TITLE: **INTELLIGENT CONTROL VIA WIRELESS SENSOR NETWORKS FOR ADVANCED COAL COMBUSTION SYSTEMS**

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ABSTRACT

PROJECT OBJECTIVES

The specific objectives are:

- To develop a rough lower order dynamical system model for the co-generation coal power plant and/or parts thereof such as the gasifier, combustor and/or hot-gas cleaning devices.
- Develop an intelligent control algorithm for control of the processes involved.
- Develop the basis for wireless network approach for the intelligent control of the power plants and/or the associated equipment.
- Perform computer simulation of the equipment and develop interfaces between the dynamical system and the CFD simulation.

ACCOMPLISHMENTS TO DATE

The accomplishments are:

i. Demonstration of nonlinear system identification for a simple test model
ii. Illustration of excitation signal dependence of identified system model
iii. Demonstration of better dynamic performance in closed-loop with multiple control inputs as opposed to a single input
iv. Reliable Transport protocols for wireless sensor and actor network

SIGNIFICANCE TO FOSSIL ENERGY PROGRAM

Developing effective cogeneration of electric power and synthetic fuel is a major goal of the "FutureGen Initiative." While a number of advanced concepts have been developed and are being tested, there is a definite need for intelligent control of these rather complex devices. In particular, achieving near zero emission requires a detailed integration of various components of the power plant.

FUTURE WORK

We intend to perform the following activities

$ Demonstration of nonlinear system identification using cold flow CFB data
$ Design and Simulation of multi-input closed-loop controllers
$ Planning for Experimental verification of multi-input control
$ Testing the energy consumption and latency in the wireless network

PAPERS PUBLISHED/CONFERENCE PUBLICATIONS/AWARDS RECEIVED/STUDENTS SUPPORTED

Journals Articles (peer reviewed)

Mazaheri, A.R., and Ahmadi, G., Particle Transport and Deposition Analysis in a Demonstration-Scale Hot-Gas Filter Vessel with Alternate Designs, Advanced Powder Technology, (Submitted To).

Students

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