



Application of Cognitive Agents to NAS Models and Real-Time Simulations

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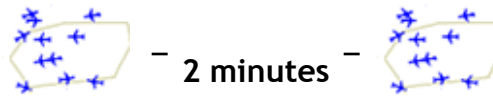
Problem



- **CAASD is commonly asked to determine what impacts new technologies may have on the National Airspace System (NAS)**
- **To understand system-wide impacts, it is necessary to understand the effects of a technology on controllers/pilots**
- **What are the effects of new technologies on controller/pilot workload, productivity, and error rates across the NAS?**

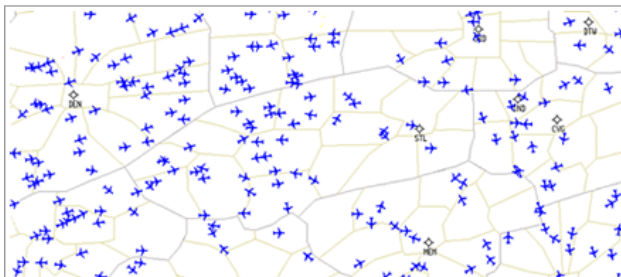
Background

In the past, we have implemented a single, static cognitive model that interacts with a constrained environment over a few minutes

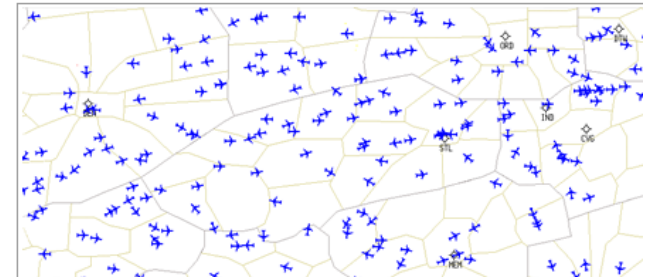


Past Environment

Through this project, we are aiming to implement many automated cognitive models that interact with a robust environment (and each other) over several days



2 days



Future Environment

Objective



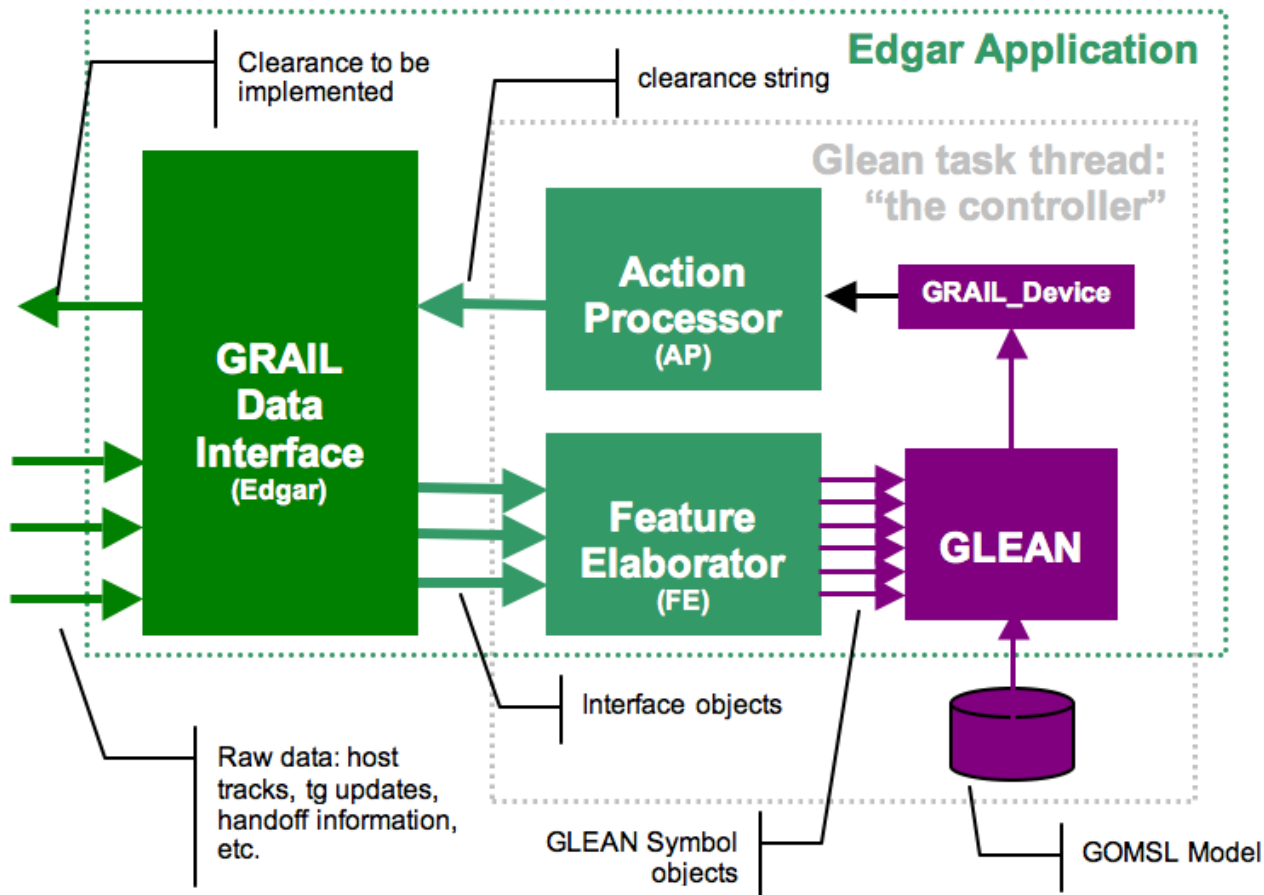
- **Create a library of autonomous cognitive models that can be implemented within NAS models or real-time simulations as “Cognitive Models in the Loop”**
 - **By the end of Fiscal Year 2008, we will have an autonomous cognitive model that can accomplish roughly 90% of common en route air traffic controller tasks; that model will be integrated with our en route simulation environment**

