

STARTLE: Bio-inspired threat detection architecture



Roke Manor Research Ltd
a Siemens company

STARTLE is a bio-inspired threat detection architecture for local protection of autonomous vehicles.

STARTLE emulates the mammalian conditioned-fear response mechanism.

Early threat warning can cue power management changes, e.g. starting up a gas turbine in readiness for increased power demands for sensing and propulsion. The approach can also be used to provide additional automatic situation monitoring for existing manned vehicles, piggybacking on data from existing sensor fits.

Aim

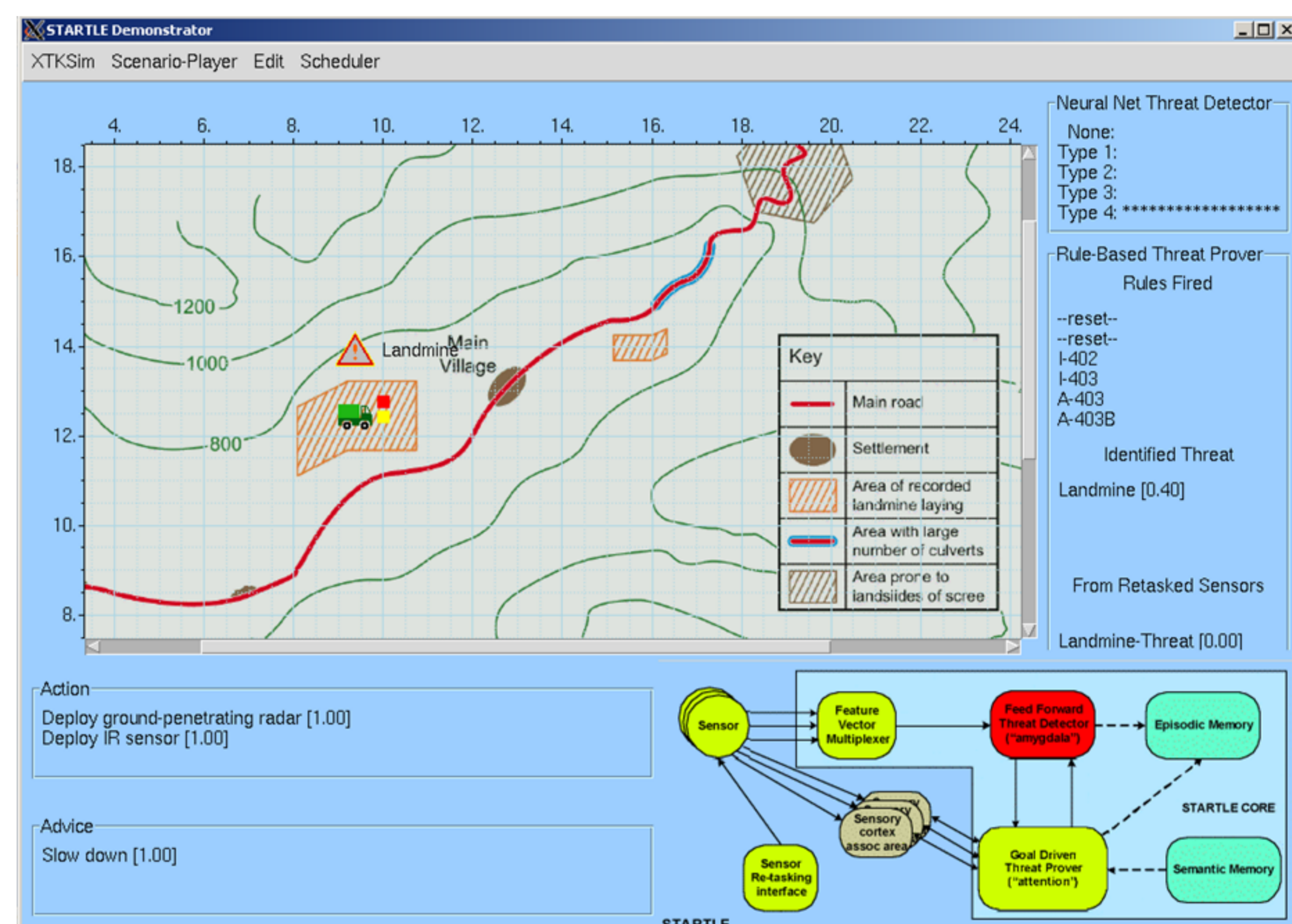
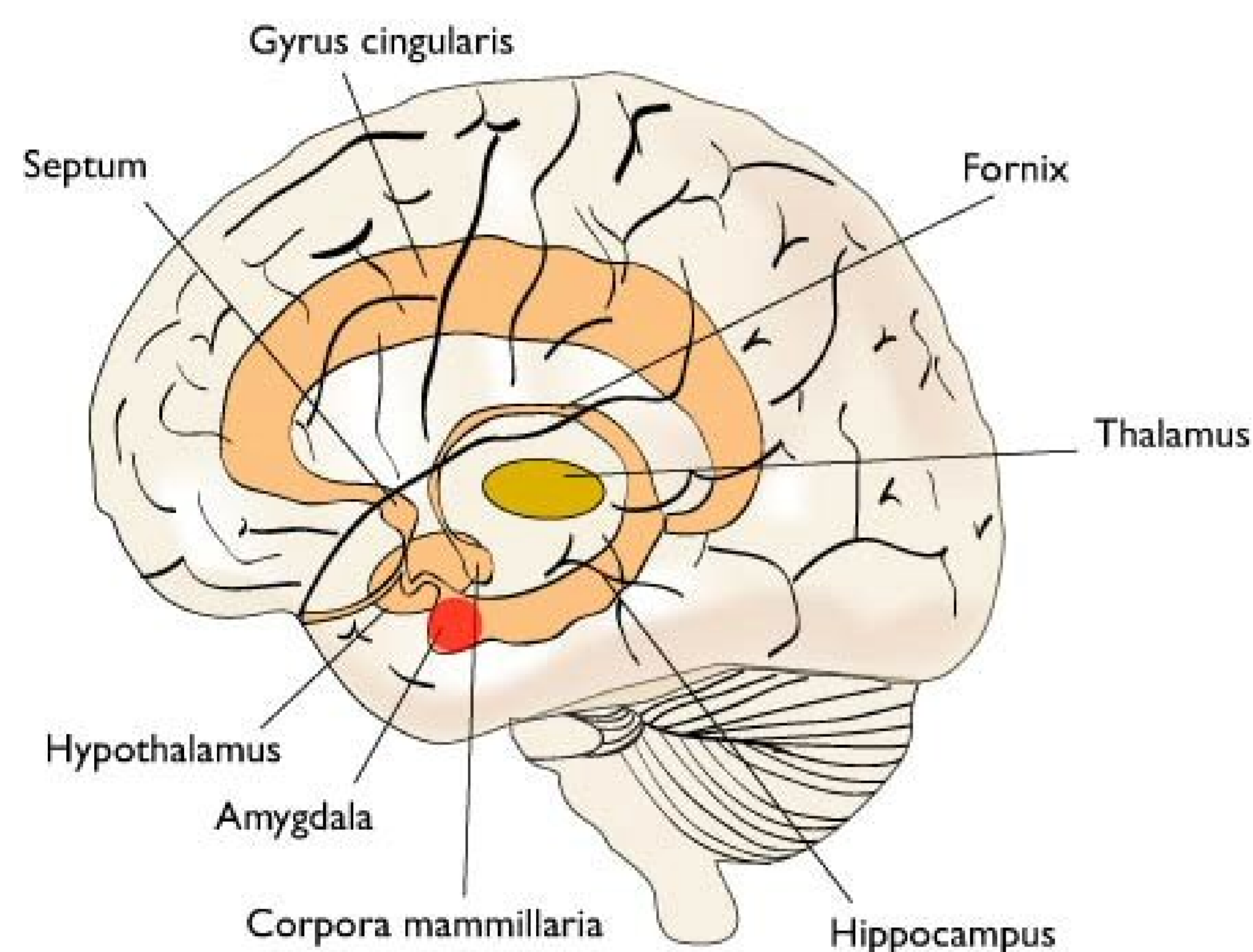
To develop and demonstrate a bio-inspired architecture for local situation awareness and threat detection applicable to UxVs.

