

Modeling and Analysis of Multi-agent systems for HMI Optimization

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Abstract—Recent research has shown that wilderness search and rescue (WiSAR) can be aided through the use of unmanned aerial systems (UASs). A single UAS, however, requires several human operators to manage the interface between the UAS vehicle and the larger search and rescue efforts on the ground and in the air that are coordinated by the central command center. For UASs to scale to real-world wilderness search and rescue scenarios, it is important to reduce operator workload and mitigate the effects of stress and fatigue through effective distributed control and augmented autonomy. A primary challenge in any effort to understand distributed control is in effectively modeling the various roles in the system from the humans, to the GUI, to the actual UAS in the physical environment. This paper discusses a Java model that explicitly formalizes the individual roles of the WiSAR UAS that can be model checked by Java Pathfinder to establish its intended behavior. The model is the basis for research on human machine interfaces to support combined human roles that reduce operator workload. In essence, by modeling each individual role in WiSAR, it is possible to then perform role fusion and show that the new UAS with combined roles, increased autonomy, and new interfaces is a correct implementation of the original system. The experience of this modeling activity suggests that modeling WiSAR or any system will be at least as hard as any solution to distributed control or role fusion.

Index Terms—Keywords goes here.

I. INTRODUCTION

Problem Statement: UASs require several human operators to monitor and administer.

II. CONCLUSION

The conclusion goes here.

ACKNOWLEDGMENT

The authors would like to thank Neha Rungta of NASA Ames Intelligent Systems Division for her help with JPF and Brahms.

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