Wireless-aware Design for Interactive Reality Applications

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Applications

- Live streaming interactive 360-degree videos
- Augmented reality (more uplink)
  - Markups
  - Virtual objects, beings
- Mixed reality
- Virtual reality (more downlink)

Applications

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- Augme[illegible]
  - Markups
  - Virtual objects,
- Mixed reality
- Virtual reality

How to make mobile, portable, wearable?

Application Requirements

- Latency, driven by perceptual, physiological requirements (**Quality of Experience**)
  - 1 to 15ms, depending on application, modality
- Tradeoff: **Network throughput** versus **on-device computation**
- Power constraints
  - Heat dissipation constraints, Battery Lifetime
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- Support for multiple users in a shared space

Opportunities for innovation

- Edge computing architecture
  - How to share the custom hardware among apps?
- Higher frequency bands (mmWave, Terahertz, Visible Light Communication)
  - Use of directionality, antenna design, mobility
- Managing QoE across applications in a multi-application environment
- Low Power Design for Mobiles, Wearables, Headsets

Tools required

- Applications
  - Prediction of user motion (head, eyes, user) with VR context
  - Prediction of content
- Lower layers
  - Prediction of wireless channel
  - QoE-aware design of networking stack
  - Scheduling network and compute jointly

Tools required

- A
  - motion (head, eyes, user) with
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Joint consideration across applications and lower layers

Summary

- Interactive reality applications are among the most challenging

- Need for joint design:
  a. Across **application and lower layers**,
  b. Between **device, edge, and cloud,** and
  c. Between **compute (CSR) and communication (NeTS)**