Software application for biomedical purposes

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Background

Places such as nursing homes have difficulty providing adequate surveillance to insure the care and/or safety for the residents. Currently, there are no non-intrusive technologies being used in these situations. Dr. Bolic's team at the University of Ottawa is developing contactless monitoring technology that detects falls and estimates breathing of a person using ultra-wide band (UWB) radar technology. The research problem to be addressed in this project is to estimate the location of a person in a room. This required obtaining 3D information about the room and integrating it with the software, estimating the range between the person and the UWB radar and presenting on the screen the position of the person in the room.

Python: Coding Made Easy

Python was chosen to develop the functionality of the application due to several factors:

- Language used by Dr. Bolic's team in previous projects
- Simpler to integrate modules built with same language
- Easy and intuitive language:
  - Easier for clients unfamiliar with coding to understand how the system functions
- Several "libraries" have already been developed in Python, making development quicker and easier

The Application

- Lets user create a map of a room
- Plots a graph based on start and end coordinates of individual items
- Can be saved to be used in the main application of the team:
  - Will be used to display the position of a person in real time

Contact Information

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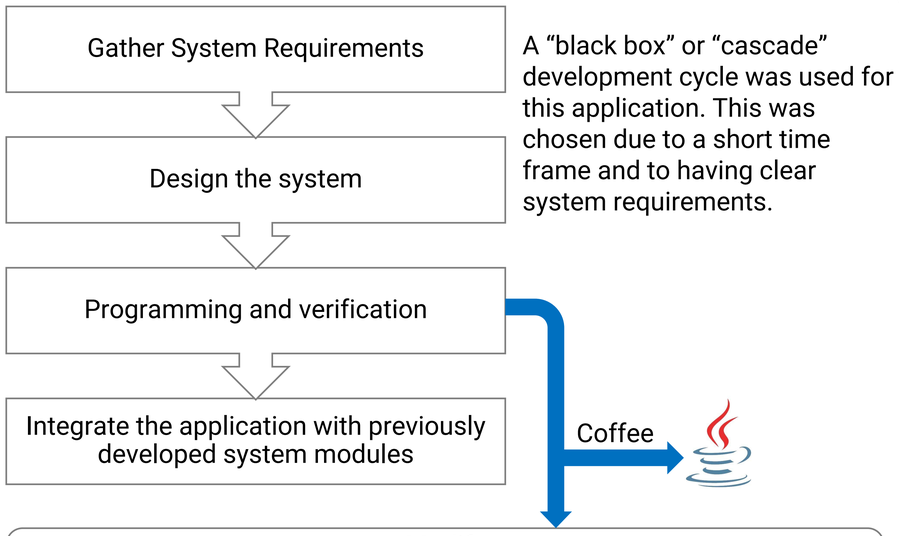
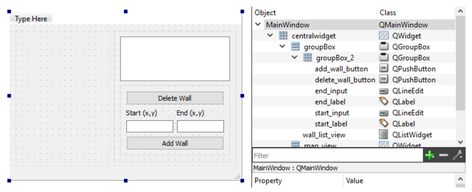
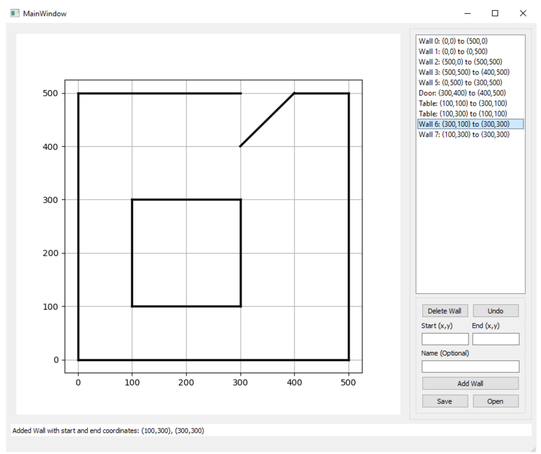
Methodology



A "black box" or "cascade" development cycle was used for this application. This was chosen due to a short time frame and to having clear system requirements.



Result



Screenshot of a demo map created with the application

The Application works without any runtime errors detected and with all functionalities, such as buttons and graphing, that were included in the current version of the graphical user interface work as intended.

Acknowledgments

I would like to thank Dr. Miodrag Bolic for being my supervisor for this project, and the MedDev team for helping me during the development process. I would also like to thank the University of Ottawa for giving me the opportunity to participate in UROP. Lastly, I would like to thank the Stack Exchange community for helping me overcome coding bugs.

Development Tools

- Python 3.6[1]
- PyCharm[2]
- PyQt 4.12 and QtDesigner[3]
- PySide[4]
- NumPy[5]
- Coffee[6]
- Matplotlib[7]

Conclusion

- Application fulfilled most requirements
- Ongoing work to finalize integration of modules
- Design changed over time due to time and resource constraints
- Possibilities for the future?
  - Automated mapping system
  - 3D vs 2D information
  - Improve GUI and interface

References

[1] https://www.python.org/
[2] https://www.jetbrains.com/pycharm/
[3] https://wiki.python.org/moin/PyQt4
[4] https://wiki.qt.io/PySide
[5] http://www.numpy.org/
[6] http://www.theonion.com/americanvoices/coffee-may-prolong-life-30659
[7] http://matplotlib.org/