Human Error Modeling Augmentations: Increasing Air MIDAS' Visual System For SvS

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Friday October 19, 2001

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SvS Environment

- Visual CRT display in the cockpit that incorporates several elements.
- Computer graphics to generate a texture-mapped display of the earth's surface.
- Text and other symbology will be overlaid onto the display
  - Ownship velocity, "follow-me" aircraft and its velocity, a "tunnel-in-the-sky", other nearby aircraft.
  - Flight controls
    - air speed, attitude, elevation.

Air MIDAS Augmentation

- Desire to have the ability to accurately perceive objects in near and far plane.
- Current Air MIDAS Visual Model:
  - Look at = Perception.
  - Limited to one plane.
  - Not able to discriminate text.
- New York University - Mike Landy
  - Wealth of research examining visual perception, 3-Dimensional perception, discrimination, classification.

NYU Visual Perception

- Spatial Channels.
  - Early visual coding represents the retinal image using a variety of channels.
- Retinal Inhomogeneity and Sampling.
- Masking.
  - Detection.
  - Discrimination.
  - Classification.

NYU/Landy - Discrim. Program

- NYU (Mike Landy)'s Discrim. Program permits viewing parameters and model parameters change (for the single model that has been implemented so far).
  - viewing distance, image size and image sampling.
  - model parameters are specific to the particular model, and specify the model's contrast sensitivity function and parameters of image masking.

Visual Augmentation Process

- Task analysis of SvS displays and flight scen.
  - Bottlenecks from limitations of vis. processing.
  - Simplified models of visual processing will be developed based on extant psychophysical data.
    - Visibility of the symbology representing approaching planes on the synthetic vision display,
    - Distraction from a given task by unnecessary, redundant or intrusive information on the display,
    - Accuracy of observer estimates of velocity of aircraft/neighboring aircraft from multiple sources of such information available on the display,
    - Ability of the observer to program a scan path using information available on the display.

NYU - HAIL Association

- Anticipating the completion of a more detailed visual model for Air MIDAS.
  - Mike Landy brings expertise not only in the visual domain with human visual performance, but also in computer programming.
  - Knowledge of computational limitations will guide algorithm implementation in Air MIDAS.