2019
Research Experience for Undergraduates

Remote Interaction with Medical Data Based Holograms

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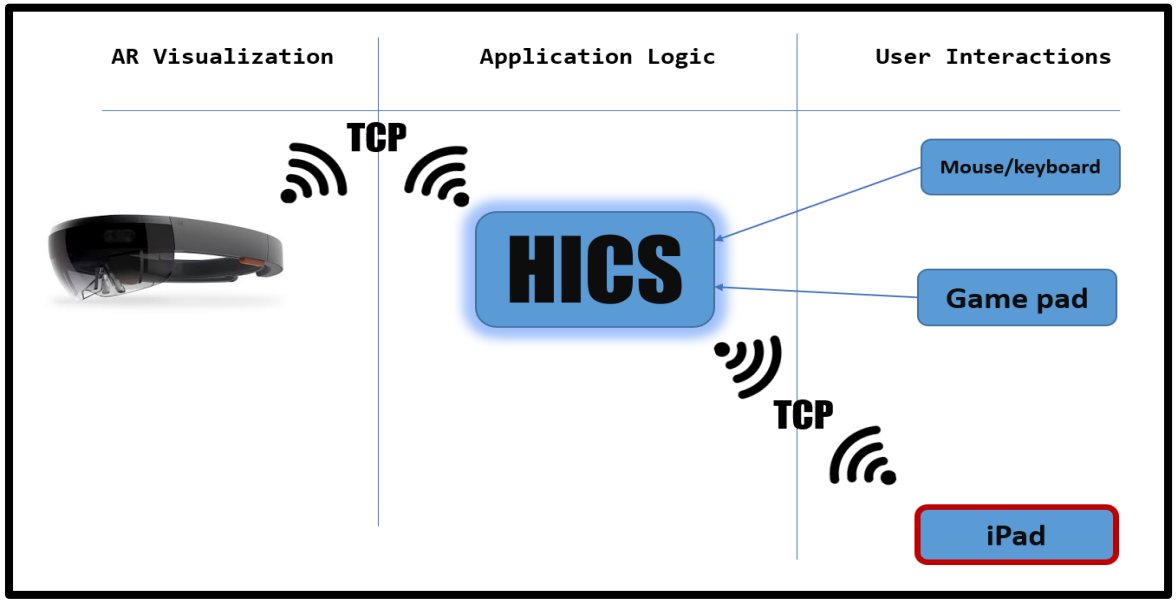
Final Presentation
August 9th, 2019

