A Platform for Rapid Development of Multi-touch Applications

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Abstract
Recent advances in multi-touch technology make a large multi-touch surface for everyday use a possibility in the near future. However, most research is done by private companies or groups of hobbyists that work separately and redundantly redesign the technology. Some progress has been made to alleviate this through open-source software to interface with a multi-touch surface. In line with this effort, we have developed tools for a simple platform that allow a non-programmer to develop their own applications. An open-source tracker was modified to communicate with a custom Adobe Flash library of simple functions to accept touch input and recognize gestures for rapid application development.

Multi-Touch Technology

Frustrated Total Internal Reflection (FTIR) is one of the standard methods used in modern multi-touch implementations. Unlike other touch screen technologies, FTIR multi-touch is simple, cheap, and not limited by size.

- Infrared (IR) light is internally reflected through a surface.
- When fingers touch the surface, IR light is reflected away and detected by an IR camera.
- The image is processed to calculate coordinate points of touch that can control applications.

Multi-touch Table

Tracker

- Our tracker is based upon the open-source, TouchKit API.
- We developed software allowing the tracker application to communicate with other external applications.
- This “wrapper” code sends information packets from the tracker, over a computer’s network.
- The tracker can communicate with any other user application able to receive these network packets.

Adobe Flash
- Adobe Flash is a popular standard for rapid prototyping of cross-platform, visually appealing applications.
- Flash includes the ability to display rich 3-D graphics and to generate dynamic sound.
- The Adobe Integrated Runtime (AIR) allows for desktop applications authored using Flash.

Flash API
- We developed a Flash interface library to receive multi-touch network packets.
- The library recognizes touch types and gestures and allows a developer to easily incorporate them as events in their own Flash applications.
  
  ```
  Click() Select an object.
  Drag() Move an object
  Pinch() Compress an object
  Pull() Expand an object
  Rotate() Rotate an object
  ```

Implementation

Applications can respond to a user’s multi-touch gestures such as:

- Generating a changing tone or chord based on the up and down movement of a user's touches.
- Rotating an on-screen 3-D cube by grabbing and twisting.

3-D graphics, dynamic audio, and multi-touch gesture recognition can be easily combined to create a rich cross-platform, multi-touch experience.