Sustainability and reducing energy consumption are targets for building operations. The installation of smart sensors and Building Automation Systems (BAS) makes it possible to study facility operations under different circumstances. These technologies generate large amounts of data. That data can be scrapped and used for the analysis. In this thesis, we focus on the process of data-driven modeling and decision making from scraping the data to simulate the building and optimizing the operation. The City of Orlando has similar goals of sustainability and reduction of energy consumption so, they provided us access to their BAS for the data and study the operation of its facilities. The data scraped from the City serves can be used to develop statistical/machine learning methods for decision making. We selected a mid-size pilot building to apply these techniques. The process begins with the collection of data from BAS. An Application Programming Interface (API) is developed to login to the servers and scrape data for all data points and store it on the local machine. Then data is cleaned to analyze and model. The dataset contains various data points ranging from indoor and outdoor temperature to fan speed inside the Air Handling Unit (AHU) which are operated by Variable Frequency Drive (VFD). This whole dataset is a time series and is handled accordingly. The cleaned dataset is analyzed to find different patterns and investigate relations between different data points. The analysis helps us in choosing parameters for models that are developed in the next step. Different statistical models are developed to simulate building and equipment behavior. Finally, the models along with the data are used to optimize the building model with the equipment constraints to make decisions for building operation which leads to a reduction in fan speed while maintaining temperature and pressure inside the building.

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The public is welcome to attend.