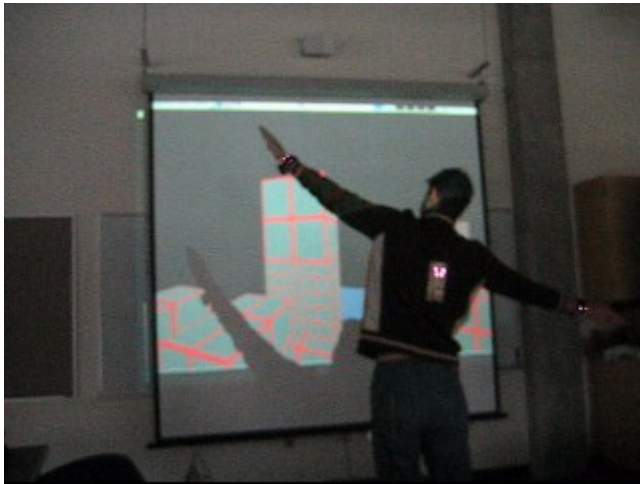


Project Icarus

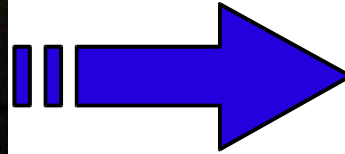


Kevin Godby
Jesse Lane
Ethan Slattery

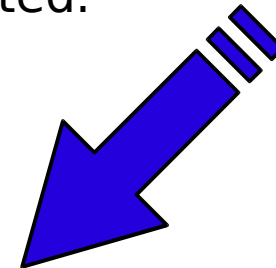
Visual Processing



1 The camera uses an IR pass-through filter so that it only sees the IR LEDs on the wrists and between the shoulder blades.



2 The image is thresholded and the vertical distance between the left, right, and center blobs are calculated.



3 Finally, the distances are sent to the flight kinematics system.

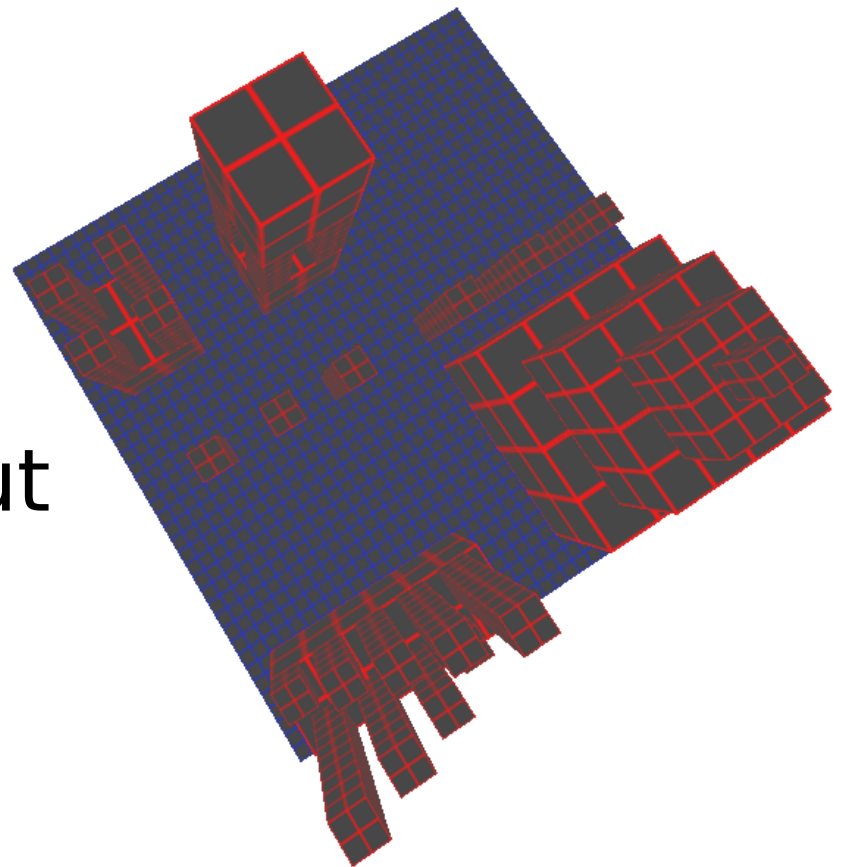


Project Overview

- Flight simulation
 - Similar flight dynamics to that of a bird
 - Virtual environment with obstacles
- Data Flow
 - User input
 - Capture with webcam and IR pendants
 - Calculate arm positions
 - Flight Dynamics
 - Receive arm position vectors
 - Calculate forward and upward velocities

Our Motivation

- Easily and intuitively move around in a 3D environment
- Possible CAVE demo application
- Cool factor
 - The dream of flight!
- No bulky control input



IR Illumination

- External Source
 - Lamp Illumination
 - Not enough light intensity
 - Costs too much money
- Wearable Source
 - Two bracelets, one back pendant
 - Camera with IR pass filter

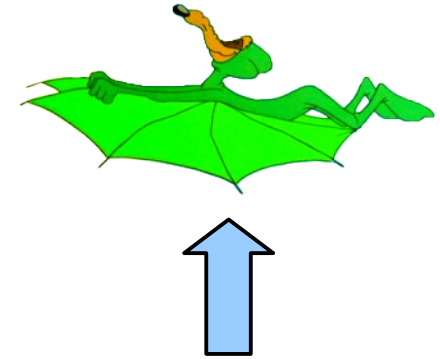


Toolset

- VRJuggler
 - So that multiple display types, including the CAVE, can be used
- Open Scene Graph
 - Open source scene graph built on top of OpenGL
- OPAL (Open Physics Abstraction Layer)
 - Open source physics engine built on top of ODE (Open Dynamics Engine)

Flight Kinematics

Upward Velocity $\propto |Y_l| + |Y_r| + \dot{Y}_l + \dot{Y}_r$



Forward Velocity $\propto Y_l + Y_r$

Angular Velocity $\propto Y_l - Y_r$

