Restricted Room Access

The Engineering Centre for Experiential Learning (ExCEL) is a proposed engineering student centre that will act as a living lab of sustainability. Its main goal is to increase the experiential learning of McMaster engineering students. One of the ways this will be accomplished is by supporting the various engineering clubs and teams by giving them a machine shop, office space and storage space. To ensure the safety of the students and their belongings, certain areas of the building are required to have restricted access.

Your task is to design a system that will restrict access to a room so only authorized individuals can access it. The system must cost less than $1500/door and be easy to implement on a large scale.

Authorizing and revoking access to a specific room should be easy and intuitive for a building administrator. The demonstration of the design can be on a small scale but there must be an implementation plan to scale up the project to meet the needs of the building. The costs and equipment needed for the full building should be outlined, along with the implementation plan for scaling up your system. You should be able to demonstrate how access to a specific room is given to certain individuals and how it is revoked. The authorization system should be tied in to a student's MacID or student number.

Occupant Tracking and Load Matching

The Engineering Centre for Experiential Learning (ExCEL) is a proposed engineering student centre that will also act as a living lab of sustainability. Its main goal is to increase the experiential learning of McMaster engineering students. This building gives students the opportunity to learn engineering fundamentals from the sustainable technologies. This is will be accomplished by allowing the students to interact with the demonstrated technologies in a variety of ways.

One of the ways the building is proposed to increase experiential learning is by doing a full energy balance of the building through the use of an extensive sensor array. One of the more difficult variables to measure is the heat energy delivered to the building by the building occupants. Your task is to design an unobtrusive system that can track the number of occupants in the ExCEL building. Using the information on the number of occupants, you may estimate the amount of thermal energy that is being given to the building.

There must be a plan to scale up your system for an entire building. Outline the costs of any equipment needed. Outline how your system will effectively track the number of building occupants and how you will effectively use this information to estimate the added load. The system can be general for the entire building or granular for individual areas. Demonstrate why one system was chosen over the other.

Energy Display System

The Engineering Centre for Experiential Learning (ExCEL) is a proposed engineering student centre that will also act as a living lab of sustainability. Its main goal is to increase the experiential learning of McMaster engineering students. This building gives students the opportunity to learn engineering fundamentals from the sustainable technologies. This is will be accomplished by allowing the students to interact with the demonstrated technologies in a variety of ways.

One of the ways that is proposed for the building to increase knowledge of sustainable technologies is to collect and display the energy load data of the building as whole and for specific building systems. Your task is to create a system that will display the data in real-time to the building occupants.

The display should be cost effective and energy efficient. The information displayed should make meaningful comparisons to increase comprehension. Student should be able to draw on historical data to see the past performance of the building.