RESEARCH ON ENERGY HARVESTING AND WIRELESS SENSOR NETWORKS  
  
PROPOSAL FOR UTILIZATION OF THE JOINT BASE LEWIS-MCCHORD (JBLM) FACILITIES

WHO WE ARE

We are group of faculty and students from the University of Washington (most from the Tacoma campus) interested in the study of Energy Harvesting from trees and its eventual use to power wireless sensor networks (WSN). The main objective of the research is to use the WSN technology to monitoring air pollution and other environmental issues.  
  
WHAT ARE OUR CREDENTIALS  
  
We have already developed experiments with both Energy Harvesting and WSN applications to the environment. We have published several articles in international journals and have presented our research work in international conferences. We work in collaboration with partners at the University of Azores (Portugal) and the University of Paraiba (Brazil).  
  
WHAT DO WE NEED  
  
We need a secure access to a number of trees of different sizes and species and located with different solar orientations in order to establish the relation between those variables and the amount of energy that can be extracted from them. That requires the use of nails of different sizes that will be attached to thermo-electric generators (TEGs) and to electronic circuits that will process and store that energy. In a subsequent stage, we would like to use that energy to power up a sensor network system consisting of two or more nodes at the frequencies of 900 MHz and 2.4 GHz. In other words, we hope to have “trees talking to other trees”, using their own energy. The sensors will measure factors like particulate density, carbon monoxide and dioxide, humidity, temperature, etc.  
  
WHO WILL NEED TO BE THERE

Currently we have involved in the project two UW Tacoma faculty members, seven undergrad students from Tacoma and one from Seattle, and one or two PhD students from UW Seattle. Those group members would need to be granted access to the facilities, but not more than 3 or 4 persons per activity, or as determined by the JBLM authorities.  
  
  
  
  
WHAT WE ENVISION FOR THE FUTURE  
  
We hope that the outcomes of this research work will be of interest to the environmental groups and initiatives inside the Base. Ideally, we envisage a potential cooperation with their efforts and the participation of the JBLM personnel in the activities described above. Our current work does not seek any kind of commercialization of financial profit, so we will share our results and accomplishments with them. In summary, we hope that the JBLM personnel will an important part of our future efforts.

HOW WE WILL HANDLE THE RESULTS

As part of the academia, we wish to present our results in international conferences and eventually publish them in peer-reviewed journals, as well as release information to the media in order to draw the public attention for the environmental issues. In doing so, we will only disclose information that is vetted by the JBLM, such as locations, pictures, etc.

WHEN

We are looking to start as soon as possible to maximize the both the weather and the continuity of students working on the project. Projections encompass three phases; Temperature Data Phase, Design & Test Phase, Data Organization & Publication.

Temperature Data Phase: Est. 5/1/2019

Week 1: Construction and configuration of temperature sensors.

Week 2-3: Installation of temperature sensors on JBLM.

Week 4: Data Collection from various species of trees.

Design & testing Phase: Est. 6/1/2019

Week 5: Revisions to WSN design based on week 4 data.

Week 6-7: Final construction and configuration of bespoke WSN.

Week 8-9: WSN Installation.

Week 10-11: Data collection & testing.

Week 12: Revise design and troubleshoot equipment.

Data Organization & Publication: Est. 8/1/2019

Week 13-16: Coalesce data for review and publication.

\*Timeline is subject to change