Detecting Drafts: An Automated Solution to Energy Efficiency

Samuel, Tristan (School: Good Hope Country Day School)

Air conditioning is vital for maintaining comfortable indoor temperatures but comes at a significant environmental and financial cost. In the U.S., it accounts for 12% of household energy consumption, totaling $29 billion annually and producing over 100 million metric tons of CO2 emissions. In large institutions like schools, inefficiencies—such as running AC units while windows or doors are open—can waste substantial energy. These situations often go unnoticed, especially in buildings with many windows and a centralized AC system. To address this, my STEM fair project proposes an affordable solution: a Raspberry Pi-based device installed in each room that detects open windows and communicates with a locally hosted website. If a window remains open, the system can automatically shut off the AC, notify the operator via email, and log the event for administrative review. Built for just $50—significantly less than commercial alternatives—the prototype proved effective in reducing unnecessary energy use and preventing financial waste.

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