

CAPSTONE PROJECT: *Monk Parakeet Monitoring*

Project Purpose: To develop a detector package specialized to the monk parakeet. This species is unique in that it builds large stick nests with multiple chambers in which individuals both nest and roost overnight. It is also of interest because it is invading the US with growing populations in FL, TX and CT. Investigators in the Biology Department would like to be able to monitor the movement of individuals among nests to address issues with migration and habitat encroachment.

The students will need to

1. Develop a methodology to uniquely identify each bird in the study
2. Track its movements in the form of determining which nests are visited
3. Develop the identification methodology and tracking methodology that are compatible with an outdoors environment and not greatly perturb either the birds or the nesting areas.
4. Develop methodologies that meet limited power, weight, and volume considerations.
5. Meet cost constraints developed by the customer (biology investigators).

Project Schedule:

- Begin fall 2008
- Expected demonstration date -- April 2009
- Project end date – May 2009

Funding Sources:

- Supplies – ECE capstone funds
- There is a potential for some supplemental funding from federal grants.

Disciplines Needed:

- Power (batteries, power distribution, power control)
- Communications or antennas for RF tracking
- Structures (mounting for components and surviving outdoor environments)
- Electronics (sensors and support electronics)
- Systems Engineering (requirements, test, evaluation, verification, project control)

Project Constraints:

- Safety (electrical and structural) – must meet constraints imposed by customer
- System form factor must meet customer specifications

Number of students desired: 5 to 10; ECE students and either ME or ETM for the structures. If a large number of students enroll, a competition between designs may be considered.

Faculty Sponsor: Stephen Horan and Timothy Wright (Biology)

Methodology:

1. Student team will need to determine an appropriate project requirements and constraints as needed by the customer in Biology
2. Student team will need to develop detailed project requirements and project success criteria
3. Student team will need to develop subsystem concepts and associated subsystem requirements
4. Students will need to produce a design that addresses electrical and mechanical safety issues, collects project science data, collects any ancillary environmental support data, and reports data as per customer needs
5. Student team will need to develop an engineering prototype system to work out hardware and software, develop assembly and test procedures, and run simulated data acquisition experiments
6. Student team will need to assemble and validate a working field prototype.

Project deliverables:

1. Mission statement
2. Acceptance criteria
3. Requirements documents document and verification matrix
4. Software and hardware design details (analysis, schematics/drawings, parts list)
5. Working prototype by CDR
6. Assembly procedures
7. Test procedures
8. Working field unit by project demonstration date

Project Reviews:

1. System Concept Review
2. Preliminary Design Review
3. Critical Design Review
4. Demonstration Readiness Review
5. Final Review (at end of spring semester)

Outreach Requirements:

1. Student team will be required to present the project to at least one precollege group/visit
2. Students will need to make a 5-minute (maximum) video describing the project and showing it working