Microsoft Research

Microsoft Research Asia
Faculty Summit 2012

Kinect in the Classroom: The Creative Use of Kinect in Student Projects

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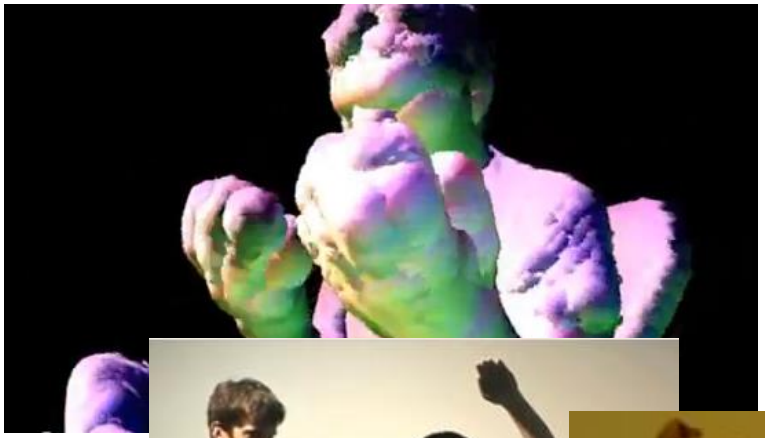
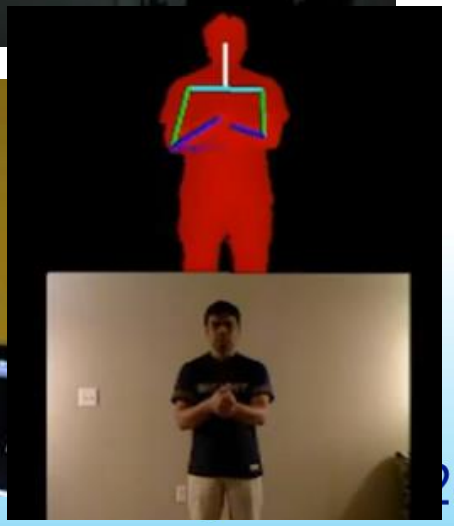
In 2010, MS Kinect took the world by storm

Within 6 months of release

Thousands of projects created using Kinect





Popular with students for projects

- WHY?
- #1 it is cool
- Enables novel interaction
- API(s) for PC available
- Low cost: USD$149

Kinect-based Projects

All that is required
is imagination.

+

KINECT™
for Windows

OpenNI™

OPENKINECT

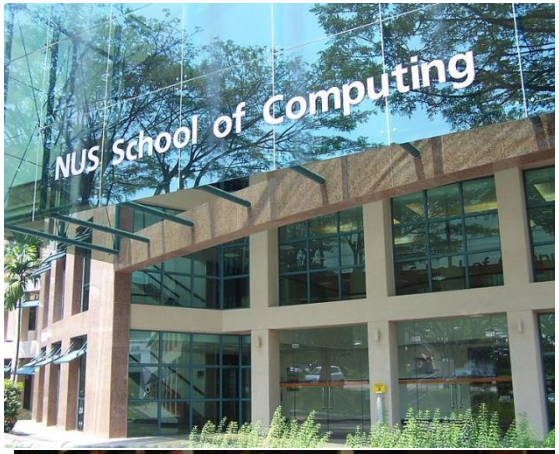
+

Educators Point of View

- Allows different types of projects
- Technical education
  - Data analysis, data fitting
  - Extracting high-level information
- Application/Design education
  - Exploiting novel interaction
  - Building apps based on Kinect API
  - Enable new types of interaction

School of Computing (SoC)

- Two departments
  - Computer Science
  - Information Systems
- 4-year undergraduate program
  - 400 students accepted a year
  - ~1600 students
- Many students do “final year project”
- Many students have class projects



