Identify the Problem

Electricity is being wasted due to students leaving lights and appliances around the boarding house when they go out. The people being affected by this are everyone who lives in the boarding house like the students and the landlord who is letting the students stay there. This is because the high usage of electricity can sky rocket the price of the electricity bill which can affect the living costs of the students and the landlord.

Research

The common cause for high electricity usage differentiates between classes, but here we will only focus on the Domestic sector. In the Domestic sector the most common causes for high electricity usage are air conditioning (Chen, 2017) refrigerators, fluorescent lamps, and flat-screen TVs (Sena et al., 2021; Chen, 2017). Recent research shows that it is possible to reduce the amount of power consumption a house has by using a microcontroller-based system that controls the standby energy consumption and lights in a home (Chioran & Valean, 2021).

Requirements

The solution for this issue must be able to meet these conditions. The conditions are:

- Affordability - This condition must be met for the prototype/solution to be available for students that are living off a budget.
- Easy to use -The prototype/solution given must be as simple as flicking a light switch for it to have no issues between the user and the prototype/solution.
- Effective - This condition is a must. The prototype/solution must be able to reduce the electricity consumption of the boarding house.

Possible Solutions

The possible solutions that I have thought of are:

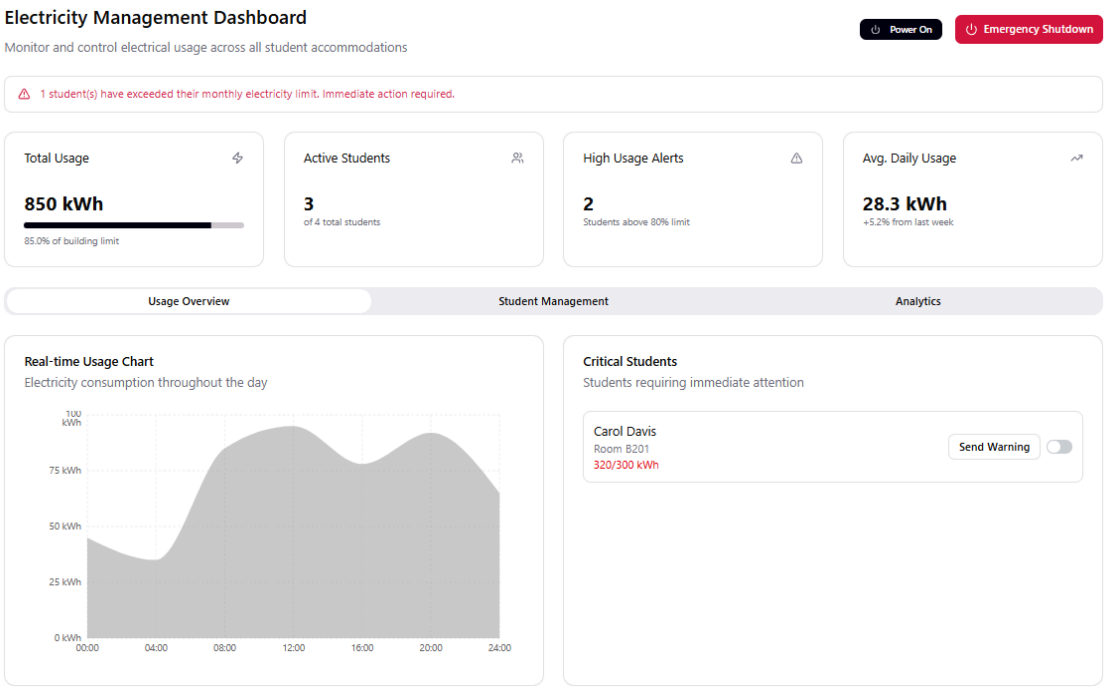
- A smart socket that turns the electrical current off if a confirmation message hasn't been received.
- A sensor that is placed at the entrance of each room in the boarding house that sends a message to the resident asking if they have turned the appliances off and tells the landlord which person is leaving.

- An application that allows the landlord to be able to monitor and turn off electricity that is being used haphazardly. This can also be used to send a warning to the student that notifies the student that they are using too much electricity.

Best possible solution

The solution I have chosen is the third solution as all it requires is a phone for the student to be able to receive notifications from the landlord that tells them they are currently using too much electricity. This allows an easy to use UI for the landlord, and a simple notification the student receives. This is also affordable as the student only needs to have a phone on hand which most students would have already. It is also effective as it shows a chart that shows how much electricity is being used and when it is being used.

Prototype Application design



Electricity Management Dashboard

Monitor and control electrical usage across all student accommodations

Power On | Emergency Shutdown

1 student(s) have exceeded their monthly electricity limit. Immediate action required.

Total Usage	Active Students	High Usage Alerts	Avg. Daily Usage
850 kWh	**3**	**2**	**28.3 kWh**
85.0% of building limit	of 4 total students	Students above 80% limit	+5.2% from last week

Usage Overview | Student Management | Analytics

Student Management

Monitor and control electricity usage for individual students

Search by name or room number...

Student	Room	Usage	Status	Warnings	Power	Actions
Alice Johnson	A101	285 kWh /300	Warning	2	On	Quick Warning | Custom
Bob Smith	A102	150 kWh /300	Normal	0	On	Quick Warning | Custom
Carol Davis	B201	320 kWh /300	Critical	3	Off	Quick Warning | Custom
David Wilson	B202	95 kWh /300	Normal	0	On	Quick Warning | Custom

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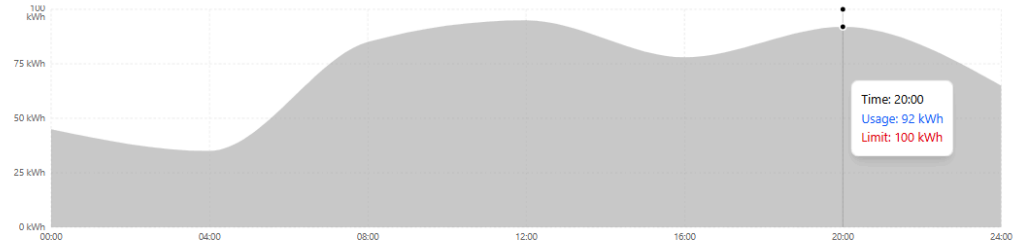
Usage Overview | Student Management | Analytics

Usage Analytics

Detailed consumption patterns and trends



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