An Overview of Root Cause Analysis of Faults in Heating, Ventilation, and Air Conditioning (HVAC) Systems

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ABSTRACT

In recent years, automated fault detection and diagnosis (FDD) has been investigated as a possible solution to the energy waste problem from faulty and inefficient Heating, Ventilation, and Air Conditioning (HVAC) systems. During the operation of HVAC systems, a fault in a component is often detected when building occupants feel the effects of its downstream symptoms. Although current FDD methods can identify the presence of anomalous conditions, they provide little insight into how we can address the fault. Root cause analysis (RCA) is a complex diagnosis task that identifies a set of cause-fault-symptom chains and advises corrective actions that a system manager can employ to eliminate the fault and its symptoms. In this paper, we will explore the challenges of autonomous RCA of hardware faults specifically in the Air Handling Unit (AHU) with Variable Air Volume (VAV) terminals and recommend potential ways to support various challenges associated with autonomizing RCA.