NUS National University of Singapore
School of Computing

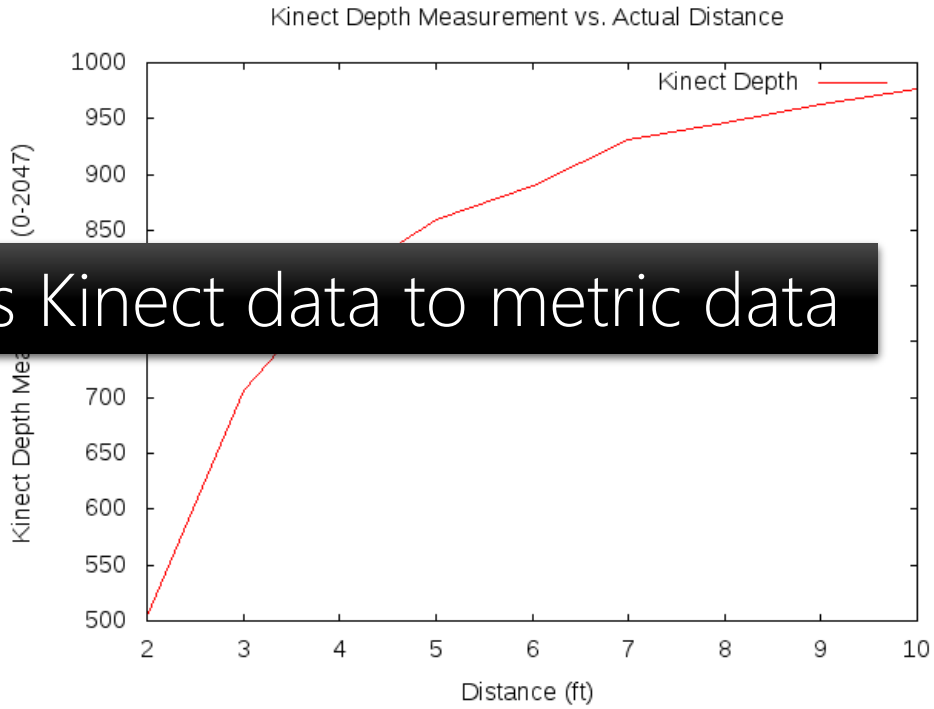
Kinect-Based Projects at SoC

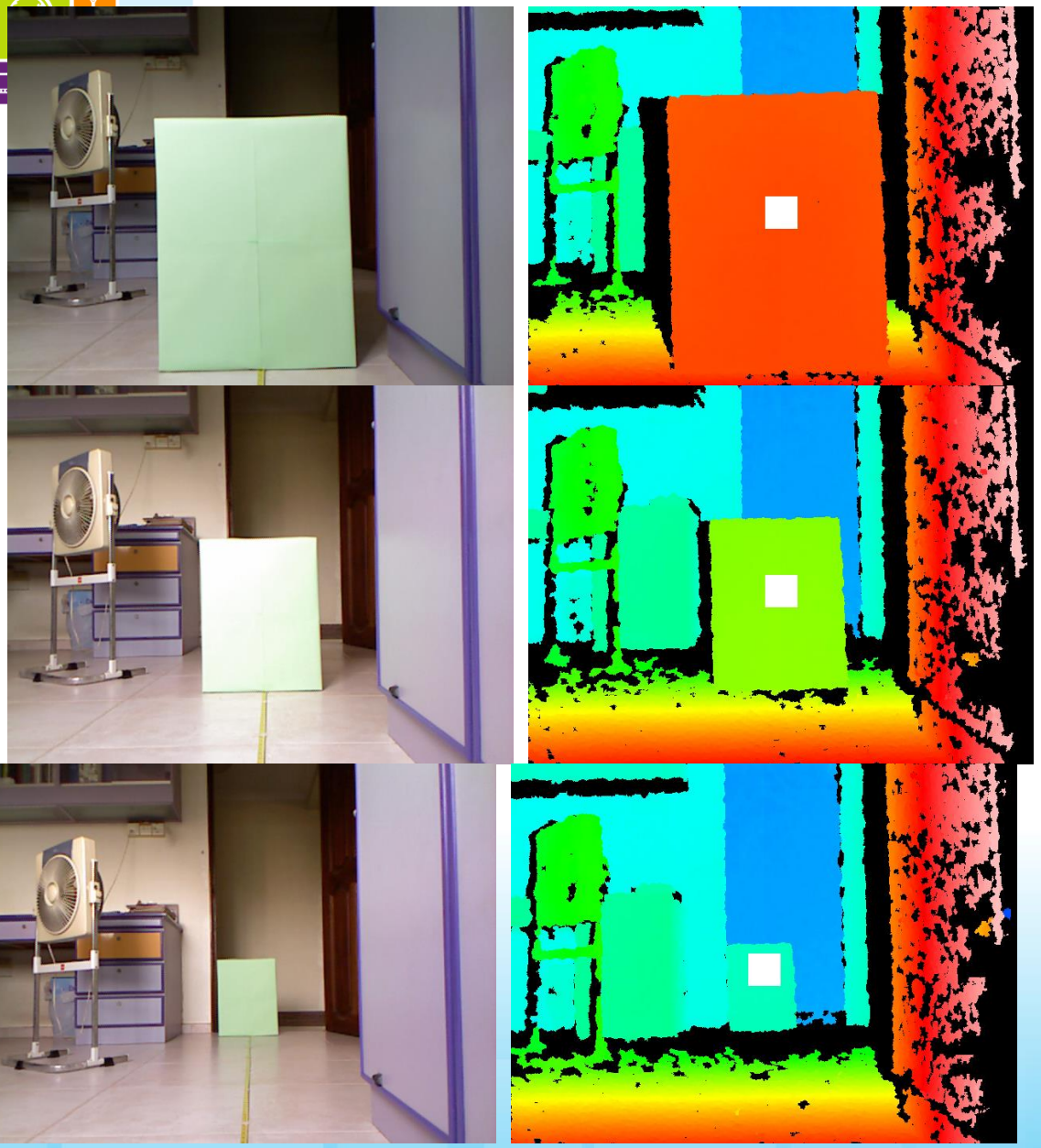
Four projects

- Two are technical
  - Data fitting
  - Gesture recognition
- Two are interactive applications
  - Learning about Bones
  - Game for "OpenHouse"