Activities



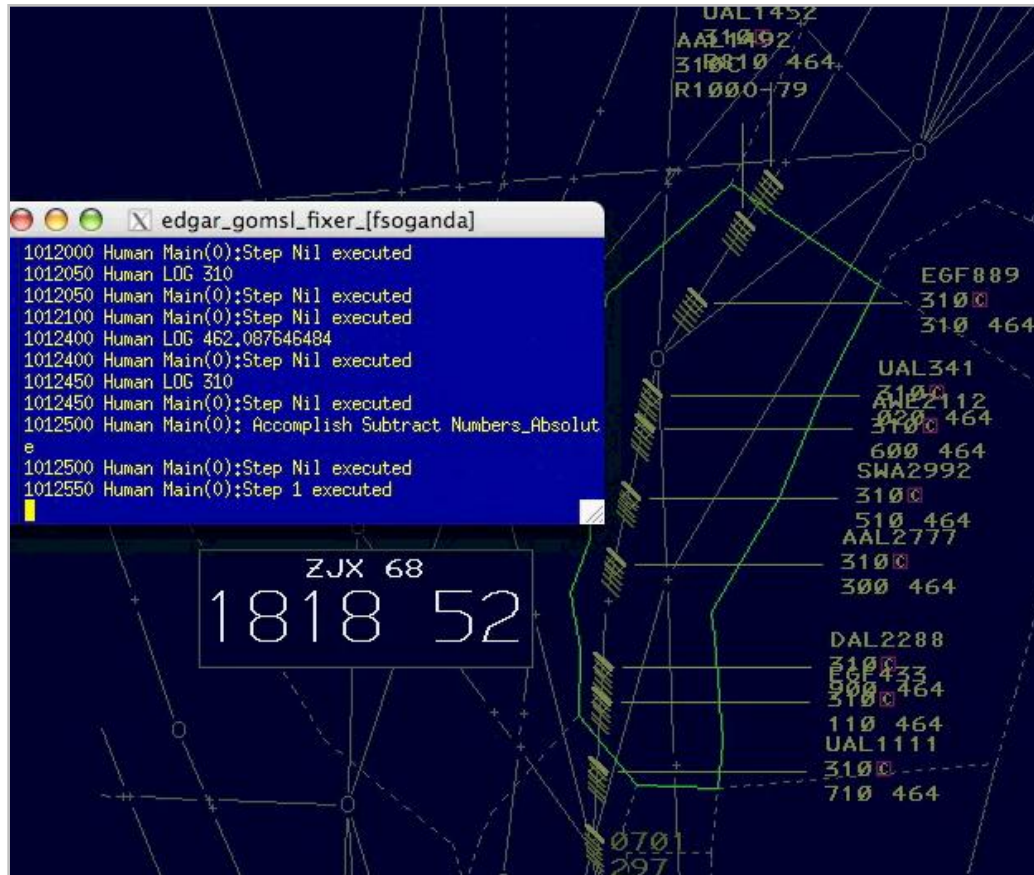
- **Task Analysis & Controller Interviews**
- **Model Building**
- **Infrastructure Development**
- **Model Validation Activity**

Highlight



Framework for communications between cognitive models and simulation environment

Demonstration



Cognitive Model Controlling Traffic in a Low Complexity Sector

Impacts



- **Embedded cognitive models will allow macro level system results based on micro level cognitive data of a type typically only gained in Human-in-the-loop (HITL) evaluations**
- **Example:**
 - **Information can predict if controller workload is reduced using automation to a point that controller productivity increases allow for handling additional aircraft or additional sectors**
- **Within real time environments, cognitive agents can facilitate HITL evaluations, acting as pilots, controllers, or Traffic Managers**

Future Plans



**Formal Identification of
uses within the FAA
Work Plan**



**Application within
the FAA Work Plan
FY09**

- **Movement from internal MITRE Research project to tool that can address NextGen problems in MITRE's FAA Work Plan**