Multi-agent System Modeling Inspired By Bat Swarms

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Abstract - Multi-agent systems are pervasive in engineering and, as a result, engineers across disciplines are challenged to design coordination strategies to achieve team-wide goals. Such large-scale coordination tasks are well executed in nature by animal groups exhibiting collective behavior, such as fish schools and bird flocks, wherein complex structures emerge from decisions based on local information. The interactions among individuals in these groups rely heavily on their communication modalities and, in the vast majority of natural examples, these modalities are based on the passive reception of information, as with vision. However, among these groups, bat swarms stand out as a unique example using sensing— biosonar— which is active and thus can be intercepted by other individuals. In this talk, we develop a model for multi-agent systems that incorporates active communication modalities and we discuss benefits and hindrances that may result. In addition, we present experiments with robotic teams using active sensing inspired by bat swarms.