Project 1: Linearizing Kinect's Output

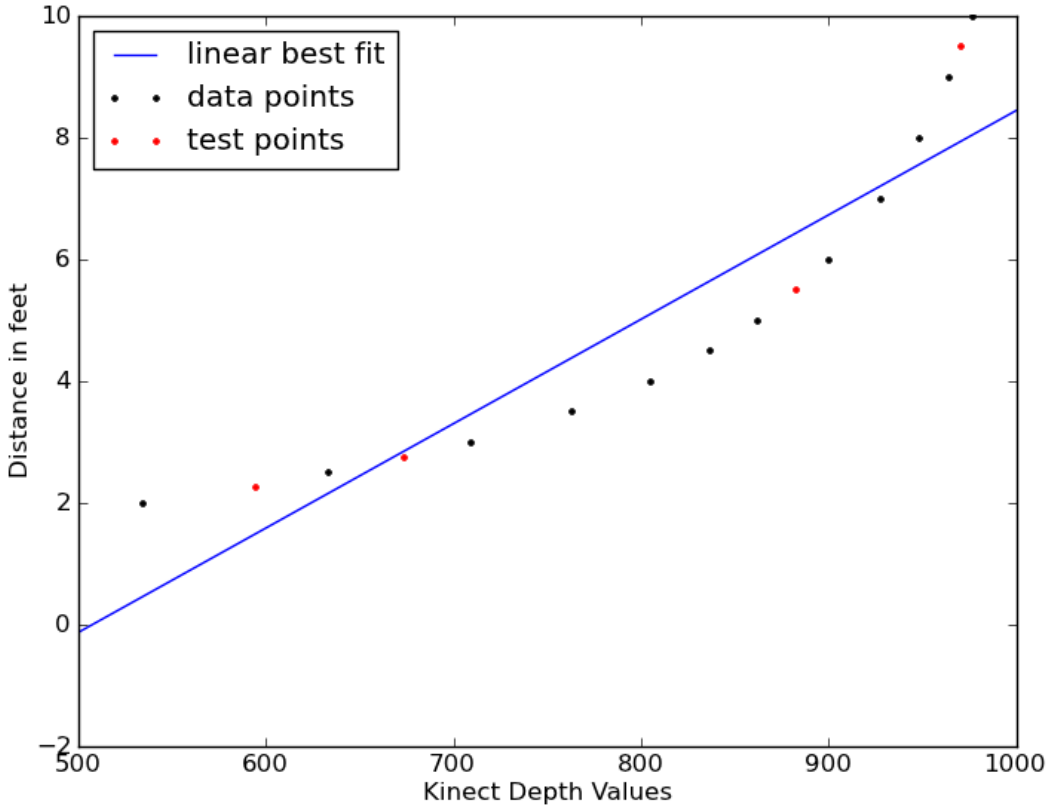
Design a function that maps Kinect data to metric data



