

Develop software for radar/lidar image processing

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NASA's Synthetic Vision Systems team has expressed an interest in developing a tool designed to visualize radar/lidar data. The tool that is currently employed for this task is QT viewer developed by Johns Hopkins. It is designed to quickly and easily import, display, and manipulate large amounts of 3-D LIDAR data. However this product is limited in its ability to perform feature extraction, utilize user definable clipping planes, provide better control of textures and coloring etc.

Research in this task area can fall into two main directions, commercial product integration and custom visualization product development. In the short term, efforts to research available commercial products that are able to provide the desired functionality will be conducted. Through communication with NASA's SVS team, the desired functionality will be highlighted in each product and suitable metrics will be developed to assess the performance of each product. The end result would be the implementation of the desired functionality that will allow efficient visualization of radar/lidar data.

Finding a commercial application that integrates 3D visualization, image processing, and statistical analyses (as provided by mathematical packages like Matlab) may prove difficult to find. Hence it may be necessary to develop a tool that possesses these capabilities from scratch. To this end, an appropriate development platform needs to be evaluated and implemented. The goal for this effort will be to create a tool robust enough to satisfy the needs of the SVS team when viewing and analyzing radar/lidar images. Constant communication between the SVS team will be necessary to ensure application usability.

Statement of Work:

- Research available commercial terrain visualization applications *
 - Develop suitable metrics for evaluation
 - Evaluate based on desired functionality criteria set by SVS team
- Research appropriate platform for terrain visualization application development *
- Develop algorithm to extract geo-referencing information from LIDAR/RADAR/Photographic data*
 - Modify the data to suitable formats for import into terrain visualization packages
- Develop efficient techniques for rendering terrain data (2D and 3D rendering)
 - Explore methods of improving rendering time through use of illumination shading models
 - Incorporate intuitive interactive navigation methods
 - Incorporate standard visualization techniques, such as isosurfaces and volume rendering
- Provide means of obtaining statistical information within integrated viewing environment.
- Demonstrate custom application capabilities through static images and video capture

* Areas of possible student involvement