

From Fault Detection and Diagnostics to Automated Fault Correction and Control Optimization

Motivation

We have developed solutions to automatically resolve the most common, impactful building control faults. This new technology capability is applicable to smaller buildings with packaged HVAC systems, as well as large buildings with built-up systems

1. Can automated correction algorithms be successfully implemented in modern FDD tools and field tested in real buildings?
2. Are the enhanced FDD solutions able to correct faults in real buildings without adverse operational effects?
3. What are the benefits, adoption drivers, and scalability challenges of fault auto-correction capability?

Self-Correcting Capabilities

- Optimized economizer high lockout temperature setpoint
- Correction of incorrectly programmed HVAC schedules
- Release of unnecessary control overrides
- Correction of biased temperature sensors
- Automated loop tuning
- Implementation of best practice reset strategies
- Mitigation of rogue zones
- Optimized zone temperature setpoint setback

Partner Engagement

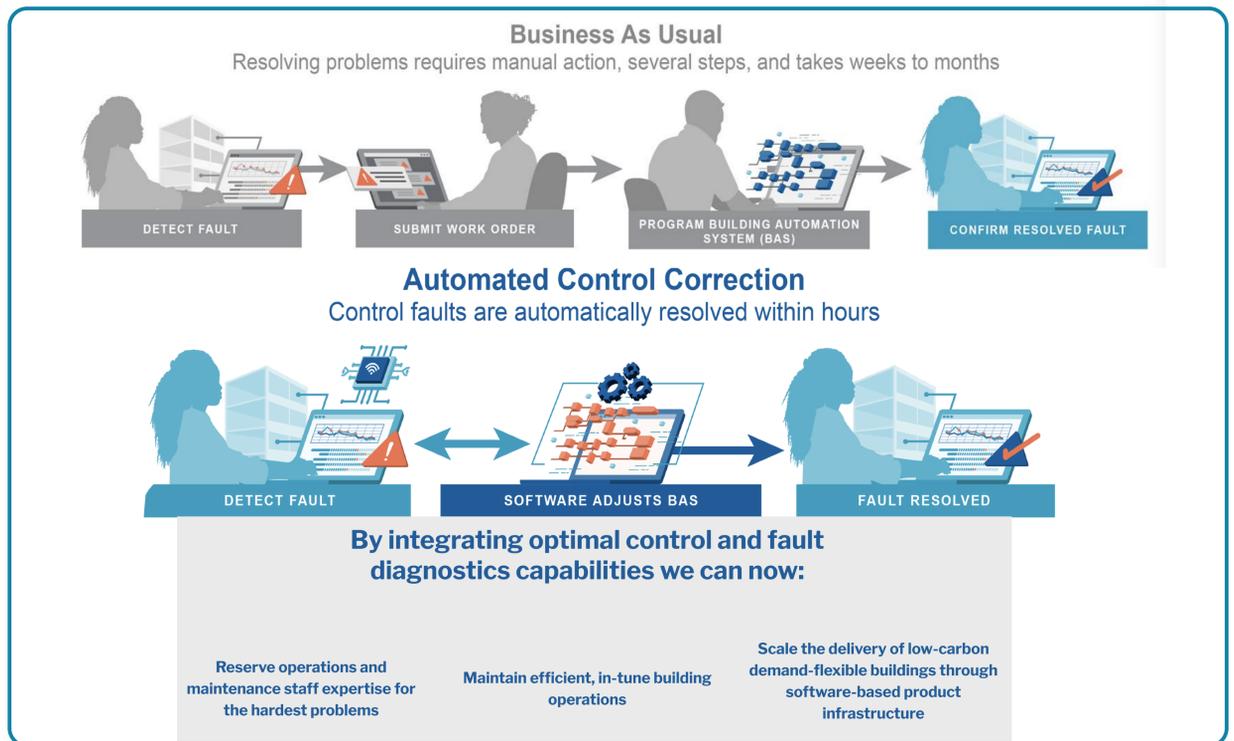


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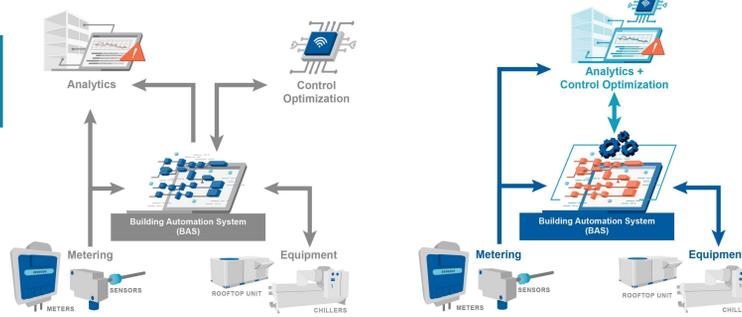


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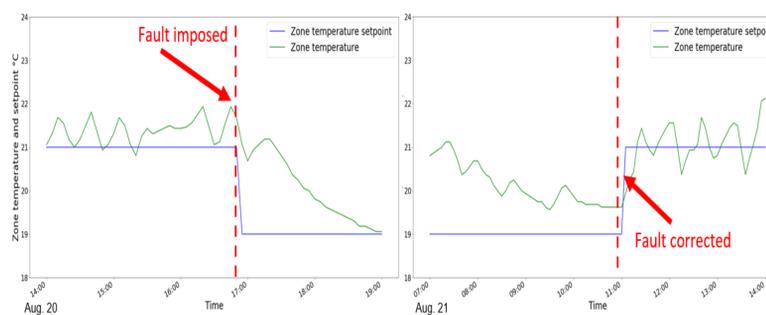
Updated FDD-BAS Architecture and Integrated Fault Correction Algorithms

- Development of secure 2-way communication between the FDD tool and the BAS