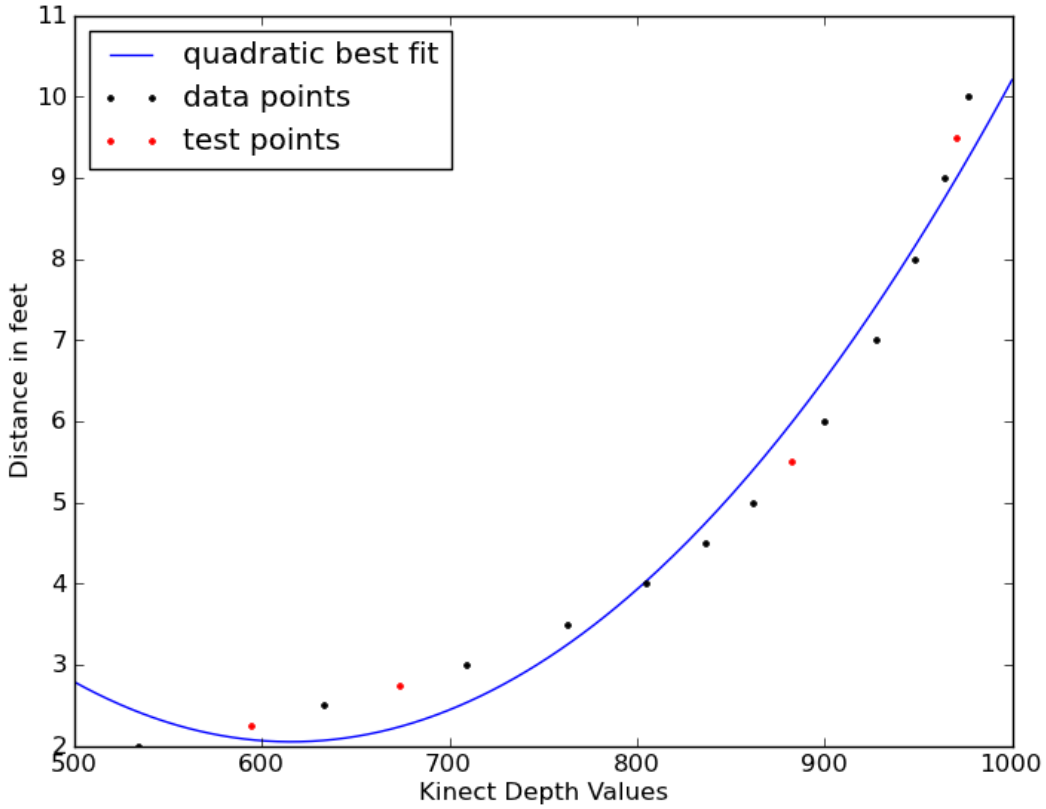


Experiment Data Gathering

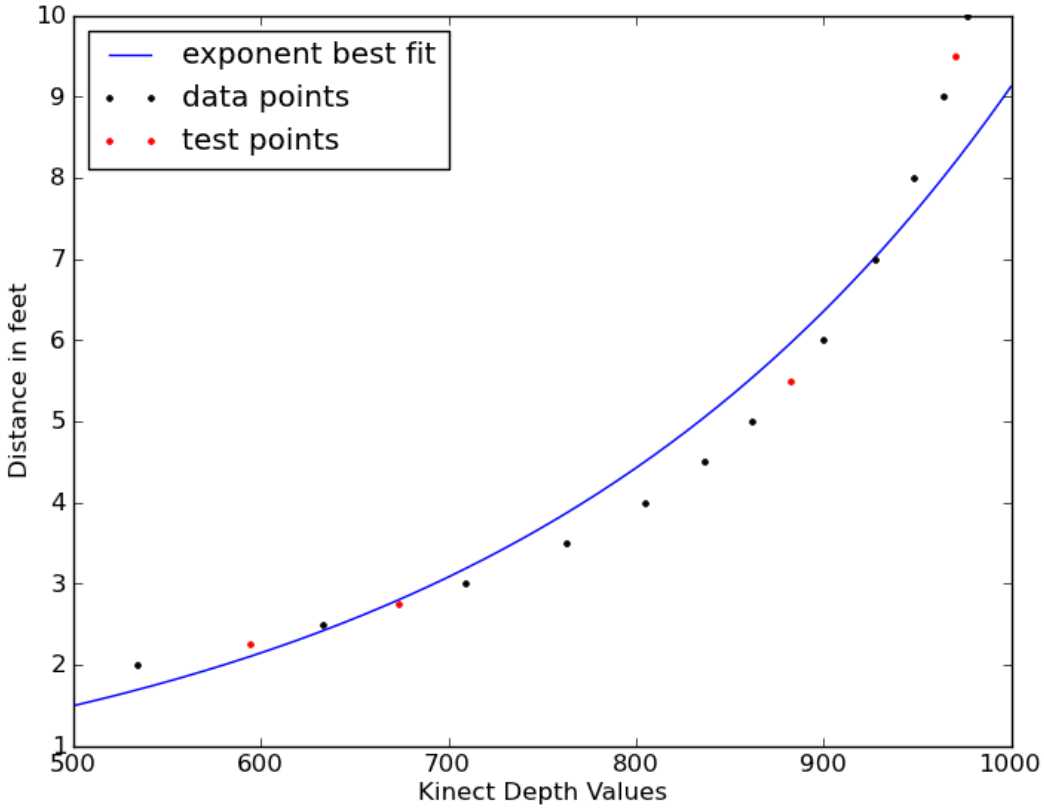
Fitting Various Functions: Linear



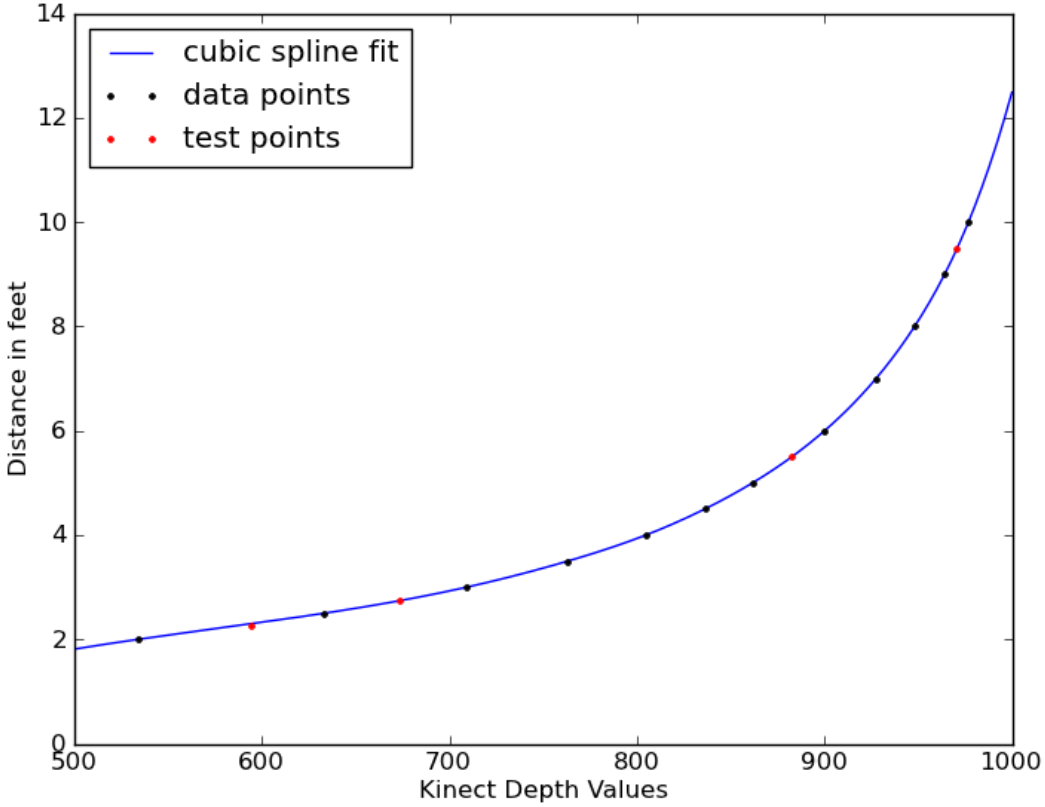
Fitting Various Functions: Quadratic



Fitting Various Functions: Exponential



