Dwight Look College of ENGINEERING
TEXAS A&M UNIVERSITY

Team 36: Self-Navigating, Obstacle Avoiding Robot
Bi-Weekly Update 1

Teammates:

Arkadi Zhanov

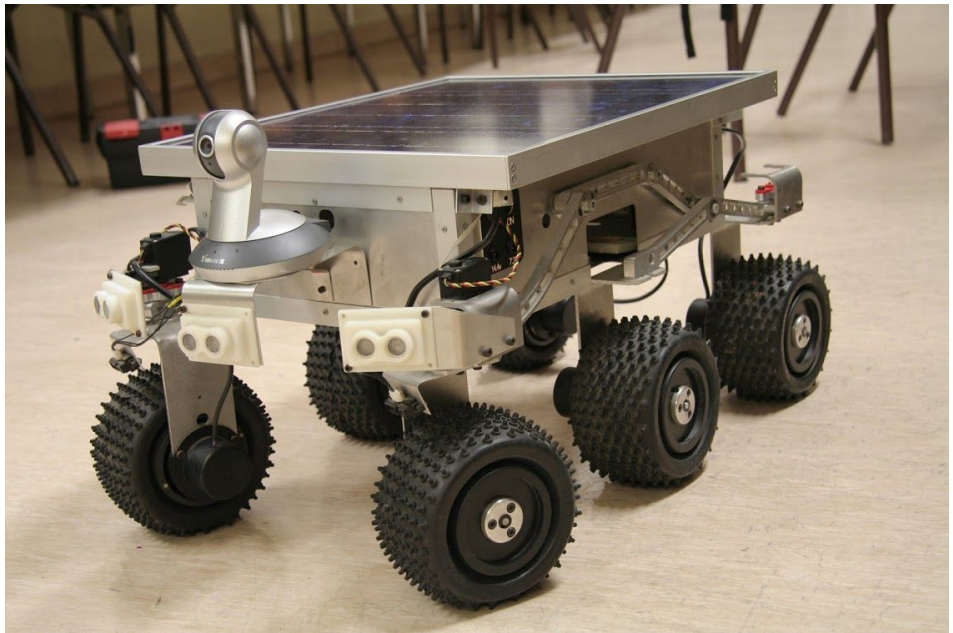
Nathan Sommer

Nikolai Paderin

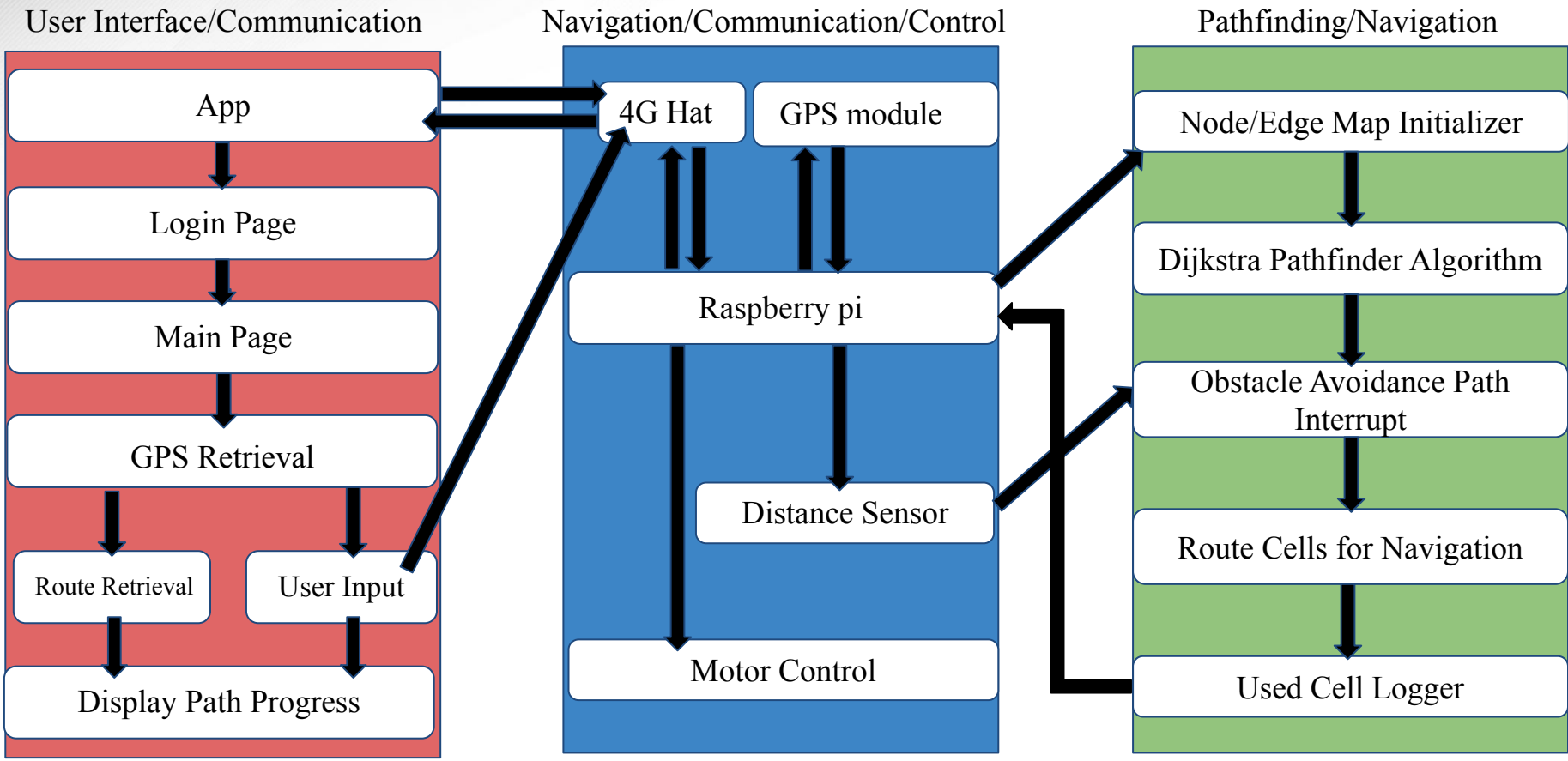
Sponsor: Stavros Kalafatis

Project Summary

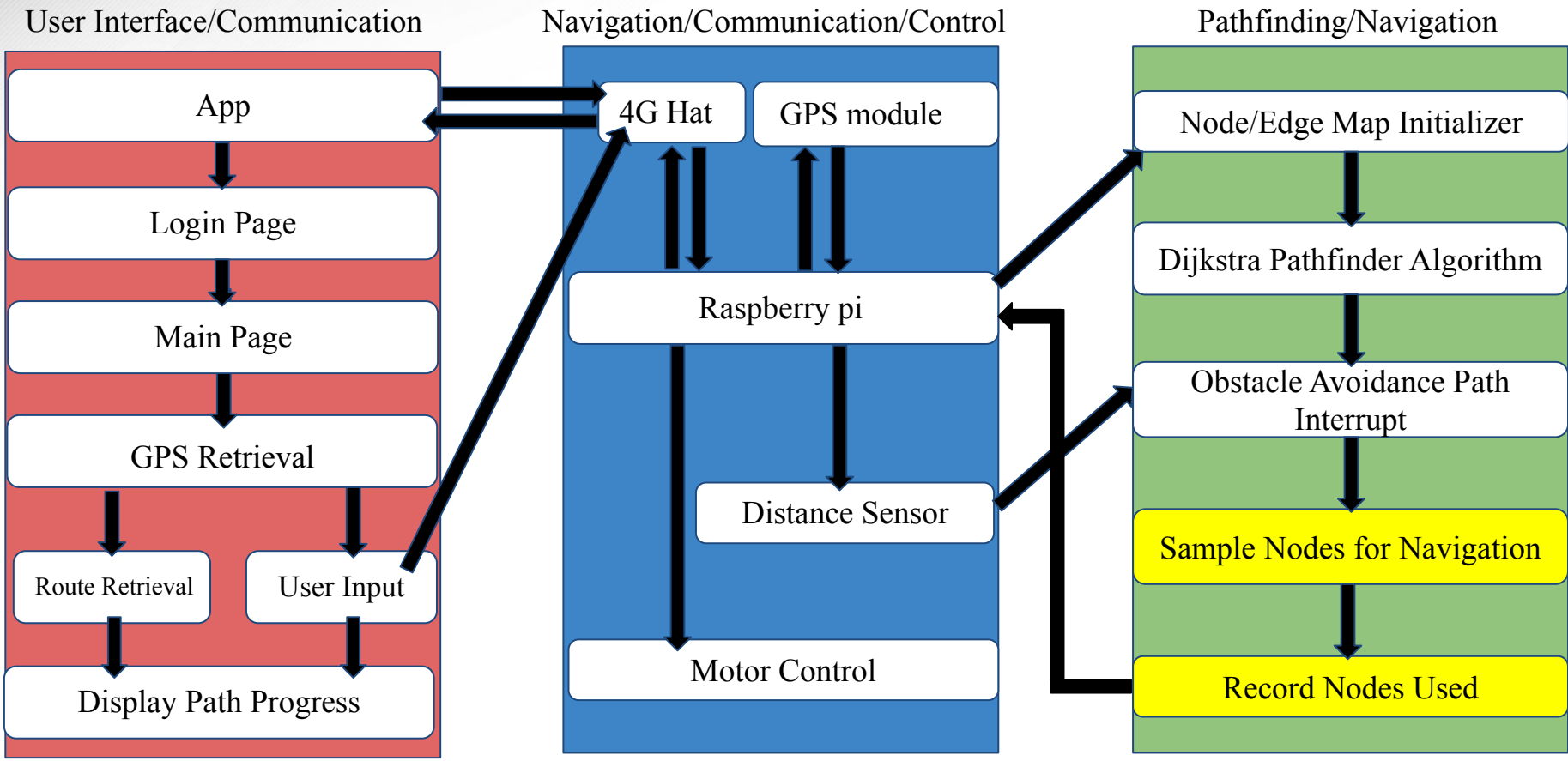
- Create a system that takes in a point on a map as the rover's destination, creates a route for the rover, and gets the rover to its destination and back while avoiding obstacles.
- The main motivation for this project is for application in military settings such as aid delivery to wounded soldiers in the battlefield or local, residential delivery of food or mail.



