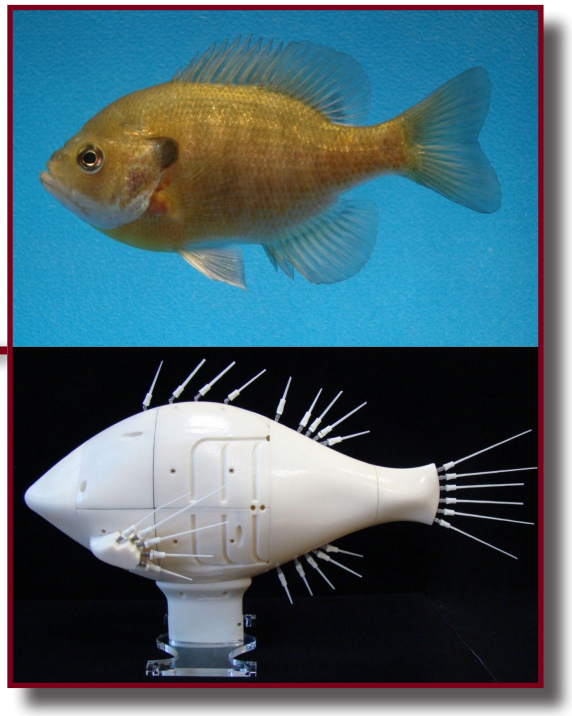
SAFL Seminar Series
Distinguished Speaker

Wednesday, November 30, 2011, 3:30pm

St. Anthony Falls Laboratory ~ Auditorium

Fish robotics: understanding the diversity of fishes using mechanical devices



George Lauder
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Abstract:

There are over 28,000 species of fishes, and a key feature of this remarkable evolutionary diversity is a great variety of propulsive systems used by fishes for maneuvering in the aquatic environment. Fishes have numerous control surfaces (fins) which act to transfer momentum to the surrounding fluid. In this presentation I will discuss the results of recent experimental kinematic and hydrodynamic studies of fish fin function, and their implications for the construction of robotic models of fishes. Recent high-resolution video analyses of fish fin movements during locomotion show that fins undergo much greater deformations than previously suspected and fish fins possess an clever active surface control mechanism. Fish fin motion results in the formation of vortex rings of various conformations, and quantification of vortex rings shed into the wake by freely-swimming fishes has proven to be useful for understanding the mechanisms of propulsion. Experimental analyses of propulsion in freely-swimming fishes have led to the development of a variety of self-propelling robotic models: pectoral fin and caudal fin (tail) robotic devices, and a flapping foil model fish of locomotion. Data from these devices will be presented and discussed in terms of the utility of using robotic models for understanding fish locomotor dynamics.