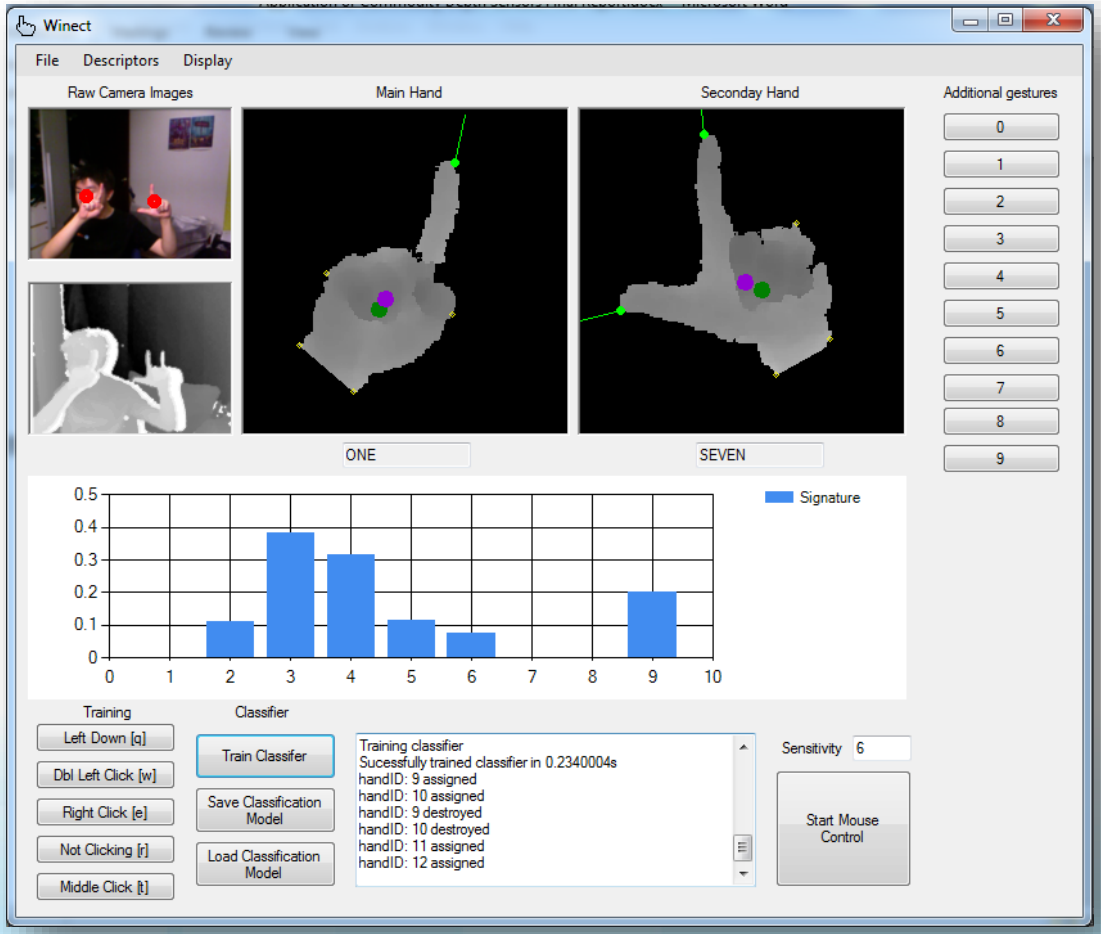
Fitting Various Functions: Spline



Outcome of Project 1

- A short, one semester project
- The student was able to provide a calibration procedure + linearization function that produced better results than other APIs