Project/Subsystem Overview (Before)



Project/Subsystem Overview (After)



Nathan Sommer

Nikolai Paderin

Arkadi Zhanov

Major Project Changes for 404

- Rover will only work on A&M campus
- Design and implement alternative navigation strategy

Project Timeline

What's Completed (from 403):

Nikolai
Finalize design specification
Rover movement code
Rover sensors code
Rover object detection/avoidance
Code to take instructions
Final testing/troubleshooting
Arkadi
Bresenhams map navigation
Bresenhams cell navigation
Populate map with walking network/geometries
Develop pathfinding algorithms
Develop geometry node code
Combine programs and finalize testing
Nathan
Be able to make path between points
Work on what to send to rover
Login Page
UI Improvements/Error Handling

What we're working on:

Nikolai
Re-connect physical wiring
Adjust code for movements
Order parts
Nathan
Creating Connection Page
Helping with Navigation System
Arkadi
Testing current navigation method approach
Designing a new navigation method

What needs to be started:

Nikolai
Integrate 4G hat + GPS module
Integrate pathfinding code with movement code
Enable connectivity between app and Rasberry Pi
Nathan
Creating the Client-Server Class
Able to recieve GPS coordinates
Able to recieve Route
Able to send user input
Arkadi
Integrate pathfinder with app input
Integrate pathfinder with movement subsystem
Test, verify, integrate new navigation method

User Interface and Communication Overview

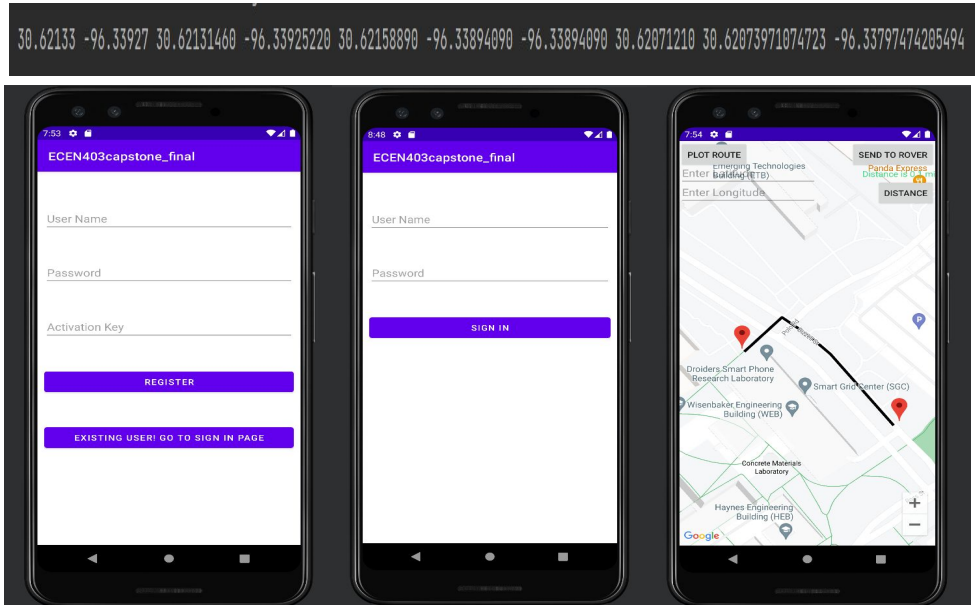
Nathan Sommer

Accomplishments since 403 3 Hours of Effort	Ongoing progress/problems and plans until the next presentation
Verified that the app is running and that everything is working correctly	Connection Page - Create the connection - Gps Retrieval - Route Retrieval - Sending user input to Rover UI Updates Navigation System

