Proposal Details

Kebreab Ghebremichael

Proposal Title: Event Based Scheduling Optimization for Building Air Handlers

Principal Investigator:

First Name: Richard **Last Name:** Meana

Phone : 864-431-10 **Email:** rmeana@mail.usf.edu

Co-Investigator 1:

First Name: Srinivas **Last Name:** Katkoori

Phone : 974-5737 **Email:** katkoori@mail.usf.edu

Co-Investigator 2:

First Name: **Last Name:**

Phone : **Email:**

Co-Investigator 3:

First Name: **Last Name:**

Phone : **Email:**

Organization: department of Computer Sience and Engineering

Description:

A large portion of the power usage for the buildings on USF campus is consumed by the environmental systems to maintain temperature and humidity. One of the currently used methods to save money in this area is (a) to either allow the temperature to "float," rising above the normal by 5-10 degrees, (b) or to close the fresh air dampers, so that the system is only having to maintain the temperature of the recirculated air. Either of these methods rely on the idea that the system load can be reduced when the spaces are unoccupied. While the campus systems are currently scheduled, where possible, to take advantage of these savings, dynamic reservation schedules make it too costly to manually change the air handler schedules. We propose that a system of interface software be developed to automatically and dynamically set the schedules of air handlers based on the space schedule information available from R25 Database. For this project, three major components need to be designed and implemented. 1. An R25 Interface that can pull relevant data from the Space scheduling database at regular intervals. This software will make use of either the standard web information, or if available a direct interface to the R25 database. 2. A database with stored procedures that will maintain the correctness of the data and pulled from R25, as well as maintaining a history for the spaces managed by the system. 3. An application that will

Commented [GK1]: Student

provide an interface between our scheduling database and the existing Bacnet system to control the environmental systems on campus. These components will each be developed and written concurrently by research assistants and managed by Dr. Srinivas Katkoori of the Computer science and Engineering department over the course of two semesters. We have approached USF Physical Plant, and with the information they provided we estimate that the average air handler uses $170 in utilities annually for every hour that it runs during a week. From the schedules provided online from space scheduling we believe that we can reliably cut a minimum of one hour per day from the air handlers' active schedules allowing us to save $850 annually per air handler. While some systems have mixed use (offices and labs as well as classrooms), by targeting the large auditoriums on campus, such as ENA, ULH, or the CPR Auditorium, we can initially apply this system to at least 5 air handlers, giving an initial annual savings projection of $4,25. Based on this project, other air handlers could be dynamically scheduled at a later date to provide additional savings with virtually no additional cost. For the pilot study, we have approached Tom Gage, Facilities Manager for the College of Engineering, who has authorized using ENA for initial testing. Once completed, the work will be presented at the USF Research Day, as well as in an article submitted to the oracle for publication.

Commented [GK2]: Is this supported by practices that are already installed somewhere else?

Commented [GK3]: IS this figure correct?

Amount Requested:

$28,306.00

Budget Justification:

Budget Justification(1,000 words) 1 RA full time positions for 3 semesters: $18,306 5 Air damper Repair or replace cost: $10,000 Total: $28,306 To complete the project in a timely manner each major component of the system will be by a research assistant. Dr. Katkoori will supervise the projects development and testing over three semesters. After talking with Toufic Moumne from Facilities Enhancement, it was decided to include the cost of repairing the dampers that control the flow of outside air into the system, as some of the dampers are currently nonfunctional.

Commented [GK4]: Why don't you use existing commercial software?

Resource Matching:

Dr. Katkoori's lab will be providing PC's for the software development, as well as the Development Environment software. The total cost for these materials if purchased would be $3960.

Timeline & Milestones:

Project start: january 1, 2013. The following are the milestones: M1: March 15, 2013 - Bacnet software can signal controller to turn on/off a test light M2: May 1, 2013 - R25 software can pull individual schedules from database M3: June 15, 2013 - Database software can manage conversion from R25 data M4: Aug. 1, 2013 - R25 Software updates all room schedules listed in database M5: Oct. 15, 2013 - Bacnet software can push updates to test air handler controller Completion: Dec. 31, 2013- Software package receives final checkout by testing against one months data from space scheduling

Evaluation

Once the software is functional(October 15, 2013), the system can be used

Metrics:	to write test schedules for air handlers for one month. By comparing these schedules to the ones already in place for the air handler, we can show the effective savings by reducing load on the environmental systems.
Plan for Sustainability:	After completion of the project all software and documentation will be turned over to the Physical Plant for implementation as they see fit. Other than maintaining the air handlers, no other requirements are needed to maintain this system. As other spaces are equipped for this software, they can be added at the Physical Plant's discretion with minimal effort.
Annual Energy Savings:	38,550 kWh
Annual Cost Savings:	$4,240.50
Return of Investment in %:	0.15
Greenhouse Gas Emission (per EPA)	0.00
Upload File:	Event_ID6_SGEF.pdf

Commented [GK5]: What is the opinion of physical plant on this?

Added By	**Vote**
Stanley M. Kroh	Yes
Margaret Rush	MayBe
Barbara S. Donerly	Yes
Thomas R. P. Snelling Thomas.Snelling@ci.tampa.fl.us	MayBe
Garrick Aden-Buie	Yes
James Buckingham	Yes

Added By	**Comments**
Margaret Rush	I think control systems for Air Handlers are important. I think it sounds like you are creating your own software, it there not software already around that can work for this purpose? I would just be careful about how much of the funding is used for projects that already have available systems out there. Then again, maybe you can create something better.
Jochen Eckart	Like this idea. It should include the option to be combined with the urban metabolism model for the USF Campus currently in development.
Garrick Aden-Buie	I like this project. I wonder what the cost would be for physical plant to implement the proposed software in areas of the campus not included in the proposal. While I share the concern about the proposed software duplicating commercially available software, I am more concerned with the apparent lack of a long-term commitment by physical plant to maintain or further implement the software. Also, I think that the software should

	include some capability to track and record both the usage of the rooms as well as the energy use and profile of the controlled HVAC units.