DIY Input Technology

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I3D Keynote, Feb 2009

Impact
Bill Buxton’s Preface to
*Human Input to Computer Systems: Theories, Techniques, Technologies*
(unpublished)

When compared to displays and graphical output, studies of human-computer interaction have paid too little attention to input. Interaction is a two-way street. To be effective, there must be a balance of concern for both directions of communication. Without this balance, the full potential power and benefit of the technology cannot be fulfilled.
The controllers bundled with Guitar Hero releases (from left to right):
Gibson SGs for Guitar Hero & Guitar Hero II (PlayStation 2)
and Gibson X-Plorer for Guitar Hero II (Xbox 360) & Guitar Hero III (PC)

<table>
<thead>
<tr>
<th>Platform</th>
<th>Sales in Japan</th>
<th>Sales in America</th>
<th>Sales in Others</th>
<th>Total Sales</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wii</td>
<td>7.84M</td>
<td>21.43M</td>
<td>17.71M Others</td>
<td>46.98M</td>
<td>48.3%</td>
</tr>
<tr>
<td>XBOX360</td>
<td>0.94M</td>
<td>16.40M</td>
<td>11.25M Others</td>
<td>28.61M</td>
<td>29.8%</td>
</tr>
<tr>
<td>PS3</td>
<td>2.88M</td>
<td>7.86M</td>
<td>9.81M Others</td>
<td>20.55M</td>
<td>21.4%</td>
</tr>
<tr>
<td>NINTENDO DS</td>
<td>25.94M</td>
<td>32.68M</td>
<td>40.18M Others</td>
<td>98.80M</td>
<td>66.4%</td>
</tr>
<tr>
<td>PSP</td>
<td>11.57M</td>
<td>16.32M</td>
<td>17.58M Others</td>
<td>45.57M</td>
<td>31.6%</td>
</tr>
</tbody>
</table>

http://www.vgchartz.com/
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Ocarina by Smule on the iPhone
Input is important, and deserves considerable attention. But once this need is recognized, the intrepid investigator quickly runs into a brick wall. Useful information relevant to the designer is near impossible to obtain. The standard texts on computer graphics (such as Newman & Sproull, 1979, and Foley & Van Dam, 1982) give us general descriptions of devices, both physical and virtual, as well as interaction techniques.
However, the "real world" is not general. It is made up of real problems, where the designer has to find some match among a mix of users, display technologies, tasks, context and input technologies. Each situation is different, and requires a deep understanding of the relevant factors. But where does one go to obtain this understanding?
Steven Hobley's Laser Harp

CS146: Introduction to Computer Graphics and Imaging

Input Technology

Topics

- Keys and Keyboards
- Pointing
  - Digital joystick
  - D-pad
  - Trackball
  - Mouse
  - Optical mouse
  - Analog joystick
  - Game controllers

http://wiki.arcadecontrols.com/wiki/Main_Page
History of DIY Input
Douglas Engelbart Mouse (1964)

Jef Raskin’s Apple ][ Joystick (1976)
Atari 2600 CX40 Joystick (1977)

Just 5 switches!

\ o5 o4 o3 o2 o1/  \
\ o9 o8 o7 o6 /  \\____________/

pin #
1  Up
2  Down
3  Left
4  Right
5  unused
6  Button
7  unused
8  Ground
9  unused

Famicom Controller – D-Pad (1983)
NYIT BBOP Animation System (1984)

Stanford Responsive Workbench
Stanford Responsive Workbench

DIY at Large
Will O'brien

http://www.youtube.com/watch?v=cBV8l5qUv4
Prototyping

Some Demonstrations

1. MAME microcontroller for switch-based controllers
2. MIDI instruments
3. Arduino + Wii Nunchuck
4. ...
Wrap-Up
WIMP

Stu Card’s
Wheel of Reincarnation
The Future

Mechanotronics of interfaces
- Mechanical and tactile
- Electronic sensing and analog computing
- Computing and signal processing

Every light switch will have a microcontroller
Every power outlet will sample power consumption

ThinSight: Versatile Multi-touch Sensing for Thin Form-factor Displays

Steve Hodges, Shahram Izadi, Alex Butler, Alban Buatmen and Bill Buxton
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Figure 1: ThinSight enables multi-touch sensing using novel hardware embedded behind an LCD. Left: photo manipulation using multi-touch interaction on a regular laptop. Note that: the laptop screen has been reversed and faces away from the keyboard; fingers are positioned artificially to highlight the sensing capabilities rather than to demonstrate a particular interaction technique. Top row: a close-up of the sensor data when fingers are positioned as shown at left. The raw sensor data is: (1) scaled-up with interpolation, (2) normalized, (3) thresholded to produce a binary image, and finally (4) processed using connected components analysis to reveal the fingertip locations. Bottom middle: these custom ThinSight PCBs tiled together and attached to an acrylic plate. Bottom right: an aperture cut in the laptop lid allows the PCBs to be attached behind the LCD to support multi-touch sensing in the centre of the screen.

ABSTRACT
ThinSight is a novel optical sensing system, fully inte-
The Future

Sensing of the real-world (sensor net, Street View)
Coupled with simulation of the virtual world
At a massive scale (Google Earth, Second Life)

How will we interact with the system?
Missing Ingredient:

Interactive Techniques

Comments?