EE / CprE / SE 492 – sddec20-05

An Advanced Networking Outreach Activity for Kids

Bi-Weekly Report #4
09/28/2020 – 10/11/2020
Client & Faculty Advisor: Dr. Tom Daniels

Team Members

Grayson Cox | UI Developer | Agile Project Manager
Austin Dvorak | Network Systems Manager
Malcolm Johnson
Ryan Newell | Hardware Systems Admin
Spencer Parry | UI Developer
Ross Thedens | Communication Systems Manager | Meeting Secretary

Reporting Period Summary

This period, we focused on making some final touches to our individual components before we attempt to make everything work together. We are still in the process of containerizing the code that will be run on the network master node, debugging some issues with video streaming in the user application, and configuring the mesh network.

Reporting Period Accomplishments

- Streaming video to user application (Grayson & Ross)
  - Successfully connected a camera node to the user application running on a laptop.
  - The video streaming is not fully functional; we are still debugging some issues with packet loss.
- Network performance testing (Ross)
  - Checked available bandwidth with iperf on personal network (used for video stream testing) for comparison with mesh network bandwidth
    - Bandwidth ranges from 3 Mbps to 8 Mbps using UDP; bitrate for 720p video from ffmpeg is reported to console at under 500 Kbps while Docker container runs
      - Bandwidth provided by mesh network is anticipated to be sufficient
    - Packet loss is ~20%, but this doesn't explain the unresponsiveness of the user application

- Adjustments to video stream Docker container (Ross)
  - Removed sample web server installation commands from Dockerfile
  - Removed code to switch apt (package manager) mirror, which was required due to issues with nginx installation from default mirror.
- Added pages to the wiki
- Sent in Bill of Materials to ETG for batteries and UPS hat (Ryan)
  - Along with that, I reached out to Leland Harker about cases for the Raspberry Pis and any recommendations he had.

Pending Issues

- Streaming video to user application
  - Having issues with packet loss; video frames are not reaching the user application video display
  - We will try simplifying the structure of the user application code to find the issue
- Package availability used when building the Docker image is somewhat unpredictable
  - Need to consider whether this will affect deployment of finished project, or just development
  - Document how mirrors can be changed when docker container is built
- Picking a case for the Pis that fits the Pi and the UPS

Individual Contributions

Team Member	Contribution	Reporting Period Hours	Total Hours
Grayson Cox	● Implement video streaming code for user application. ● Help to test and debug video streaming. ● Assist Spencer with containerizing the user application and backend application.	12	56
Austin Dvorak	● Tested API on mesh network with ip and network name configuration ● Added API to startup script ● Added file support for mesh network configuration ● Started wiki design	12	54
Malcolm Johnson	● Received case recommendations from purchasing	12	24

	● Began narrowing case search		
Ryan Newell	● Created and sent an order to ETG for batteries and UPS ● Reached out to Harker for case recommendations	12	48
Spencer Parry	● Worked with Grayson on a good way to set up the Docker compose file ● Continued work on the Docker compose file	12	52
Ross Thedens	● Assisted Grayson with testing and debugging video stream to user application ● Assessed network bandwidth on the network where Janus tests have been performed so far ● Adjusted Docker container for video streaming	12	52

Plans for Next Period

- Select and order Pi cases (Malcolm)
- Resolve issues with video streaming to user application (Ross & Grayson)
  - Investigate cause of freezing
  - Determine if fixes are required outside the user application
  - Apply all fixes required to solve problem
- Add information on developed systems to Gitlab wiki (All)
  - Deployment page containing dependencies for each application
    - Document how to switch apt mirrors for video stream Docker container (Ross)
  - Design page containing system architecture diagrams
- Check bandwidth of mesh network (Austin)
  - Compare with other measurements to verify feasibility of 720p video stream