DeLorean: Using Speculation to Enable Low-Latency Continuous Interaction for Mobile Cloud Gaming

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Current mobile cloud gaming architecture

- **Problem**: Poor interactivity with network RTT
- **Solution**: Speculation & view interpolation
  - Server: Speculate user actions and send predicted future frame to the client
  - Client: Perform VI correction on mis-predicted frame before rendering

DeLorean architecture

- $i_5 \Rightarrow f_5$: rendering for $t_5$
- $i_5$: input for $t_5$
- $t_7 t_8 t_9$: output $f_5$

**Speculating navigation events:**
- Movement buttons
  - => Speculate using same button
- Mouse movement
  - => Super-sample mouse movement
  - => Use Markov chain to predict

**Speculating impulse events:**
- Time-shifting mechanism
  - => Restrict when impulse event can occur
  - => Shift impulse events to allowed frame

Significantly reduces the number of states without sacrificing game interactivity!

DeLorean Overview

Using partial CubeMap:

*TOP*   *FRONT*   *RIGHT*   *LEFT*   *(BACK not used)*  *BOTTOM*

**View interpolation:**

- Fire
- No fire
- Impulse event allowed: $t_5, t_7, t_{12}, t_{15}, ...$

Input Image  Input Depth  Output Image