Bridging Facilities Operations with Maintenance to Improve Understanding of Building System Behaviors

Graduate Student: Varun Kumaraswamy, PhD Candidate, CEE, CMU
Academic Advisors: Semiha Ergan, Burcu Akinci

Problem Statement

• Poorly maintained and improperly controlled equipment result in 15-30% of energy waste in buildings
• Interdependencies between operation and maintenance is not clearly known in current practice
• Historical knowledge of work orders and building automation system alarm information not used for possible improvements in operations and maintenance

Research Vision

• Poorly maintained and improperly controlled equipment result in 15-30% of energy waste in buildings
• Interdependencies between operation and maintenance is not clearly known in current practice
• Historical knowledge of work orders and building automation system alarm information not used for possible improvements in operations and maintenance

Research Method

• BAS Data
• Work Orders
• BIM

• BAS
• Zone High Temp
• AHU Fail
• Pump Fail
• Ignored Alarm
• WO Started

• Automatically Initiate Preventive Maintenance WOs
• Sensor Problem Identification
• Suggest BAS improvement in spaces for better operational performance

Expected Contributions

• Framework to enable integrated analysis of BAS and WO data with temporal dimensions
• Lead to better insights from the different data sources about real behaviors of building systems over time in relation to their spatial setting.
• Fewer redundant maintenance problems and waste due to such redundant work will be experienced
• Eliminate waste due to unidentified problems in building systems