- Translate the research-grade algorithms generated by the research team into platform-specific fault correction algorithms

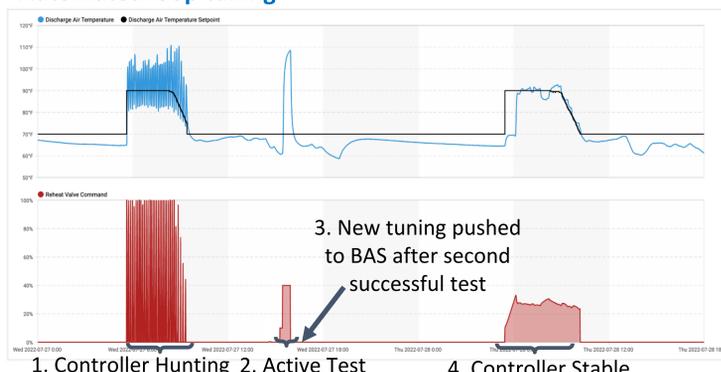


Correction & Optimization Effectiveness

Improve zone temperature setpoint setback



Automated loop tuning



Field Test

- High scalability to deploy in various BASs



Dissemination

<https://transformingbuildingcontrols.lbl.gov/>



Advancing Market Solutions for Self-Correcting, Optimized Controls

Leapfrogging the status quo, the U.S. Department of Energy and Berkeley Lab have joined forces with the smart buildings industry to deliver the first ever technology to automatically find and correct control problems.



Building controls are notoriously error-prone

Equipment faults and control problems drive up greenhouse gas emissions and energy bills - to the tune of \$17 billion and 90 million metric tons of CO2 equivalent annually. These problems compromise occupant comfort and productivity, as well as equipment life, and make it difficult to coordinate building power use with a clean energy grid.

Analytics technologies are now even more powerful

Building fault detection and diagnostics technologies are already saving owners millions of dollars per year in their buildings, with less than two-year paybacks. In partnership with Berkeley Lab researchers, Clockworks Analytics and CopperTree Analytics have integrated optimal control capabilities into their fault detection solutions. Berkeley Lab will continue to support this effort.