Project 2: Finger Gesture Recognition

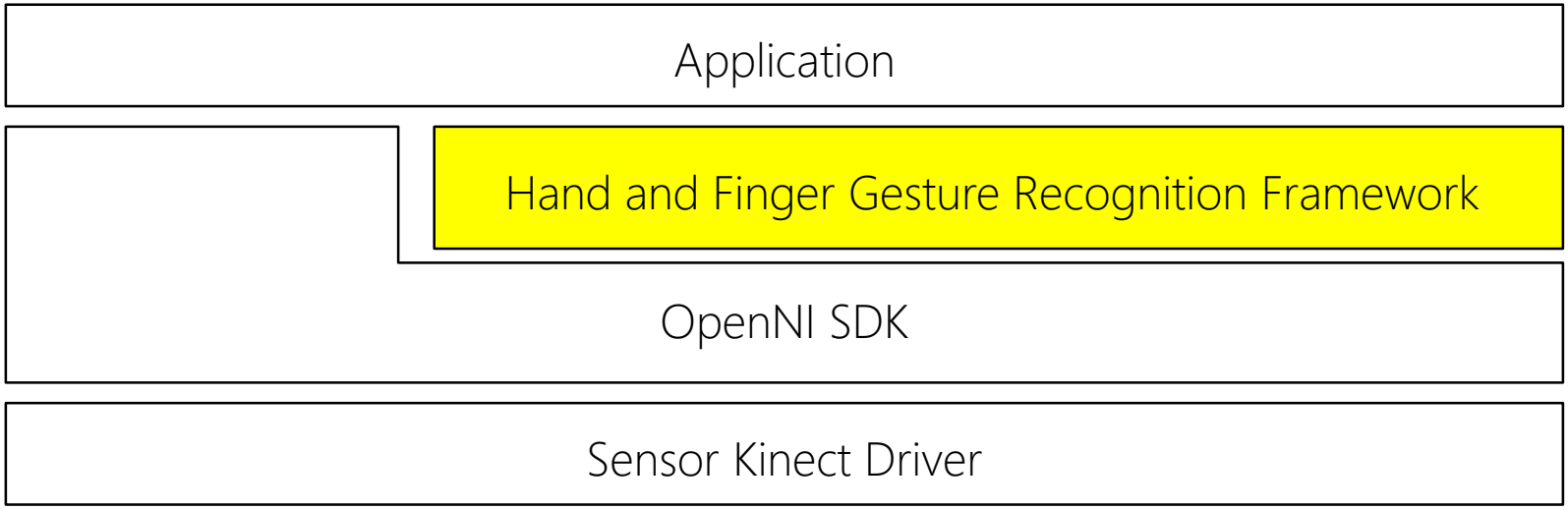


Recognize 10 gestures

ZERO ONE TWO THREE FOUR

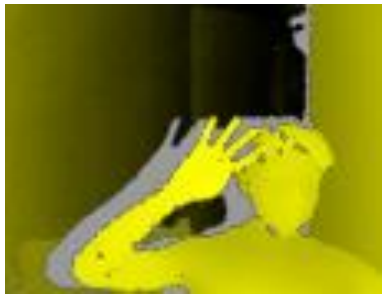
FIVE SIX SEVEN EIGHT ROCK

Build a "Gesture API"



- Framework complements OpenNI SDK to provide information on:
    1. Trained Gestures
    2. Finger Tips Tracking
    3. Palm Center
- Process time: 7ms

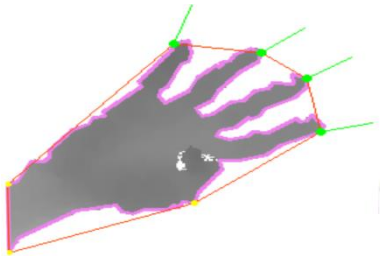
Processing Pipeline



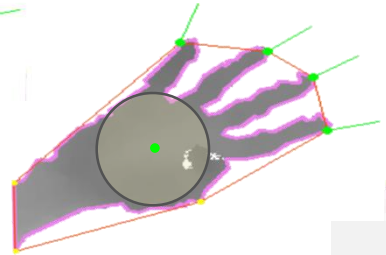
1. Hand Tracking

2. Hand Segmentation

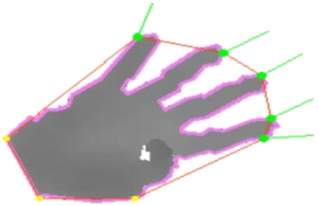
3. Contour Tracing



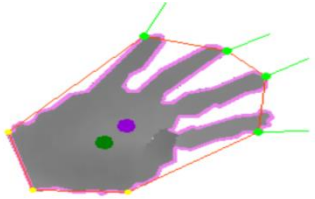
4. Fingertips Identification



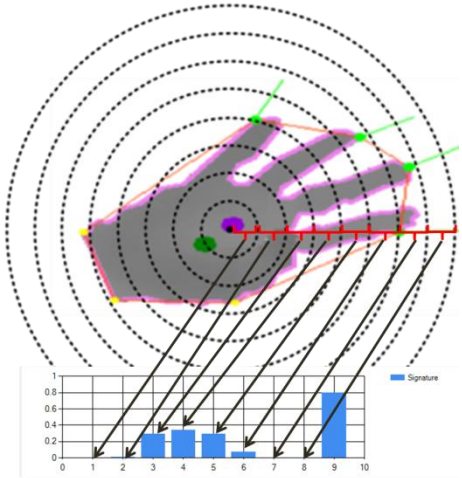
5. Identify Palm Center



6. Wrist Segmentation



7. Recalculate Centroid Position



8. Build hand signature

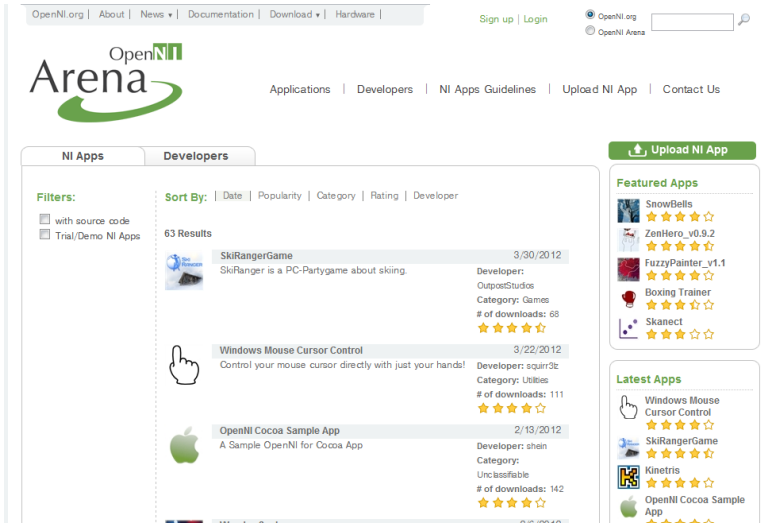
9. Identify signature

Time	0	1	2	3	4	5	6	7	8	9	10	11	12
Gesture	1	2	1	2	2	1	2	1	3	2	2	2	2
				Sliding window: 2									

