



Battery Operated Radiator Controller (BORC)

Technology, pilot studies, results, innovation, and impact

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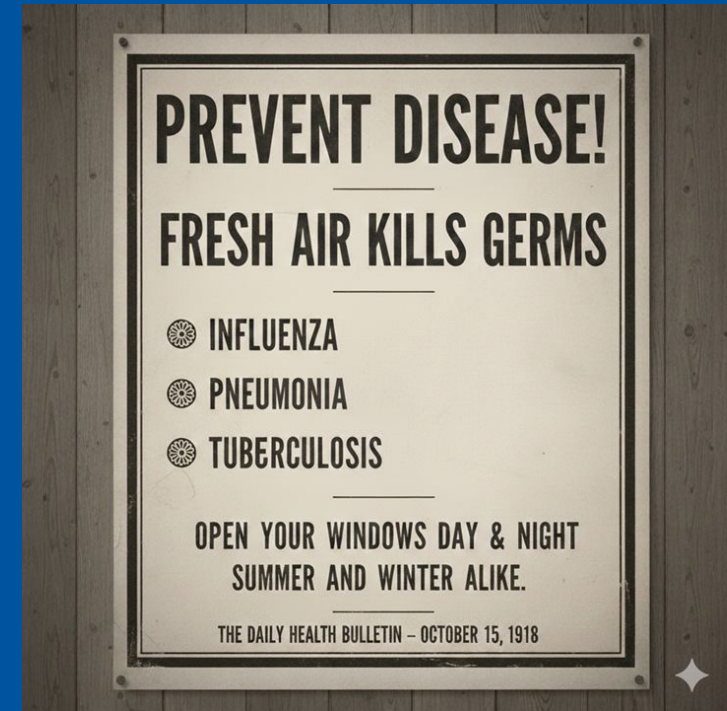


The problem

The problem



... was once the solution





Technology overview and design

1 Comfort and efficiency

- Onboard temperature sensor for stable space temps
- Prevents overheating/under heating
- Self-calibrates to match valve type

2 Easy retrofit

- Direct TRV replacement – no major system changes
- Battery lasts entire heating season
- Simplified modern interface

3 Smart and connected

- Operates independently (no internet) or via secure gateway
- Remote temp control, scheduling, and setback features
- Low-power IoT with long-range radio (up to 1,500 ft.)

4 Scalable integration

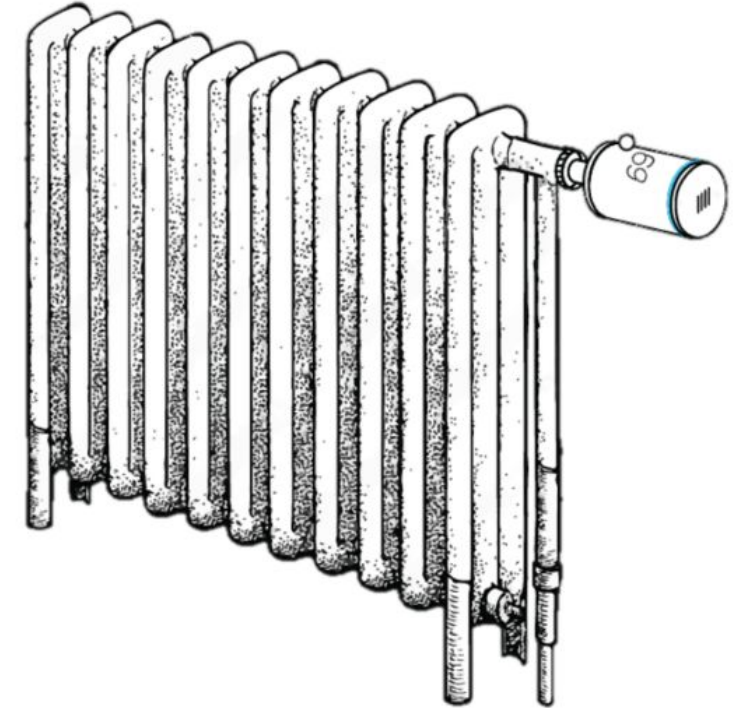
- Connect to building automation systems
- Modernizes legacy radiators across single or multiple buildings



