Remotely Piloted Aircraft Virtual Reality Mission Planner

CAPSTONE PEER REVIEW

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OUTLINE

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INTRODUCTION
ABOUT ME

- 15 years of USAF service
- BS Aeronautics – Embry-Riddle Aeronautical University
- RPA Sensor Operator Instructor
- Air University (CCAF) accredited Formal Training Unit Instructor
- Defense aerospace Technical Writer and Design Engineer
BACKGROUND
Propeller or turbine powered, fixed wing or rotary, small to large airframes. Capable of carrying a variety of sensor payloads, weapons, or other instruments.
The Pilot/Sensor Operator workstation enables the RPA crew to remotely operate the aircraft and organize and synthesize a variety of situational awareness tools.
REMOTE SPLIT OPERATIONS

OPERATING LOCATION
Mission Control Element

MISSION ENVIRONMENT
Launch & Recovery Element

SATELLITE RELAY
Narrow the human/machine divide inherent in RPA flying operations

- Improve the RPA mission planning process
- Increase the level of spatial and situational awareness of the mission environment
TERRAIN MASKING

When an opaque environmental object obscures the clear line of sight from the viewer
VIRTUAL REALITY MISSION PLANNER
TERRAIN GENERATION
Creates terrain imagery and height maps from global selectable imagery
VR DEVELOPMENT

➢ VR modeling in Unity
➢ Oculus Rift VR hardware
3 METHODOLOGY
SEQUENCE OF EVENTS

RPA CREW SELECTION
C1 & C2: Respective Pilot and Sensor Operator RPA crew of similar experience

EVALUATION
Crews performance is evaluated against standards. Crews given survey.

MISSION PLANNING
C1: 2D mission planning products
C2: 2D & 3D planning products

MISSION EXECUTION
Crews execute their briefed plan

PLAN ILLUSTRATION
Crews illustrate and brief their plan
GOALS & OBJECTIVES
PERFORMANCE OBJECTIVES

**FLIGHT PLANNING**
Improved understanding of the mission and environmental factors affecting mission success

**SITUATIONAL AWARENESS**
Increased awareness of all mission elements in play and reaction to unexpected changes

**SPATIAL AWARENESS**
An increased awareness and tactical consideration of terrain and aircraft positional issues
TIMELINE
Finalize unity VR Mission Planner.

**STAGE 2**
Develop ISR mission simulation. Refine performance criteria. Develop tactical objectives.

**STAGE 3**
Select RPA crews for simulation. Test simulation.

**STAGE 4**
Crews execute mission simulation. Evaluate crew performance.

**STAGE 5**
Finalize capstone deliverables.

**STAGE 6**
Present capstone at conference.
TIMELINE

JANUARY 1
Completion of VR Mission Planner in Unity

JANUARY 22
Completion of RPA simulator mission build

JANUARY 29
Selection of RPA crews for evaluation - Test simulation

MARCH 1
Completion of final capstone deliverables

FEBRUARY 1-5
Crews run mission simulation
PROPOSED RESULTS
Through 3D visualization, +SPATIAL AWARENESS +SPATIAL AWARENESS +FLIGHT PLANNING helps crew members with low spatial ability by decreasing cognitive load. Avoiding terrain masking and lost targets.
“Conformation of the ground is of the greatest assistance in battle.”

—SUN TZU, The Art of War
THANKS

DO YOU HAVE ANY QUESTION?

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