Drone Control

Adrian Kurt

Mansour Hamidi

Urs Zysset

Outline

1. Task
2. Oculus Rift
3. Architecture
4. CASE and CARE
5. Evaluation
6. Conclusions
7. Difficulties

1. Task

Two multimodal interfaces for controlling a drone:

- First multimodal interface
  - Wii board:
    - tilt forward / tilt backward / tilt right / tilt left
  - Wii mote:
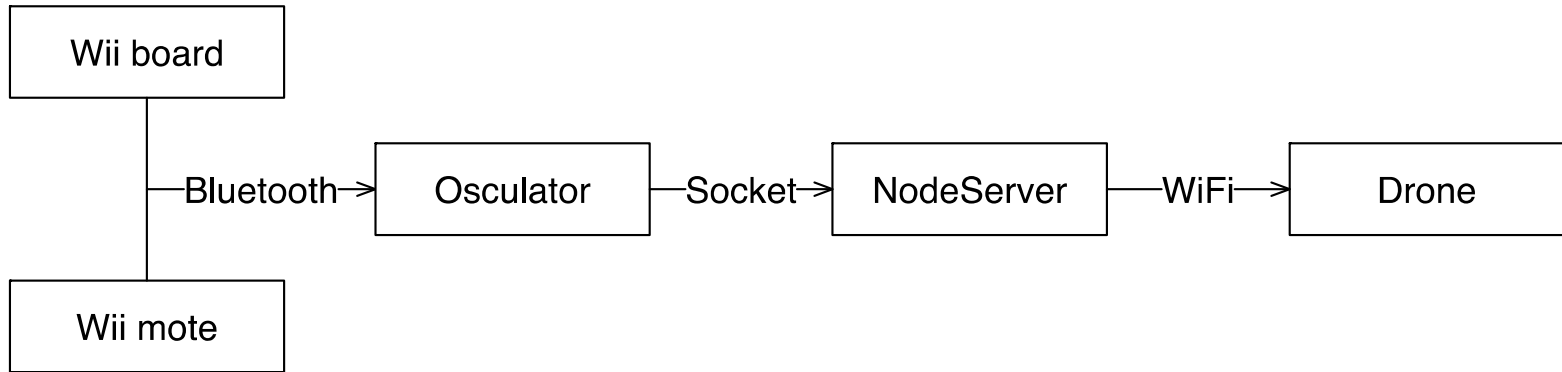   - move up / move down / spin left / spin right
- Second multimodal interface
  - Wii board:
    - move up / move down / spin left / spin right
  - Wii mote:
    - tilt forward / tilt backward / tilt right / tilt left

2. Oculus Rift

- Additionally streamed video feed from drone to Oculus Rift
- Not used in the evaluation
  - Too difficult to control
  - High latency
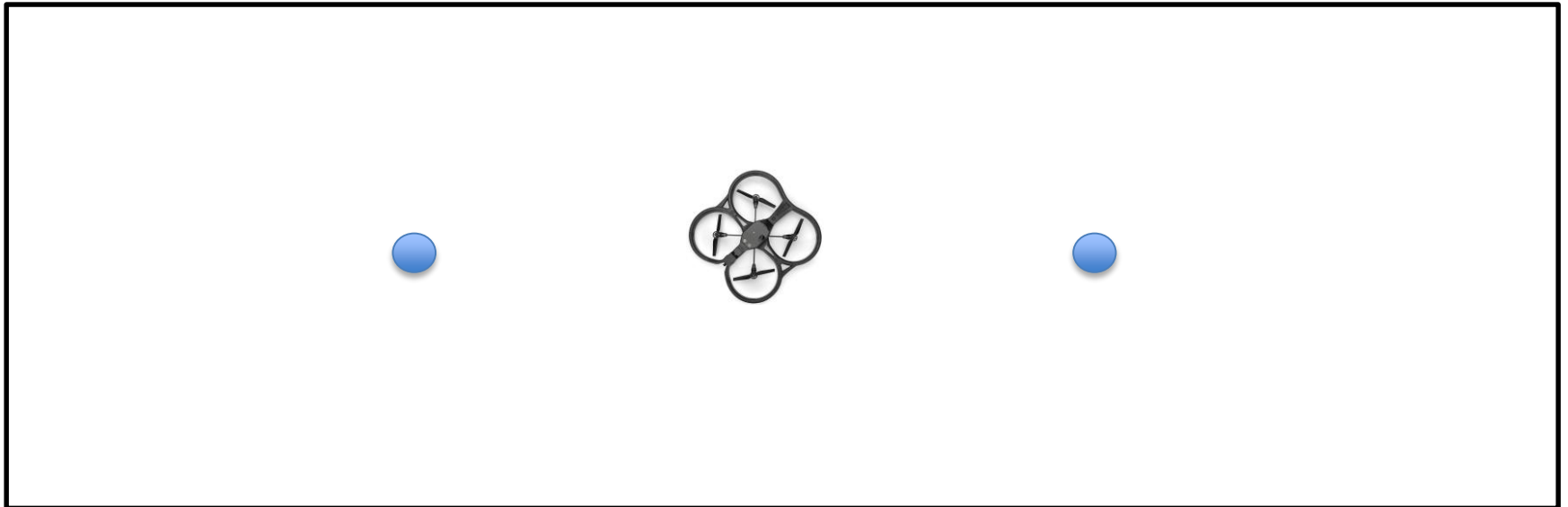 - Limited field of view

3. Architecture

4. CASE and CARE

- CASE
  - Concurrent

- CARE
  - Complementarity
  - Assignment

5. Evaluation

Controlled experiment:

- Fly a simple course for 2 minutes
- Achieve as many rounds as possible

5.1. Hypothesis

When controlling the drone with a joystick for directional movement (modality 2) a subject can do more rounds on a course than using the Wii balance board (modality 1) for directional movement.

5.2. Variables

- Independent variable
  - Control of the drone (modality 1 or 2)

- Dependent variable
  - Number of rounds a subject can fly in 2 minutes

5.3. Subject Selection

- Family members and friends
  - Various technical knowledge
- Within group experiment
  - Split in two groups
  - Each group started with an other modality

5.4. Procedure

1. Introduction to modality X

   – One minute test flight (modality X)

2. Introduction modality Y

   – One minute test flight (modality Y)

3. Measurement flight

   – 2 minutes fly on course, modality X

4. Measurement flight

   – 2 minutes fly on course, modality Y

5.5. Results

- Six test subjects in total
- Counted completed rounds only

Modality 1	Modality 2
3	2
2	1
3	4
3	2
4	2
3	2

Average rounds	3	2.2

6. Conclusions

- Hypothesis wrong
  - Test subject achieved in average more rounds with modality 1
- Different flight styles encountered during experiments
  - No use of rotation, flying sideways instead
  - Flying forward and using rotation

7. Difficulties & Best Practices

- Battery life
  - 15 minutes flight time
  - 1-2 hours charge time
- Crashes of control software
  - Osculator blocked regularly
  - Node.js scripts sometimes crashed
- Weather/Wind
- Neighbours mowing their yard
- Need of a huge open space

Questions