

TASK # HF002-04-05. APPLIED GAME THEORY TO ENHANCE ATC TRAINING

PROJECT AT-A-GLANCE

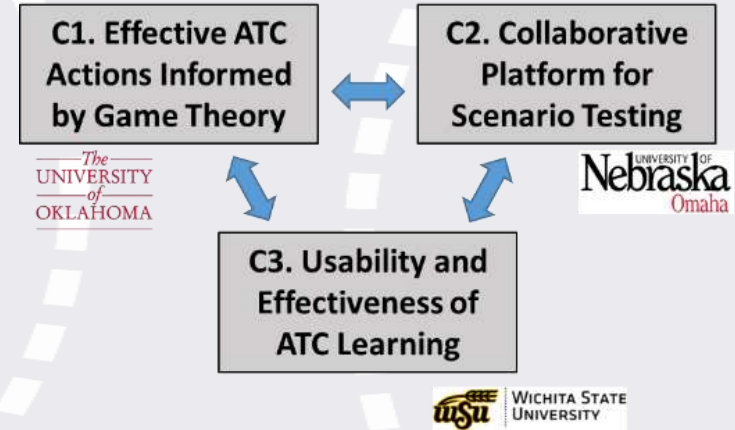
- UNIVERSITIES: Univ. of Nebraska at Omaha, Univ. of Oklahoma, Wichita State Univ.
- PRINCIPAL INVESTIGATORS: Dr. Kash Barker (OU), Dr. Jibo He (WSU), Dr. James Taylor (UNO)
- STUDENTS: Srinath Kosaraju (OU), D. Christiansen (UNO), H. Schleu (UNO)

RELEVANCE TO TECHNICAL TRAINING AND HUMAN PERFORMANCE

- This project explores the use of decision analysis techniques (game theory in particular) as well as mixed reality (MR, e.g. Microsoft HoloLens) software platforms to enhance ATC training for addressing such uncertain and “deviations from normal” operating conditions.

STATEMENT OF WORK

- C1. Understanding how effective ATC actions can be informed by game theory, including (i) Understanding normal and variations to normal ATC operations, and (ii) Documenting decision analysis and game theory approaches to support training for a variety of operating conditions.
- C2. Developing a platform for scenario testing that examines collaboration and competition involved in ATC, including (i) Understanding the normal collaboration modalities used in ATC operations, (ii) Researching additional collaboration tools and modalities that could be used in ATC operations, and (iii) Developing proof-of-concept demonstrations that evaluate the effectiveness of collaboration tools in decision analysis and game theory exploration.
- C3. Exploring the usability and effectiveness of ATC learning through the game theory-driven collaborative platform, including (i) Creating training materials so users/trainees can learn to use the new mixed reality platform, (ii) Recruiting ATC with diversity in age and technical experience for a usability study, and (iii) Summarizing user study findings using a User-Centered Design approach for feedback.



STATUS

- C1 is over half completed with several related game theory approaches to traffic networks being studied.
- C2 has developed an ATC spatial awareness and tracking game using the Microsoft HoloLens Augmented Reality platform. The game challenges users to keep track of the spatial separation of aircraft in a 3D environment, while directing them to land on a runway.

USABILITY TESTING FOR THE NEW PLATFORM

1. **ATC recruiting:** Novice and experienced ATC, age groups
2. **Testing materials:** Old ATC system and new platform with 3D environment; Questionnaire
3. **Experiment design:** IV: experience, age, types of system, task complexity. DV: accuracy of task performing, response time, time of training, and strategy
4. **Procedure:** Task: Ensure aircraft separation by direction, speed, and altitude. Complexity: three groups based on the scenarios and number of aircrafts. Time: one hour for each of the six sections, two days for the entire experiment. one hour to finish one section and at least two days to finish the whole training procedure. After training, participants will task a test using the new platform and old ATC system.

Publications, Presentations & Awards

- Publications:
- Presentations:
- Awards: