ECCS/PCAN/EAGER: Biologically Inspired Resource Harvesting in Mobile Wireless Networks - This research will provide techniques to harvest and manage two of the most important resources required by a wireless mobile device: energy and computing power.
ECCS/PCAN/EAGER: Biologically Inspired Resource Harvesting in Mobile Wireless Networks

We are currently investigating a control theoretic approach to address resource allocation and mobility prediction in wireless networks. In the previous progress reports, we have addressed the issues such as mobility prediction through a Hidden Markov Model and a control theoretic approach for resource allocation. The model is generic and the HMM can be replaced by other prediction models as desired. We investigated the performance of a Multilayer Perceptron Neural Network model. The Neural Network model is compared to the HMM for performance. The prediction accuracies are almost the same the in case of the HMM for single AP movement. However, in predicting the longer sequence lengths (next n movements of a mobile user), the HMM performs better than the Neural model. Also, the model coefficient convergence times were found to be longer for the Neural Network model.

In order to test the performance of our proposed computational model, we have implemented ABC's 'System Architecture', 'Tag Structure' as well as 'Ant Agents' in the popular network simulator, ns-2. To prove that many distributed applications can be written using Ant Agents, we implemented a simple user application belonging to the Bag-of-Tasks (BoT) paradigm. There are three reasons for choosing an application confirming to this paradigm. First, many...
applications that fit this paradigm are highly computationally intensive and thus can benefit from cooperation from other devices in wireless ad-hoc networks. Second, an application following these paradigms can easily be divided into large number of coarse-grain tasks. Third, these tasks are highly asynchronous and self-contained and there is limited communication amongst the tasks. These three properties make the chosen paradigm suitable for execution in a networked environment.
**Report Information**

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**Infrastructure Contact**

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**Primary Place of Performance**

- **Address 1**: 200 Broun Hall
- **Address 2**: Auburn University
- **Country Code**: US
- **State**: AL
- **ZIP Code + 4**: 36849 - 5201
- **Congressional District**: 03

**Recipient Highly Compensated Officers**

- **Prime Recipient Indication of Reporting Applicability**: No
- **Officer 1 Name**: Officer 3 Name
- **Officer 1 Compensation**: Officer 3 Compensation
- **Officer 2 Name**: Officer 4 Name
- **Officer 2 Compensation**: Officer 4 Compensation
- **Officer 3 Name**: Officer 5 Name
- **Officer 3 Compensation**: Officer 5 Compensation

**Report Audit Trail**

- **Created By**: Cindy Selman
- **Date Created**: 10/06/2010 04:55 PM
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- **Last Updated On**: 10/06/2010 05:11 PM