

Gesture Recognition using MS Kinect in Real-time

Real-Time System Project

Group 4

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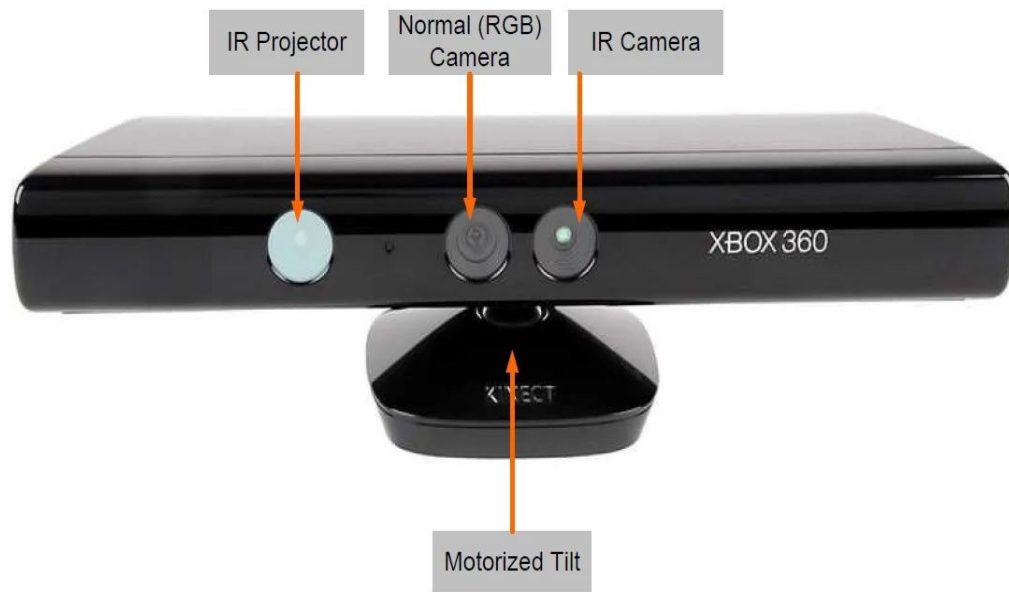
Division of works

- Tran Khoa: main programmer, working directly with MS Kinect.
- Lam Phuoc Huy: secondary programmer, searching for support materials.
- Pham Nhat Nam: tester, plan management, working with documents, reports and support in work.

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Introduction: Features



- ❖ Identify 20 separate spots of articulation at the same time on a human's body.
 - ❖ Recognizing the sense of depth to build up the 3D environment.
- => Applicable in gesture recognition.
- ❖ Gesture to recognize in this project: swipe hand left/right, raise hand up to a direction.

Introduction: Features

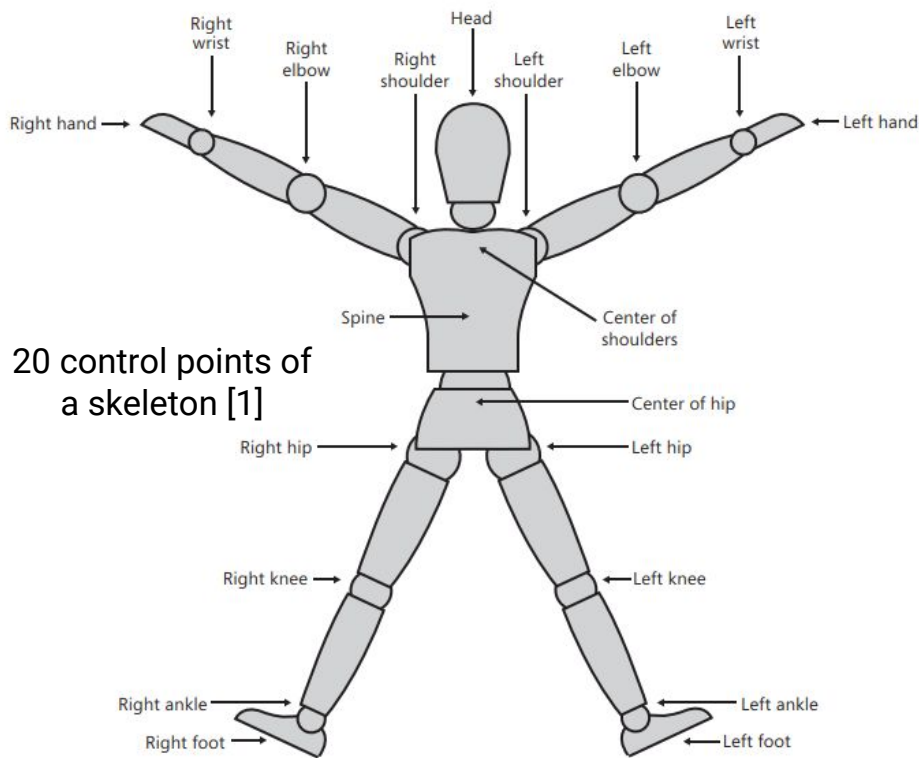
System Requirement:

- USB 3.0 connection for Windows 10 (Windows 8.1/8/7, Linux require only USB 2.0 connection).
- Microsoft .NET Framework 4.5.
- Microsoft Kinect for Windows Runtime v1.8/1.7.
- Microsoft Kinect for Windows SDK v1.8/1.7.