Approach

Biologically-inspired architectural study and proof-of-concept software demonstration of a model of cued attention for local protection of UxVs.

Outcomes

Bio-inspired model of cued attention developed. Proof-of-concept software demonstration of a simulated UGV operating in a route clearance role.



Proof of Concept Demonstration
A Route Clearance vignette

STARTLE is a bio-inspired architecture for local threat detection for UxVs

STARTLE exploits existing sensor fits, piggybacking on existing data streams to provide early warning of potential threats to own vehicle.

STARTLE can be applied to:

External threat monitoring for UxVs

Internal system status monitoring of UxVs

External threat monitoring for manned vehicle as a mid-life enhancement using existing sensors

STARTLE uses a feed forward ensemble classifier and goal-proving threat assessor to direct sensor assets and select processing algorithms...

...emulating the mammalian brain's amygdala and sensory cortical areas...

...to efficiently assess possible threats

Allowing for more efficient and more focused use of available processing power

Key components:

Neural network – gives high performance, lightweight monitoring and alerting

Rule system provides cued sensor re-tasking (rules explicitly will require additional data to be collected from a particular sensor / processing algorithm) and gives traceability allowing reasoning to be validated

Neural Network training can be based on real or synthetic environment derived data, allowing wide range of potential operational scenarios to be investigated

Rule system is compiled by domain experts and allows system to request the most appropriate sensor data to confirm potential threats

Learning – potential to accommodate on-the-job learning in future systems

Contact : mike.hook@roke.co.uk