Concept Model: KEEL® (Knowledge Enhanced Electronic Logic) Technology for Semi-Automated Sniper Subject Matter Expert

Compsim Proposal

Objective: To provide a "reasoning engine" to assist a marksman sight a target, thus enabling a marksman with basic training to perform at a much higher level when targeting distant objects in adverse weather conditions.

This is a concept model only and has not been tested in real world environments.

Approach: The approach discussed in this document identifies two alternatives: Both utilize a PDA application that allows the user to define range and weapon type by selecting values from a list and then defining environmental (wind) conditions by using a series of scroll bars. In one approach, the user would be given textual instructions about how to adjust the sight. In the second approach, the data would be fed directly into the gun; automatically adjusting the sight (this may or may not be feasible).

Sample human interface:

This is a (very preliminary) sample human interface for a Sniper SME demonstration. The weapon / bullet combination could be identified in the combo box in the upper left. The range could be selected from the list box at the upper right. The range would be broken into 10 segments (closest at the top) with windage causing the bullet deflection to show in the horizontal scroll bars. Other inputs from the user will also probably be required…..

Concept: This concept suggests that it will be easier to train the marksman to observe weather / wind conditions and let the PDA / computer calculate adjustments to the sight, than it is to train the marksman to both observe weather / wind conditions and also to train him/her to adjust the sight accordingly.

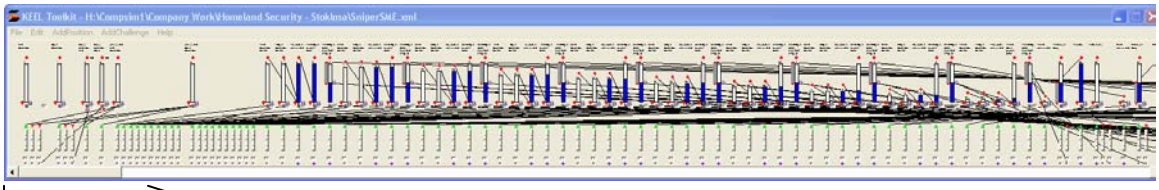
Behind the Scenes:

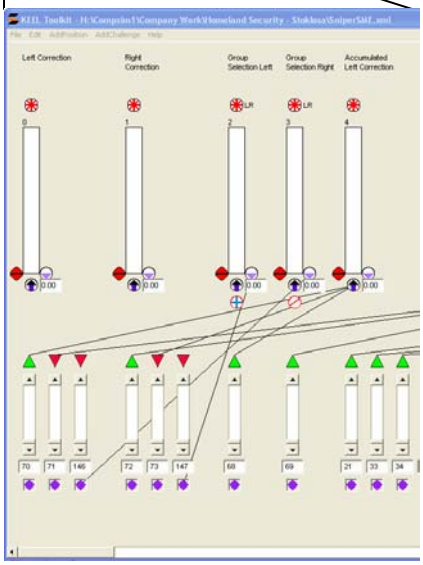
This proposal utilizes KEEL Technology behind the scenes, where human expertise is captured using the KEEL dynamic graphical language. The 10 scroll bars provide inputs into the system regarding how the user observes the wind. This is just one alternative. Another might be to use circular dials where the wind heading throughout the range is identified. There may be other conditions to consider (elevation, buildings / trees, blocking or redirecting wind…)

The KEEL graphical language allows the designer to create an analog engine that will process the information and create one or more output signals that could be used to control or define the settings for the weapon sight. The KEEL Engine (based on the resulting cognitive model) will then be packaged in the PDA.

KEEL Technology

Compsim's KEEL Technology attempts to mimic the way that a human interprets information and makes judgmental decisions. The dynamic graphical language allows the designer to observe the decision-making process while it is being developed. The resulting cognitive model can be implemented in microprocessor based systems that take a very small memory footprint (may be important in some applications). Because decisions and actions created with KEEL Engines can be completely explained and audited, they can be corrected and extended if necessary with relative ease.





This is a screen capture of the KEEL dynamic graphical language defining the KEEL Cognitive Engine behind the preliminary design for the Sniper SME demonstration. NOTE: The KEEL Engine will, as a minimum, have to go through a tuning process (or teaching process), just like a human would to identify the relative adjustment for wind, weapon type, and distance (and other factors).

The purpose of this paper is to stimulate thought about how KEEL Technology might be able to emulate the interpretation skills of the best human marksman. Compsim does not possess the domain expertise to build KEEL Technology into a "product". This would have to be done in partnership with a domain expert.

Compsim LLC is a provider of next generation cognitive technology for application in automotive, industrial automation, medical, military, governmental, enterprise software and electronic gaming markets. The company is headquartered in Brookfield, Wisconsin.

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