Introduction: Kinect v1 vs Kinect v2

Features	Kinect v1	Kinect v2
Depth sensor type	Structured light	Time of Flight (ToF)
Red, Green & Blue (RGB) camera resolution	640×480 , 30 fps	1920×1080 , 30 fps
Infrared (IR) camera resolution	320×240 , 30 fps	512×424 , 30 fps
Field of view of RGB image	$62^\circ \times 48.6^\circ$	$84.1^\circ \times 53.8^\circ$
Field of view of depth image	$57^\circ \times 43^\circ$	$70^\circ \times 60^\circ$
Operative measuring range	0.8 m–4 m (Default); 0.4 m–3.5 m (Near)	0.5 m–4.5 m
Skeleton joints defined	20 joints	25 joints
Maximum skeletal tracking	2	6

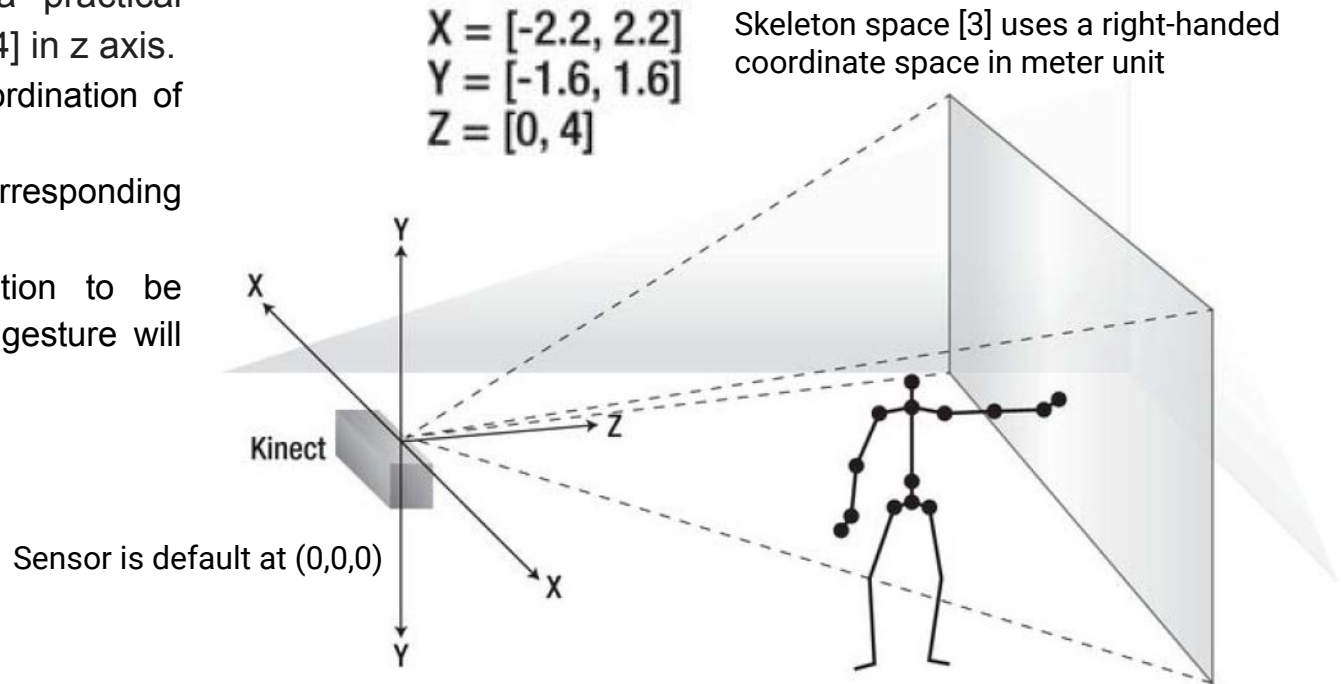
Algorithm



- The Kinect for Windows SDK provides us with a set of APIs that allow easy access to the skeleton joints. [2]
- HelixToolkit is applied to handle 3D problem. [5]

Algorithm

- The Kinect sensor has a practical **ranging** limit of 1.2–3.5 m [4] in z axis.
- Based on the change of coordination of joint to decide the gesture.
- Each gesture will be set corresponding to an area of coordinates.
- Depending on the application to be applied, the output of each gesture will be set appropriately.



Demo

Conclusion

- Mostly based on the Microsoft Kinect SDK APIs
- Gesture to recognize is still simple.
- Can control basic features of applications like VLC.

Reference

- [1] Catuhe, D., 2012. *Programming With The Kinect For Windows Software Development Kit*. Redmond: Microsoft Press.
- [2] Jana, A., 2012. *Kinect For Windows SDK Programming Guide (Community Experience Distilled)*. Packt Publishing.
- [3] Webb, J. and Ashley, J., 2012. *Beginning Kinect Programming With The Microsoft Kinect SDK*. [New York]: Apress, page 114.
- [4] [https://en.wikipedia.org/wiki/Kinect#Kinect_for_Xbox_360_\(2010\)](https://en.wikipedia.org/wiki/Kinect#Kinect_for_Xbox_360_(2010))
- [5] <https://github.com/helix-toolkit/helix-toolkit>