Using Head and Finger Tracking with Wiimote For Google Earth Control

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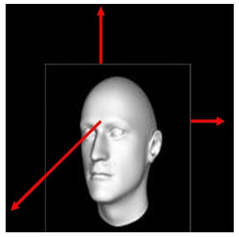
Aim

Implementing a futuristic user interface, with head and finger tracking, and using this interface in the popular program Google Earth.

Johnny Lee holding the sensor bar, below the camera, so that wii remote tracks the position of the camera, and the image on the TV is generated accordingly.

Introduction

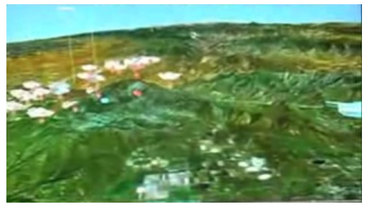
Using an **LED array** and some **reflective tape**, you can use the **infrared camera** in the **Wii remote** to track objects, like your fingers, in 2D space. This lets you interact with your computer simply by waving your hands in the air similar to the interaction seen in the movie "**Minority Report**". The Wiimote can track up to 4 points simultaneously.



You can move the globe by moving your head. You move right, earth turns to west. You get closer to the screen, Google Earth zooms in.

Tracking Methods

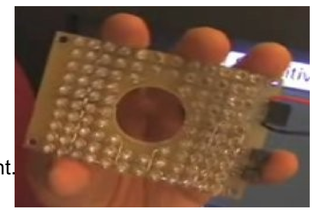
Head and finger tracking methods developed by Johnny Lee are used for controlling **Google Earth**. It can also be used for other programs like **Nasa World Wind** or completely different programs.



As you can see in the figures on the right, when you move your head lower, a tank behind the mountain gets out of sight. The image on the monitor is entirely depending on your heads position.

Key Hardware

IR Lighting is crucial for both head & finger tracking. The **size** of the **IR LED array** is important. IR Leds on the glasses improves the head tracking quality incredibly.



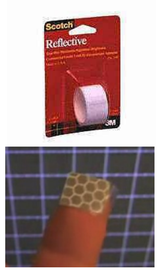
Hardware needed

Nintendo Wii Remote

- Wii Sensor Bar
- Reflective Tape
- IR LEDs on glasses
- IR LED Array

Wii remote will be used as an infra red camera. Also other infrared camera's can be used for this purpose. We just use it because we have it already, and wii remote does the point position extraction for us. The downside is it can only extract **4 point** positions.

Reflective tape will be used for finger tracking. Tapes will cover the front side of the finger, so tapes will reflect the light when you are pointing them to the IR camera.



Any **IR camera** can be used to detect the head and finger position.

Portable IR Leds may be more suitable than the Wii sensor bar.

Wii sensor bar *has strong infra red LED's, which creates a big glaring point for the IR camera to detect.*

Conclusion

You can move your head or finger instead of using keyboard and mouse for controlling Google Earth.

Future Work

The new user interface can be used in different programs. Computer games are good applications for this new interface. A boxing game would create a good immersiveness with this use interface.

Better hardware → Better performance.

Parameters can be optimized for **smoother** movement.

IR Source on the Head

The **best solution** is to put the IR sources on the head, on the glasses.

Professional solution:

Putting the sensor bar on a cap is a simple solution for head tracking.

Amateur Solution

References

•[1] J. C. Lee, “Tracking fingers with the wii remote,” 2007. [Online]: http://www.youtube.com/watch?v=0awjPUkBXOU

•[2] ——, “Head tracking for desktop vr displays using the wiiremote,” 2007. [Online].: http://www.youtube.com/watch?v=Jd3-eiid-Uw