GENERAL DYNAMICS UK LIMITED

July 2004 – September 2010

Principal Technologist

- Given the brief of addressing the rigorous analysis and implementation of new mathematical and scientific algorithms and techniques for potential project exploitation. Involved in the DIF DTC work undertaken by General Dynamics in collaboration with Cambridge University to track targets using translational and rotational invariant transform methods; specifically the 'Dual Tree Complex Wavelet Transform'. This 'Understanding the Maths' role is seen as vital to future development.

- Mathematical Modeller for a multiple platform time sensitive target tracking system, a derivative of the SEDS programme. This incorporates a modified structure Kalman filter method and a fuzzy logic measurement noise covariance estimator based on the innovation sequence. Small scale temporal differences, due to different platform observations times and transmission latency, are accounted for in a positional nonlinear algorithm placed before the Kalman filter. This avoids the use of potentially unstable, state sensitive, Extended Kalman Filter methods without the complexity and computational load of Particle Filters. Disparate observations are combined using a modified Covariance Intersection method and the results are used to cue other assets within the simulation. The Kalman Filter element of the work has been published in a paper presented at the IET Tracking and Data Fusion Seminar.

- Mathematical Modeller for the Synthetic Environment Demonstration System (SEDS). An IRAD designed to investigate the viability of the using a synthetic environment for simulating targeting scenarios. The system incorporated an HLA backbone via a MAK RTI and a series of platforms with attached sensors, modelled in Opnet for network timings and propagation losses, and an in-house modelling behavioural environment which began to address the management of the geo-positioning and intelligent movement of the platforms.

- Under an 'Independent Research and Development' (IRAD) programme developed Head Related Transfer Function 3D Audio capabilities for synthetic sound picture applications. Based on VME processor boards with a DSP accelerator mezzanine card, the system utilizes head tracking, head orientation and distance of apparent source to give the user a synthetic sound picture of their surroundings designed to include synthetic cueing.

- Under another IRAD programme developed a prototype network modelling toolbox, in Matlab and Simulink, for determining potential latency and potential data throughput of processor boards and network interfaces such as Ethernet and VME buses. Modelling of complex objects was based on simple primitive constructs connected via the Simulink graphical interface. This has now been fully developed by the programmes department and was distributed for company wide use in 2007.