User Interface and Communication

Nathan Sommer

- App works, however planning on changing route creation
- Will be creating a connection page



Pathfinding and Navigation Overview

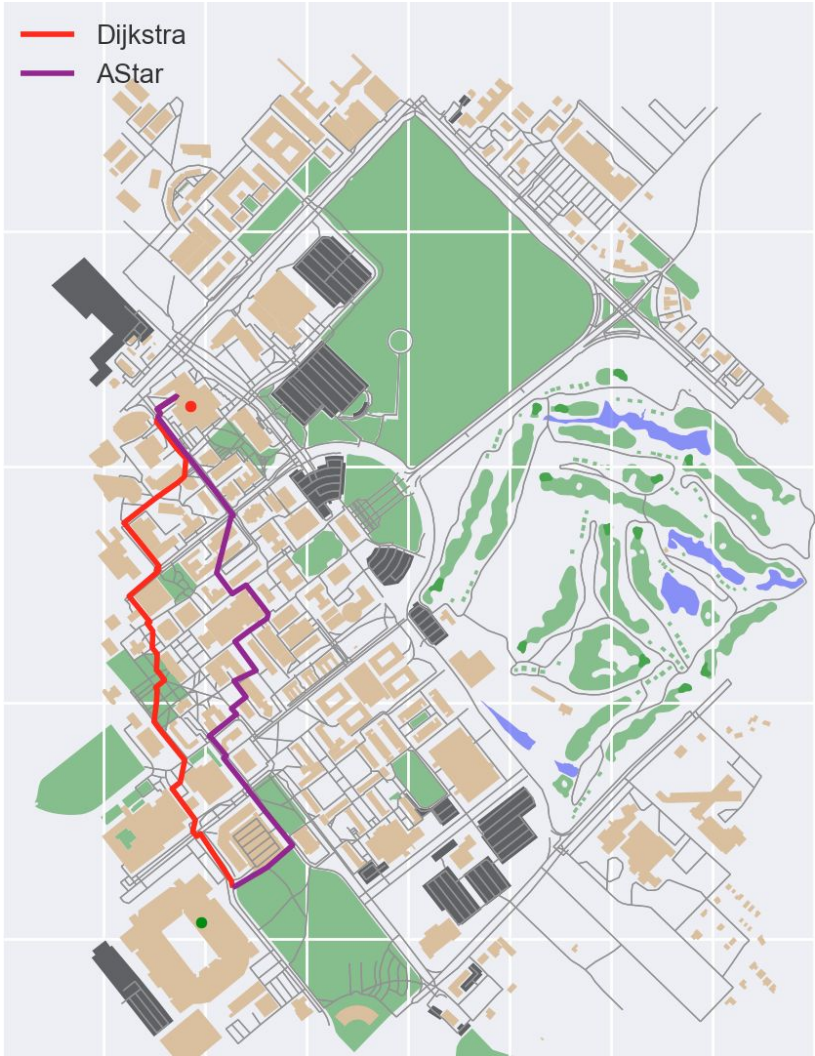
Arkadi Zhanov

Accomplishments since 403 3 Hours of Effort	Ongoing progress/problems and plans until the next presentation
- Verified that the pathfinder algorithm is still functional - Discovered that the navigation method may need reworking	- Determine viability of cell approach for navigation or switch to a different approach - Design, code, and test alternative navigation approach (node sampling from line path)

Pathfinding and Navigation

Arkadi Zhanov

- Pathfinding algorithm works (Dijkstra)
- Navigation approach worked independently in testing but discovered issues internal with compatibility and complexity
- Navigation method will most likely be modified