10. Filter Using Sliding Window

Show Video

Outcome: API is available for download

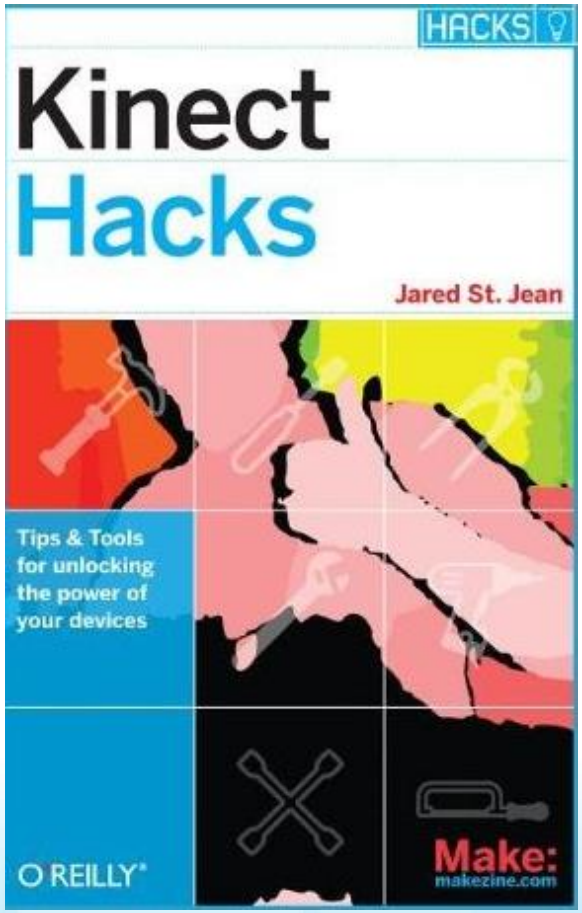


"Winect" is published on OpenNI Arena, a site for publishing depth sensing applications. Garnered 250 downloads in 2 weeks, with a 4 Stars rating.

Featured on 3rd party websites:

- www.kinecthacks.com
- www.developkinect.com
- www.kinectasia.com

Outcome: API to be featured in a book



"Winect" is going to be featured in an upcoming book to be published by O'Reilly media.

The book consists of cool applications and do-it-yourself hacks for people to check out at home.

Jared St. Jean
developkinect.com

And . . . .

DemoFest

Asia Faculty Summit 2012
October 26–27, 2012 | Tianjin, China

	Microsoft Kinect technology, which enables users to fly kites inside and to help preserve, digitally, this aspect of our culture heritage that is on the verge of extinction.	University
31	**A Hand Gesture API for Kinect** We demonstrate "Winect," an open-source API that uses the Kinect sensor's depth camera to recognize a variety of hand gestures and additional low-level features, such as finger positions and hand orientation. We show several apps that use this API, including one that allows you to control the computer's mouse cursor. Different gestures can be used to define the various mouse functions, such as right, left, and middle click. You can also use gestures to scroll through your screen. We also show how to use depth position and hand gesture together for various type of game play. The API is publically available.	Ho Kok Wei (Daniel), National University of Singapore

Come see our demo later today!

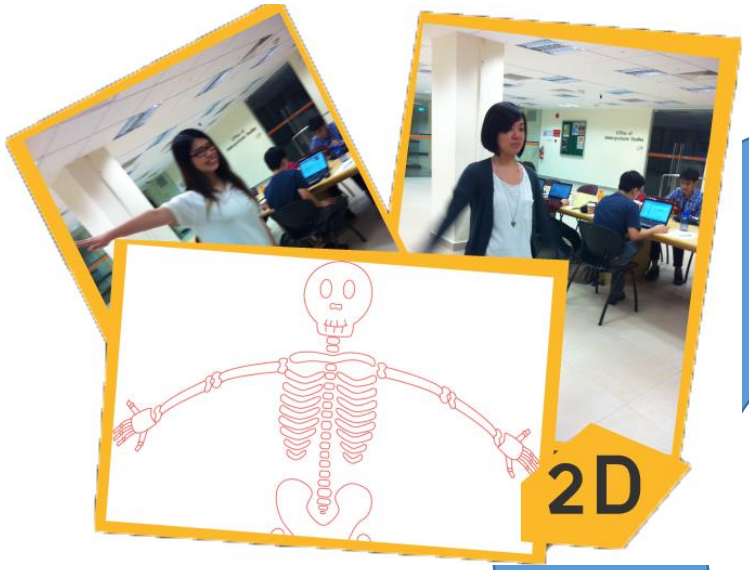
(Daniel Ho)

Project 3: Understanding “Bones”

Design Project

- CS4201: Interactive Systems Project
  - Prof. Shengdong (Shen) Zhao
- "Understanding Bones" project
- Show cased at the Singapore Science Centre

Project 3: Understanding “Bones”



3D Fun Fact

Show Video

Outcome of Project 3

- 492 users played the game!
  - Mostly aged 7-12
- Feedback was great!
- 83% of participants felt the exhibit was "impressive"
- 40% of the participants played multiple times

