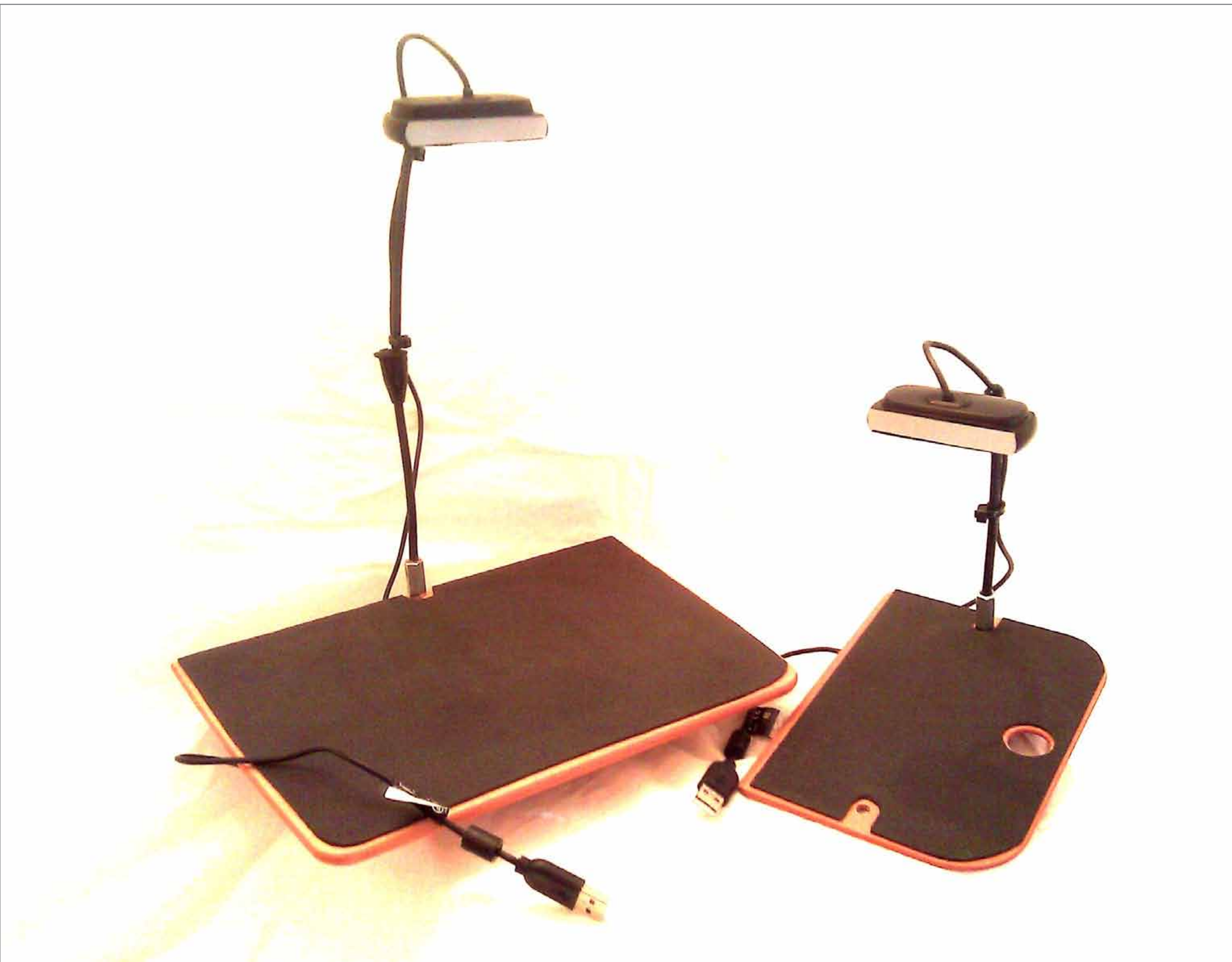
Usability Palette Demo Part 1
http://youtu.be/a1dDia4zYKc

Usability Palette Demo Part 2
http://youtu.be/OR3230sQ0Gg

Playing a game in portrait view with one finger
http://youtu.be/d_nPRkKkKfY

Playing a game by tipping the device
http://youtu.be/VGampcFQsTE

Camera Palettes used today by Psychster Inc.

Not Just Pretty Pictures

Psychster Inc.