Gen I



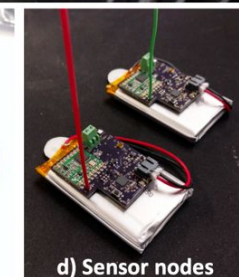
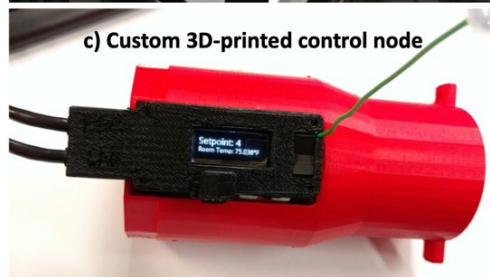
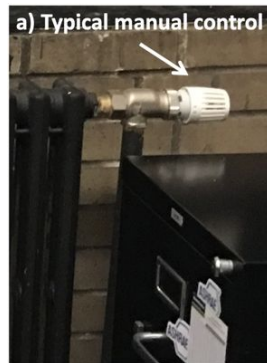
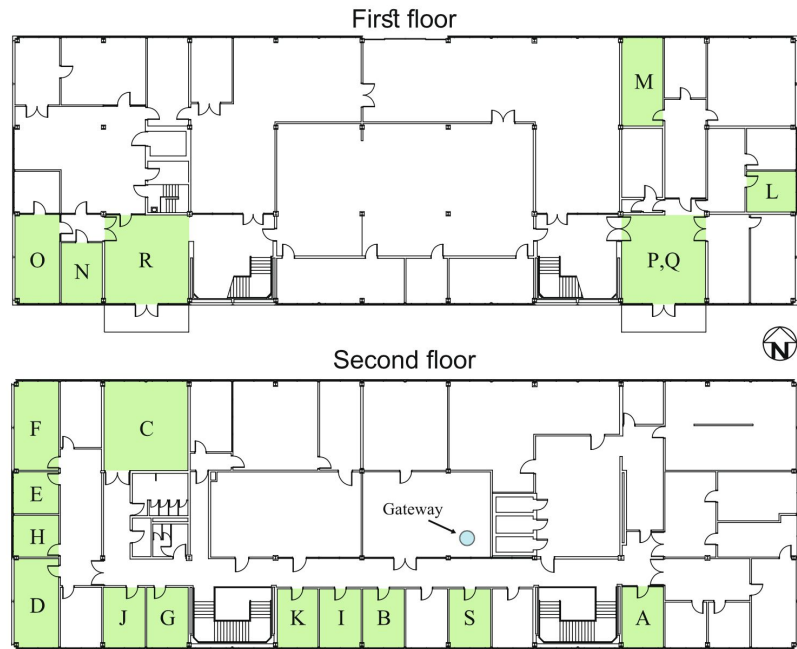
Gen II





Research project and pilots

2019-2020 Illinois Tech campus building: in 17 rooms and around 95+ nodes in total



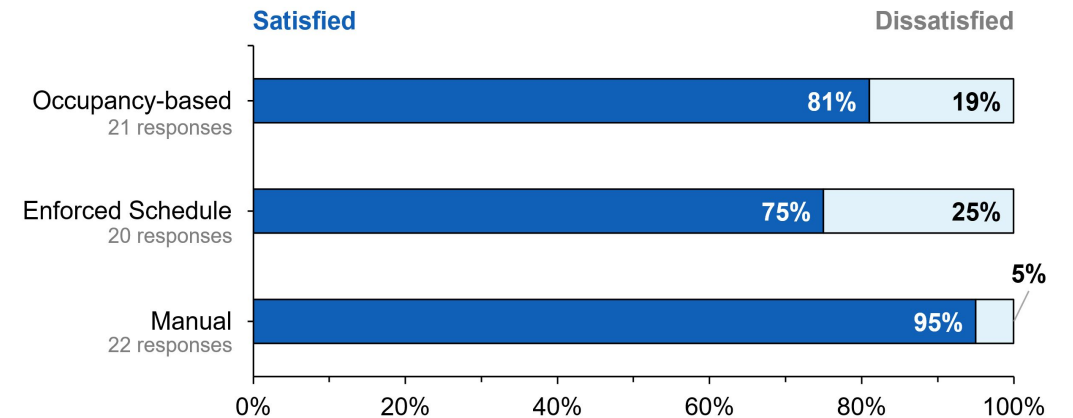
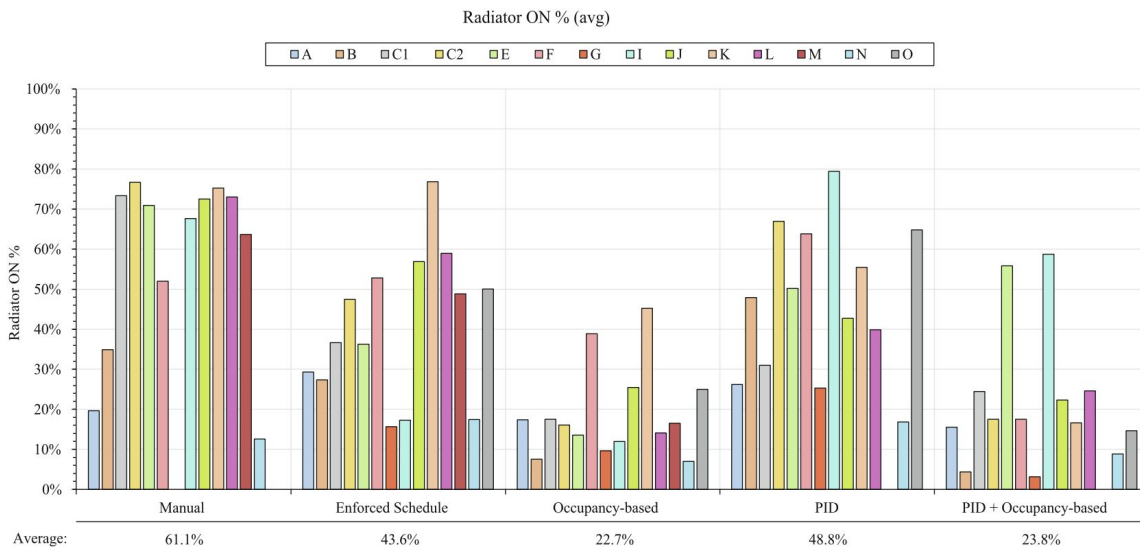
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A Manual	A				A			A													
B Enforced Schedule		B	B				B														
C Occupancy-based				C		C			C												
D PID										D		D		D							
E PID + Occupancy											E			E	E						
Date	1/14/2019	1/21/2019	1/28/2019	2/4/2019	2/11/2019	2/18/2019	2/25/2019	3/4/2019	3/11/2019	3/18/2019	1/27/2020	2/3/2020	2/10/2020	2/17/2020	2/24/2020	3/2/2020	3/9/2020		
	9-week experiment start									9-week experiment end											
	2019									2020											
										6-week experiment start						6-week experiment end					