Navigation, Communication and Control

Nikolai Paderin

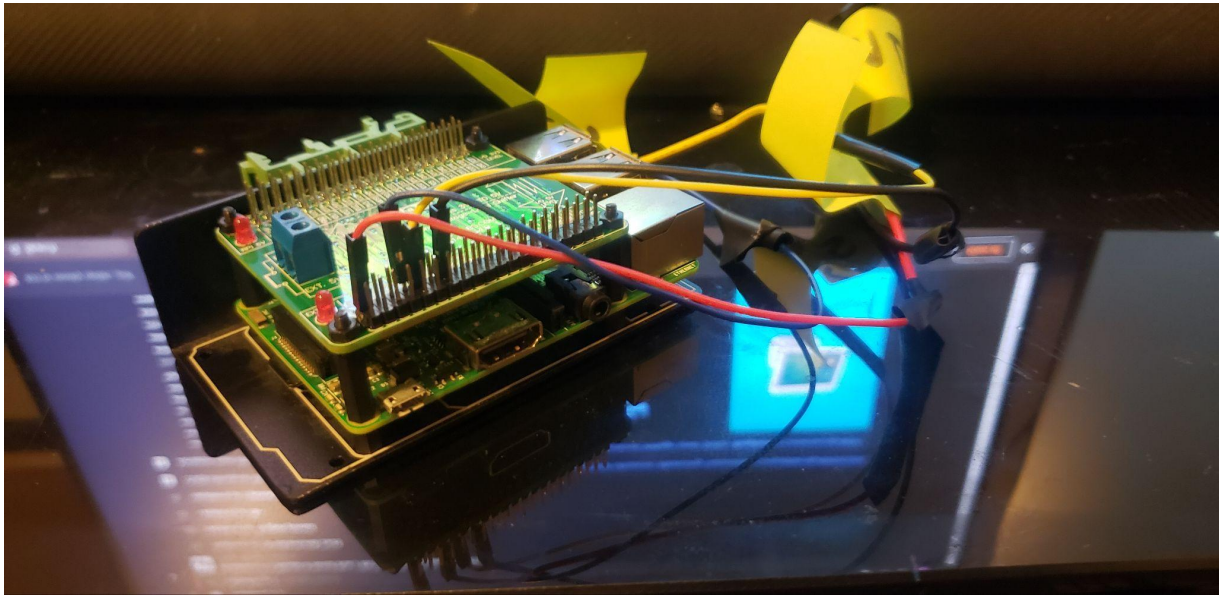
Accomplished since 403 2.5 hours of effort	Ongoing progress/problems and plans until the next presentation
- Verified some initial design flaws and came up with ways to improve upon them - Acquired a portable power bank for Raspberry Pi.	Control code - Made final adjustments to movement code for precise and accurate movements Object avoidance - Rewire and re-test all sonar sensors to make sure they are all functioning together

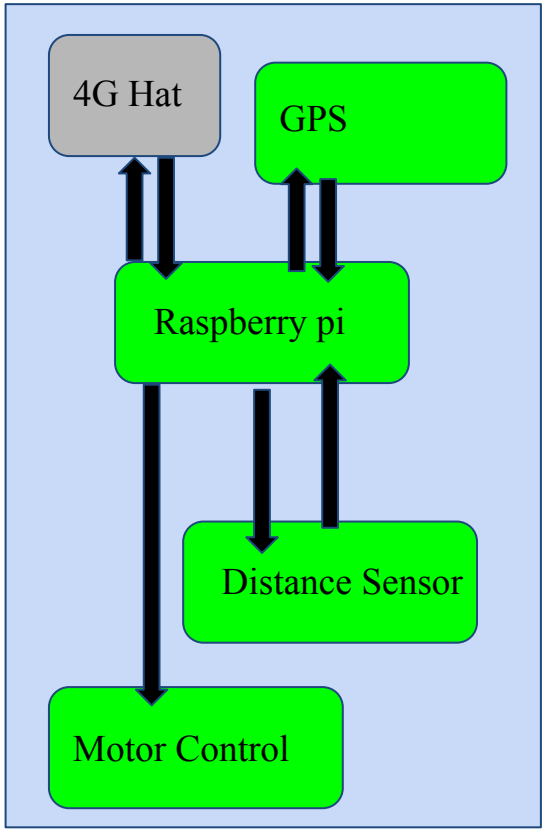
Navigation, Communication and Control

Nikolai Paderin

- Rover works and will move by command, however code needs to be adjusted for more precise and accurate movements.

- Will be integrating a 4G hat to enable communication between rover and application.





Parts Ordering Status

- Parts ordered + received:
  - Level Shifter
  - Distance sensors
  - GPS Module

- Parts on order waiting for delivery (Expected by Sep 7th):
  - 4G hat
  - Global sim card

Execution & Plan

Mile Stone/Timeline	Aug 31	September 7	September 14	September 21	September 28	October 5	October 12	October 19	October 26	November 2	November 9	
												Have not started
												Behind
Finish 403 Objectives + cleanup Nikolai												In Progress
Finish 403 Objectives Nathan												Work finished
Finish 403 Objectives Arkadi												
Order any additional parts necessary												
Integrate pathfinding code + Rover movement												
Install 4G hat												
Enable Connectivity between App + Raspberry pi												
Testing and final checks + troubleshooting												

Q&A