

IOWA STATE UNIVERSITY

Department of Electrical and Computer Engineering

Senior Design Project Proposal Form

Client/Company/Organization: Iowa State UniversitySubmitter (name): Daji Qiao, Halil CeylanEmail: daji, hceylan@iastate.eduProject Contact: Daji QiaoEmail: daji@iastate.edu

Project Title:

Wireless Embedded Roadway Health Monitoring

Project Abstract (include **ALL project goal(s)**, design constraints, and technical approaches and tools):

Advancements in technology and wireless sensor networks creates the possibility for long-term, real-time health monitoring of pavement and bridge systems at low cost in a reliable and sustainable transportation infrastructure system. Such systems will be able to detect problems such as cracks, black ice formations, etc. and alert maintenance crews earlier than current visual inspections saving money, time, and potentially lives.

Primary project goal is to design and prototype a system using commercial off the shelf (COTS) MEMS sensors which can be embedded into a concrete roadway. Design must consider harsh environmental factors, wireless communications and sensor networking, and energy requirements of such sensors. Project goals are as follows:

1. Develop wireless capable circuits with a microcontroller, memory storage, and power management to interface with commercially available temperature, humidity and strain sensors in concrete pavement applications.
2. Investigate and design packaging schemes which can withstand the harsh environment.
3. Construct a prototype systems.
4. Conduct design and lab experiments on the reliability, accuracy, and robustness of the developed prototype.
5. Document all findings and design decisions.

Expected Deliverables (include expected schedule, cannot be open-ended, **must list at least one deliverable**):

Deliver a tested and working prototype and a well formatted formal document by April 2015.

Specialized Resources Provided by Client (be as specific as you can):

COTS temperature, humidity and strain sensor systems, help manuals, access to concrete pavement instructions site, concrete paving pictures and videos, concrete materials and portland cement concrete pavement lab at CCEE.

Anticipated Cost: _____

Financial Resources Provided by Client (if any): \$ _____

NOTE: General Resources Provided by ISU/ECpE: MSDNAA software, and access to resources in ECpE teaching and research labs, e.g., electronics, embedded systems, etc.

Enter # Students Preferred/Required:

Special Skills Required of Students (be specific):

- Electrical Engineering
- Computer Engineering
- Software Engineering
- Other (specify): _____