UNIVERSITY of HOUSTON

Goal

Create a mobile app to control holograms remotely

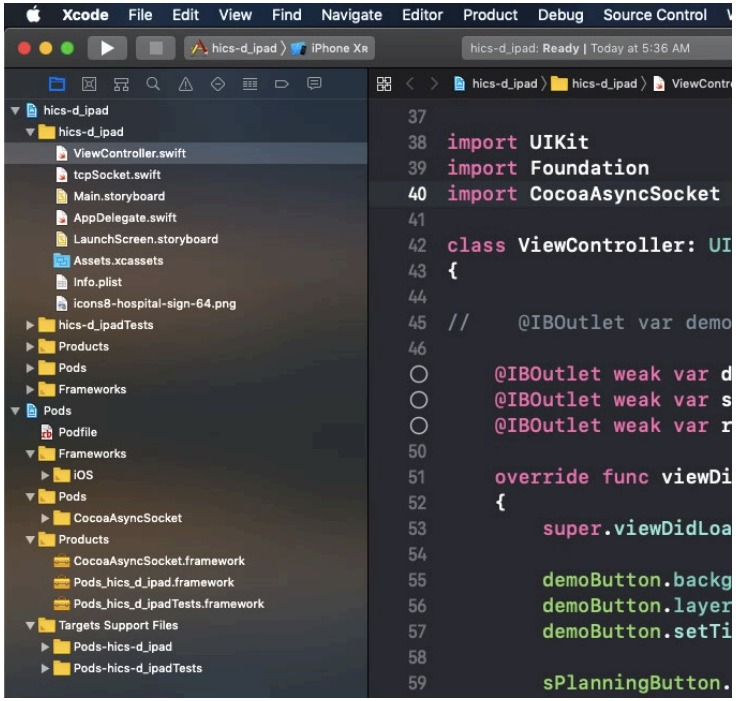


Objectives

1. Create mobile app
2. Connect app to HICS
3. Read and write to sockets

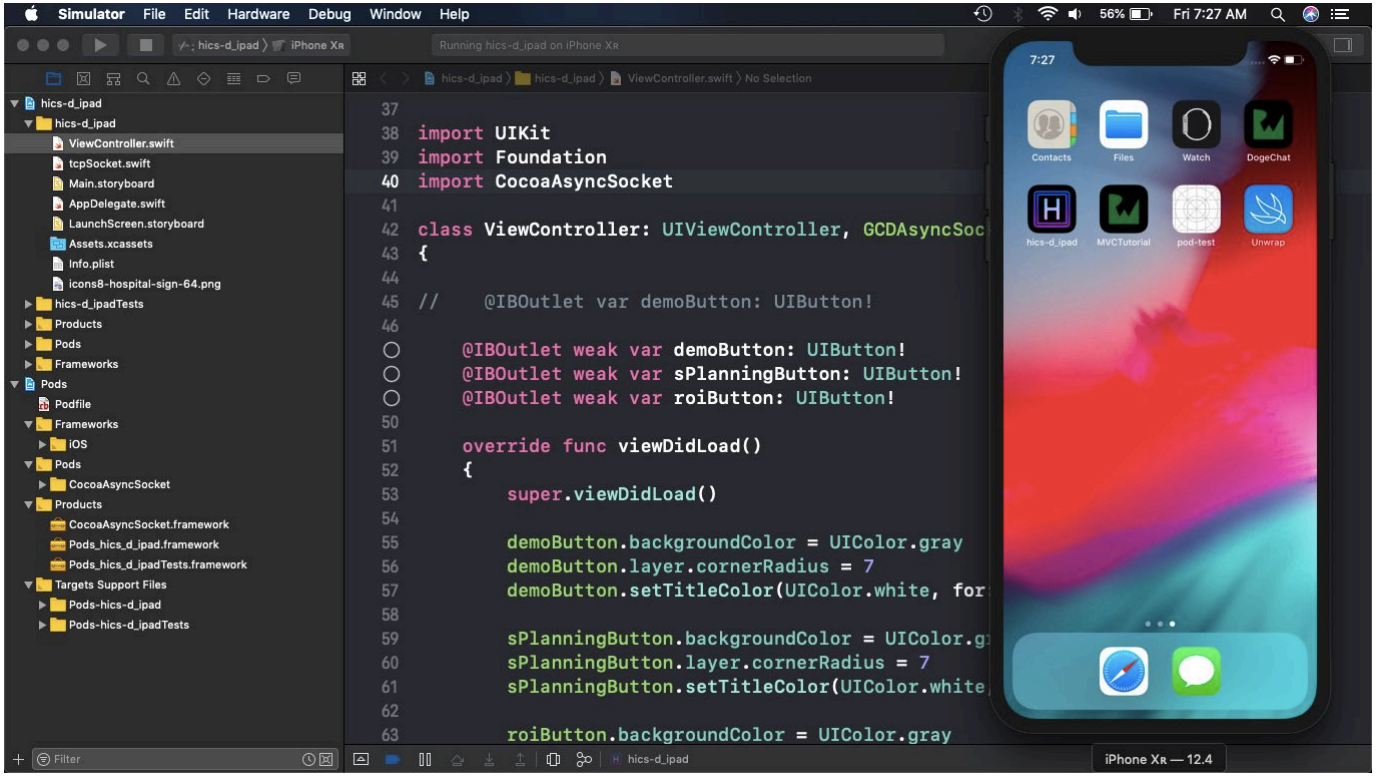
Objective 1: Tasks

- Create iOS app
- Use Swift backend



Objective 1: Accomplishments

- Working iOS application

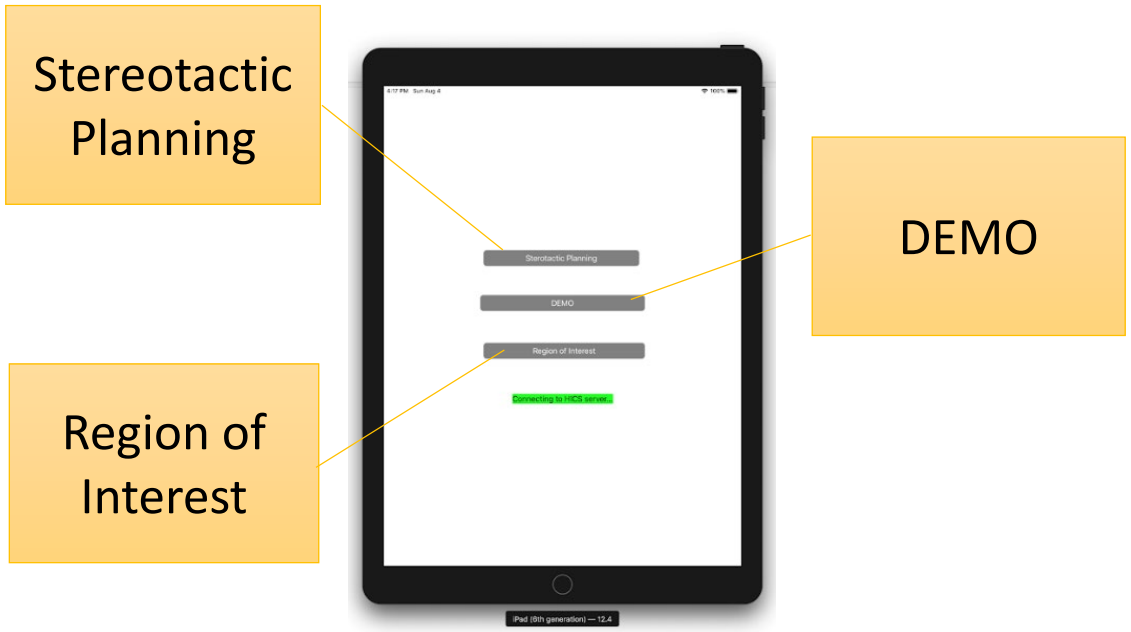


Objective 1: Methodology

- Read documentation (Swift)
- Swift/ mobile application books

Objective 1: Results

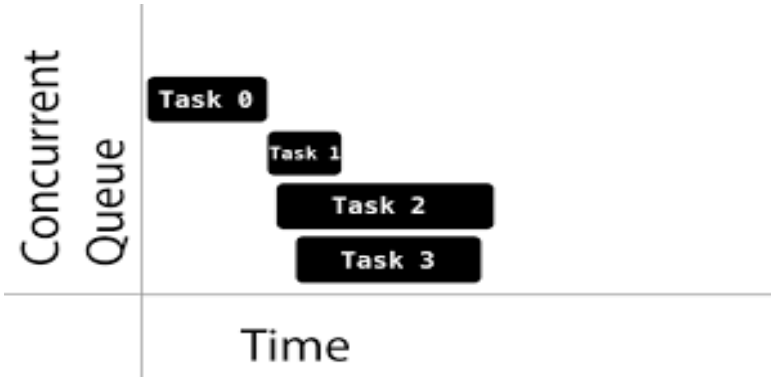
- Initial HICS modules



HICS iOS Controller application

Objective 2: Tasks

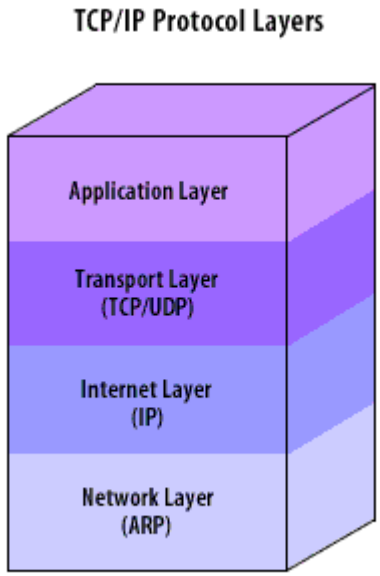
- Connect to Holographic Imaging and Control System



https://www.raywenderlich.com/5370-grand-central-dispatch-tutorial-for-swift-4-part-1-2

Objective 2: Accomplishments

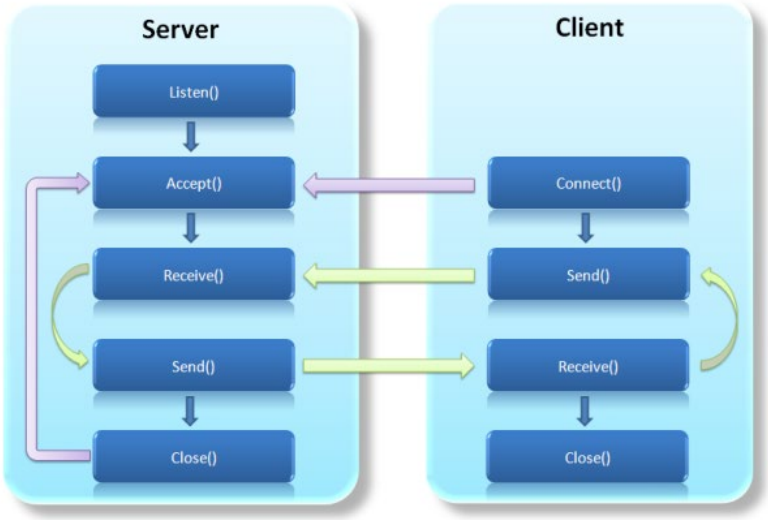