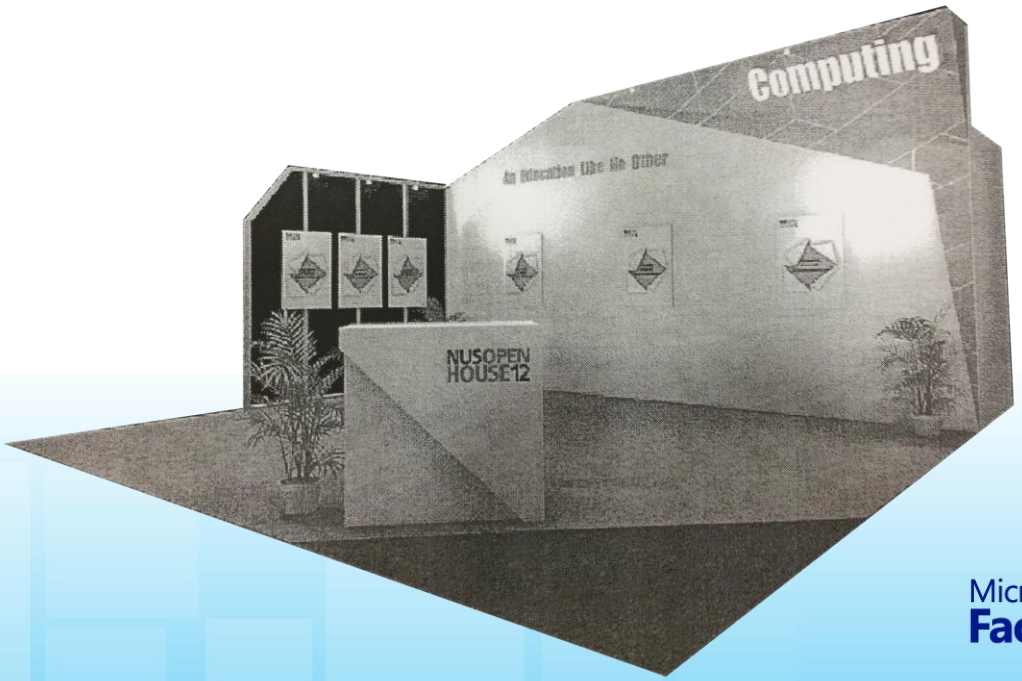
Project 4: "OpenHouse" Game

- NUS hosts an Open House to prospective students in March each year

NUS OPEN HOUSE 12

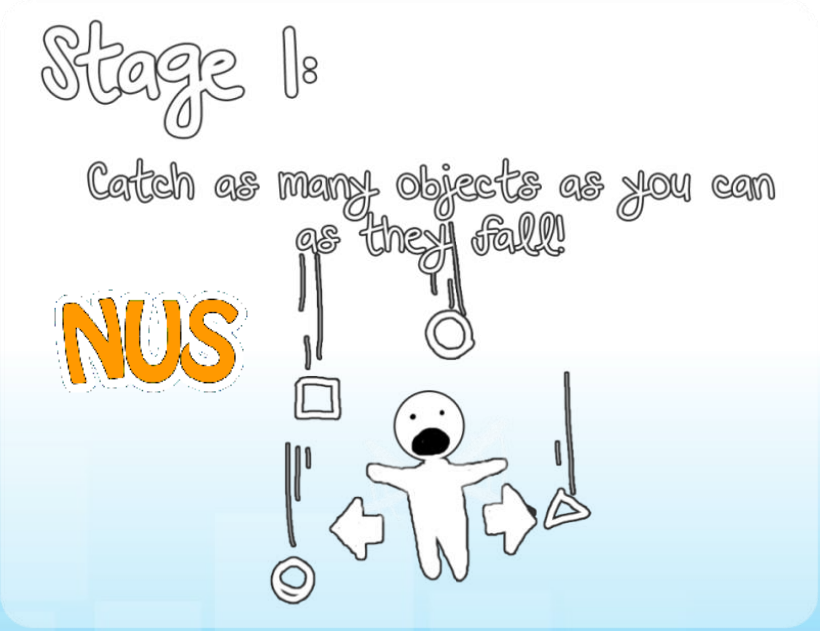
Project 4: "OpenHouse" Game

- SoC has a large booth that students can visit
- **We wanted something to get peoples attention**
- And that showed how "fun" computing can be . .



Kinect-Based Game

- Student designed a game for participants
- Items dropped and you had to catch as many as possible with your hands/feet



Installed at our OpenHouse Booth

Show Video

Outcome of Project 4

- Received a many positive comments from professors and potential students
- Project was center piece of the SoC booth
- 130+ Players, age's from 6 to 65

Concluding Remarks

- Kinect is a great resource for student projects
- Can facilitate various levels of learning
- Great for novel applications and demos

+

KINECT™ for Windows®

OpenNI™

OPENKINECT

+

Recruitment using Kinect

```
BOOL CMymfc29BAuto::DisplayDialog()
{
    // TODO: Add your dispatch handler code here
    TRACE("Entering CMymfc29BAuto::DisplayDialog %p\n", this);
    BOOL bRet = TRUE;
    AfxLockTempMaps();  // See MFC Tech Note #3
    CWnd* pTopWnd = CWnd::FromHandle(::GetTopWindow(NULL));
    try
    {
        CPromptDlg dlg /*(pTopWnd)*/;
        if (m_vaTextData.vt == VT_BSTR)
        {
            // converts double-byte character to single-byte character
            dlg.m_strData = m_vaTextData.bstrVal;
        }
        dlg.m_lData = m_lData;
        if (dlg.DoModal() == IDOK)
        {
            m_vaTextData = COleVariant(dlg.m_strData).Detach();
            m_lData = dlg.m_lData;
            bRet = TRUE;
        }
        else
        {
            bRet =  FALSE;
        }
    }
    catch (CException* pe)
    {
        TRACE("Exception: failure to display dialog\n");
        bRet =  FALSE;
        pe->Delete();
    }
```

Computer science is thought of as only programming. . .

Recruitment using Kinect

Kinect makes computing fun and tangible. . .

Thank You Microsoft!