ARTIFICIAL NEURAL MEMBRANE FLAPPING WING

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Neural networks have evolved from a simple computer simulation to performance adaptive systems based on computational models derived from study of the ordering of neurons. Advances in materials, especially thin films, have provided a new environment for experimentation with the development of artificial neurons as device resident controllers for structures and vehicles. Advancement in the design of hypersonic and space launch systems has created the requirement for revolutionary technologies in the health-monitoring and control of highly complex autonomous flight systems. The concept of an artificial neural membrane flapping wing provides an integrated view of often non-related technologies and disciplines. The concept of such a device and potential vehicle may advance the field of autonomous flight systems through biomimetics.

The concept an ANM flapping wing is supported by the basic idea of integrating a neural network into a thin film or smart skin membrane for the purpose of demonstrating the ability of an artificial neural network or ANN to control simple locomotion for the purpose of flight. Simple contraction of the thin film has been demonstrated by running current through carbon fibers deposited on a polymide sheet. It is necessary to evaluate mechanisms of locomotion and complete modeling of ANN controllers for different types of motion. It is the basis of this proposal to develop a virtual library investigating the potential types of motion that may be demonstrated by an ANM flapping wing. The construction of a set of simulations investigating various operations and applications of ANM in atmospheric flight, underwater flight, adaptive solar sails, and artificial organs will expand the study as to allow visualization of different materials, controllers and mechanisms of locomotion.