Illinois Tech campus pilot results

✓ Around **63% savings** (in radiator usage)

✓ **75%-95% satisfied** with the control strategies





Commercialization pilot

Goal is to validate BORC's commercial and manufacturing viability while quantifying energy savings and user experience to inform the design of future energy efficiency programs and rebate structures.

Installation and measurement currently in progress:

- School facility: 20–25 units (3 stories + basement)
- University building: 30–50 units (5 stories + basement)



Impact: addressing a massive legacy gap

The market need:

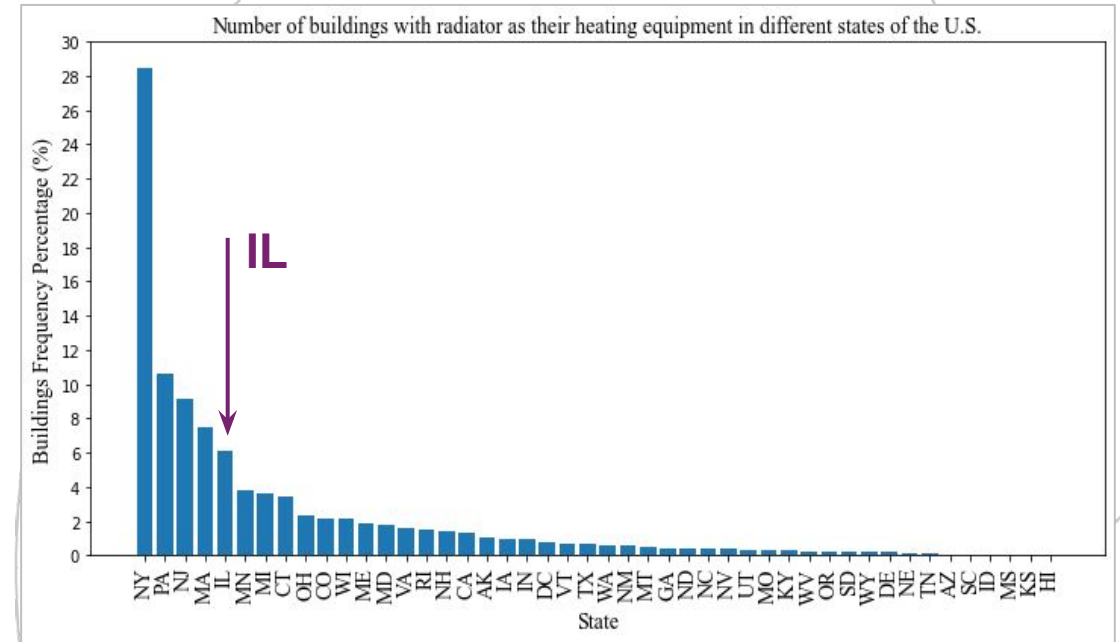
- ~9 million U.S. residential buildings rely on legacy radiator systems (**1/4 steam**) with virtually no modern, or affordable retrofit options
- Current commercial solutions are expensive, proprietary, and lack flexibility

The origin: local roots

- Developed at Illinois Tech in south side of Chicago, empowering over a dozen graduate and undergraduate students to solve real-world urban energy challenges

The legacy: from research to reality

- Successfully transitioned from an academic project to a student-led startup, **Radiator Revivers LLC**





Future potential and strategic next steps

Our vision is to get BORC into the hands of every customer who can benefit from it

Validate and results

- Complete 2025-2026 pilot; quantify energy/cost savings and payback period
- Capture non-energy benefits

Rebate strategy

- Develop and propose rebate structures for integration into the Peoples Gas and North Shore Gas Energy Efficiency Programs

Sector focus

- Prioritize affordable housing and educational facilities, lacking modern controls, and thermal comfort

Tech expansion

- Enable compatibility with single-pipe steam radiators and universal valve configurations



Questions?

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