- TCP vs UDP



https://www.distributednetworks.com/network-security-firewalls/module4/tcp-ip-network-security.php

Objective 2: Methodology

- Connect using sockets
  - What framework? Why?
  - Below HTTP requests
- Non blocking I/O



http://www.webtech360.com/detail/c-socket-programming-tcp-communication-client-server-3433.html

Objective 2: Results

- Connection to HICS successful

HICS iOS Controller application

TCP

HICS New Server

Objective 3: Tasks

- Read/ Write to sockets
  - Populate GUI dynamically

Objective 3: Accomplishments

- Protocol in progress
  - Use JSONDecoder
    - property matching

Objective 3: Methodology

- Unwrap byte stream and decode messages sent via TCP

Objective 3: Results

- In progress

Deliverables

- Working mobile app
- New server
- Research log
  - Issues and fixes

Limitations

- Needs message encryption
  - TLS

Future Work

- Decode data packets from stream
- Delineate user tasks
  - Compare and contrast uses
  - Collect data

https://www.microsoft.com/en-us/hololens

Conclusions

- Lessons learned
  - Focus on task by task
  - Use general purpose language on front end and back end

Skills Acquired

- Git
- Cmake build engine
- iOS programming
- Socket programming
- Network protocols (layers)
- Swift
- Asynchronous approach
- Concurrency of threads
- MVC Architecture

Acknowledgements

The REU project is sponsored by NSF under award NSF-1659755. Special thanks to the following UH offices for providing financial support to the project: Department of Computer Science; College of Natural Sciences and Mathematics; Dean of Graduate and Professional Studies; VP for Research; and the Provost's Office. The views and conclusions contained in this presentation are those of the author and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the sponsors.