

Honors Summary

My primary roles in this Senior Design Project were that of Software Manager and owning the wireless communications subsystem. The Software Manager role offered opportunities to lead the team in researching and architecting the proper software tools to allow multiple independent platforms to communicate wirelessly and reliably as well as

My other focus was on the wireless communication subsystem. This included designing three separate firmwares for a server, client, and secondary microcontroller to communicate wirelessly and serve varying roles depending on the specific platform. In addition, I had to design the system to provide the capabilities for those working on the alignment/controls subsystem to easily interface with my subsystem. This underscored the necessity to work closely with the other members of my team to make sure that we all were on the same page regarding what they needed capability-wise. It also required me to work with the other members on designing appropriate circuits for these microcontrollers and ensuring that they could send appropriate signals for controlling motors.

My role in this paper consisted of contributing to many sections, including some written collaboratively and others independently. The abstract was primarily written by me, and I collaborated with the entire team on the objective statement and marketing requirements. I performed research into the background information of existing systems and patents related to our design and wrote about this, such as the “Automotive Dolly System” patent, a Raspberry Pi-based RC car with smartphone control, and a room-scale VR system with robots that moved the furniture.

My subsystem in this project was heavily focused on inter- and intra-platform communication between platforms, so I wrote the sections on serial communication standards, such as SPI and UART. Additionally, all sections of the computer network communications were researched and written by me, including Wi-Fi, Zigbee, Thread, Z-Wave, LoRa, and Bluetooth.

Further, as the software manager of the team, I took the lead on researching and choosing an embedded system to use, so much of the embedded systems sections were written by me, including about the PIC24 and ESP32. Because of this role, I also wrote the sections for the level 0-2 software behavior and design, including many of the tables and illustrations in those sections. I also wrote the sections explaining and narrating our actual implemented code and firmware.

I also worked on the engineering standards specification sections, such as safety standards, communication standards, and data format standards. Finally, I wrote our design team’s conclusions and recommendations to summarize our progress and recommend potential next steps should the project be continued.

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Through this project, I gained experience in working closely with team members on a long-term project. This felt like a more realistic real-world experience, allowing us to experience many successes and setbacks and moments of frustration and excitement with and for one another. This project was a good experience in the life cycle of product design and how to learn skills on the fly to accomplish tasks that may not have been taught in the classroom. Should our project be continued, I believe that we could finish constructing all four robotic platforms and finish implementing a completely wireless furniture moving system.