

**College of Engineering  
Summer Research Experience for Undergraduates Program**

**Request for an Engineering Student for Summer 2011 Research**

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**Brief description of Summer Research Project (please explain the interdisciplinary nature of this project).**

The atmosphere contains numerous of signals that can potentially be used for weather hazard detection and early-warning. For short-term prediction, detection, and tracking of fast-moving hazards such as tornadoes, weather radar is the primary sensor. But weather radars have a number of fundamental limitations that can hinder their effectiveness. Because it can overcome some of the limitations of radar, infrasound has been proposed as a synergistic technology to be used alongside radar in a tornado early-warning system.

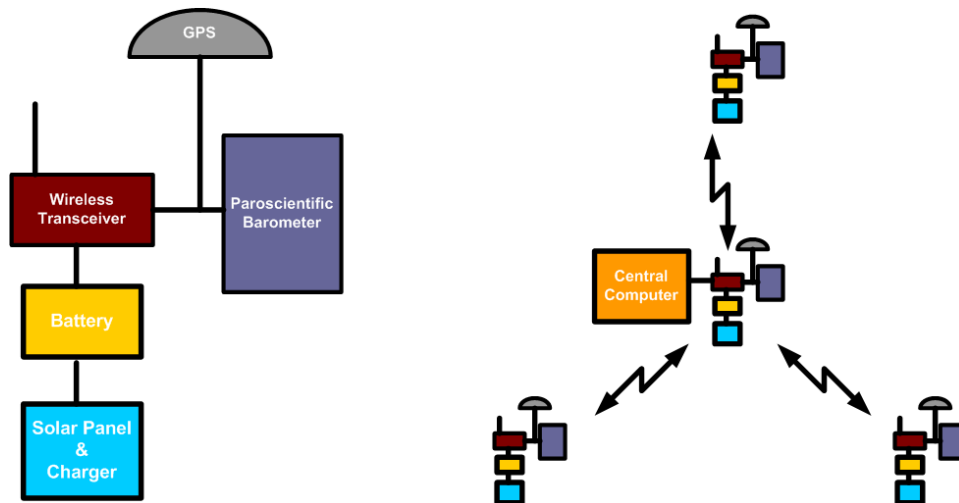
The Center for Collaborative Adaptive Sensing of the Atmosphere has developed an infrasound array that will be part of a tornado early-warning system in its Oklahoma radar test bed. At present, the sensor nodes in the array are connected via cables to the data logger of the array. This limits our flexibility in deployment and increases the effort of installing and maintaining such arrays. We are in the progress of designing a “wireless” alternative where the sensor nodes and the data logger communicate over IEEE 802.11.

This project is interdisciplinary due to the aspect that electrical engineers, meteorologists, social scientists, and computer scientists collaborate in CASA. It requires a certain level of understanding of meteorology and infrasound. In addition, it is important to understand how information generated by an infrasound array will impact the warning process for severe weather.

**Brief description of what the student will be doing:**

The goal of the REU project is to design and implement a wireless sensor node that will communicate wirelessly with the data logger as indicated in the figure below.

The student’s tasks will be to outfit a pressure sensor with 802.11 interface, battery and solar panel, and test its functionality in combination with the data logger.



Is this a CASA-related project? Yes ☒ No ☐

Preferred background of student (major(s), class, GPA, pre-requisites, etc.):

ECE major who has experience in building hardware.

Did you mentor a student last summer in the College REU Program?

Yes ☒ No ☐

If yes, please describe the outcomes for that student (i.e. Honor's thesis, conference presentations, manuscripts, papers, etc. Describe accomplishments to date as well as plans for the spring semester if the work has continued):

CASA had 3 students working for us during summer 2010 on our infrasound project: Alex Mendes, Brian McCarthy, and Bettina Benito-Figueroa. I believe Alex and Bettina were REU funded. Brian, I think, had NASA funding.

- Did the students themselves present at a conference?

NO.

- Did a publication result?

YES.

D. Pepyne, M. Zink, E. Knapp, A. Mendes, B. McCarthy, S. Klaiber, and B. Benito-Figueroa, 2011. An Integrated Radar-Infrasound Network for Meteorological Infrasound Detection and Analysis. To appear, 91st Annual Annual Meeting of the American Meteorological Society, 23-27 January 2011, Seattle, WA.

- Are the students still working with us?

NO.