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3D Visualization for FAA Part 77 Obstruction Evaluation

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RCEU 2017 Project Title: 3D Visualization for FAA Part 77 Obstruction Evaluation

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Faculty Mentor Biography:
Dr. Haessler teaches geography at the University of Huntsville, Alabama, and works at the local airport, Huntsville Madison County Airport Authority (HMCAA) as their GIS analyst and planner. She holds a Ph.D. from the University of Cincinnati in regional development planning, a masters in geography from Western Illinois University and a masters in community planning from the University of Cincinnati. She also holds current private, commercial and flight instructor ratings since 2005, and has worked at a number of different airports across the United States. She enjoys being able to work in both the geography and aviation sectors, and has a unique background that gives her practical and academic experience in both these sectors.

Project Summary:
Project Background: Federal Regulation Title 14 Part 77 tasks airports to perform obstruction evaluation and airport airspace analysis (OE/AAA). The task of mapping airspace has mounting importance for airports as flight movements and urbanizing land use encroach and contribute to an increasingly complex vertical modeling environment. Many airports find that they are being tasked to do more with less, both in terms of funding assistance and the technical expertise of their staff. Some airports may not have the funding to outsource an entire Part 77 analysis, and this is especially true for smaller airfields who are already diverting resources to work on digitizing and mapping to comply with the Federal Aviation Administration (FAA) electronic Airport Layout Plan (eALP). Even though many airports have access to funding assistance through the FAA and state programs, the waiting list to access these funds can be lengthy. In the interim, airports on the waiting list are finding that their airfield planning is less optimized than if they had more integrated digital and spatial workflows.

Helping airports convert to a digital modeling platform allows them access to analysis and information that transcends simple airspace delineation. For example, a geographic analyst can incorporate parcel data with airfield data and identify not only the current incompatible land uses around the airport, but also project the urbanization trends and highlight parcels that may require protections from encroaching urbanization. Having access to these types of data can help an airport to adequately plan and guide adjacent development so that noise complaints, the potential for future runway expansions and the heights of surrounding structures/developments are compatible. Aside from planning information, a geographic information system (GIS) can be used to inform airport operations. For example, the inclusion of tree species data could be used to estimate growth rates of trees around an airfield and predict when and where hazardous airspace encroachment is likely to occur. These types of information can result in more efficient pruning protocols, which can save airfields money and enhance airfield safety.

Project Purpose: This mentorship is intended to generate or develop modeling options, like those listed above, or consider new ways data can be combined to enhance safety or reduce operational costs at an airfield. It is hoped that the final products, 1) add to the methodological body of aviation literature, 2) provide less advantaged airfields new ways of developing a Part77 or eALP and in doing so, 3) help these airfields gain access to the benefits that the larger airports have with respect to accessing more detailed land use planning and enhanced safety data. Deliverables will include maps, research paper(s) or a poster to present at a UAH conference or a conference of the students choosing.

Mentor Supervision and Interaction & Student Duties: The student will meet weekly at an established time to review progress and discuss ideas or challenges that they may be having with the project. Additionally, the student will have access to the mentor for questions or concerns throughout the mentorship, and have the option to participate in various airfield functions if they think it would be helpful to advance their understanding of airfield operations. An airfield tour can be arranged to help the student understand the complexity of the HSV airport, and if the student is interested in seeing roles of other personnel at the airport, tours with personnel that work in sectors, including, environmental, engineering, computer engineering, operations management, etc., can be arranged. During the first to second week the student will perform background literature research, take trips to the airport to gain practical insight into airfield operations, and work with the mentor to establish a time line that narrows the focus of their research into an area that interests them. The remaining weeks will be used to generate research deliverables, which could include maps, research paper(s) and poster to present at the UAH conference or a conference of their choosing. Publication potential through FAA sources or other transportation journals is also likely.

Benefits to the Student: New students often do not have access to opportunities that allow them to marry the theory of their discipline to practice. This is a research opportunity that shows the practical application of geography and urban planning in the aviation sector. The student will learn how to set up databases, manage data and work with data from mixed sources in a GIS. They will learn how to diagram work flow structures in GIS and how to translate GIS work flows into a publication or poster.

Student Prerequisites: The ideal student would be someone with at least one year of GIS and an interest in human geography, aviation, planning, environmental planning, engineering or airport operations in general.