

Smart Home Facing High Electricity Bill

**B.Tech (AIDS)
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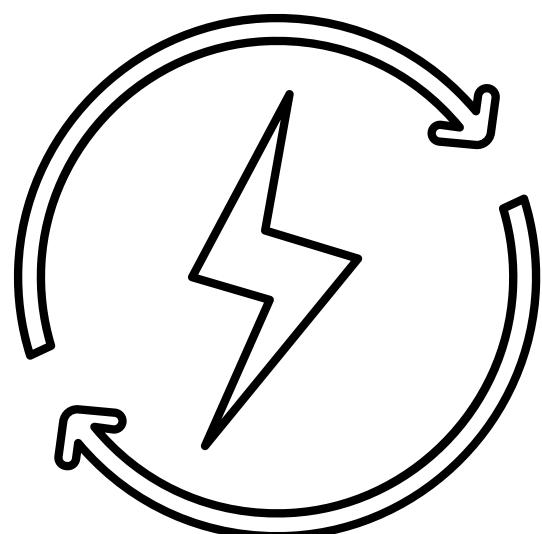
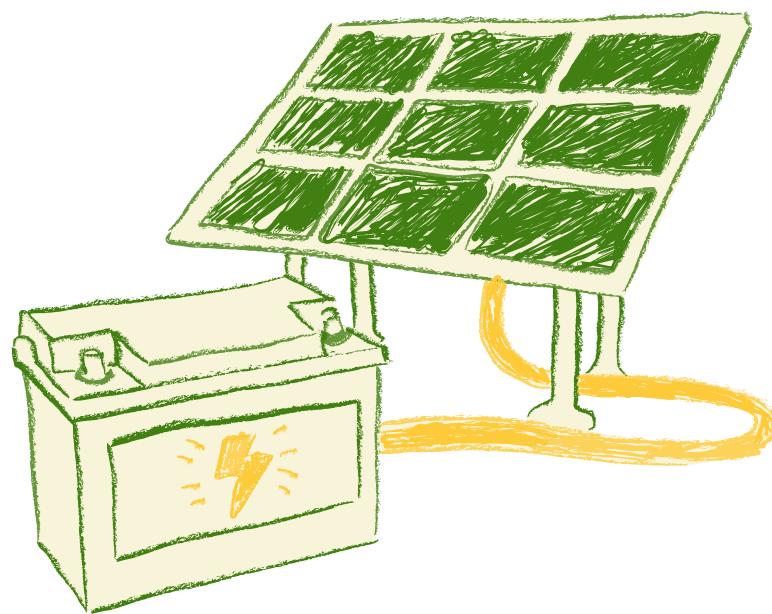
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Introduction

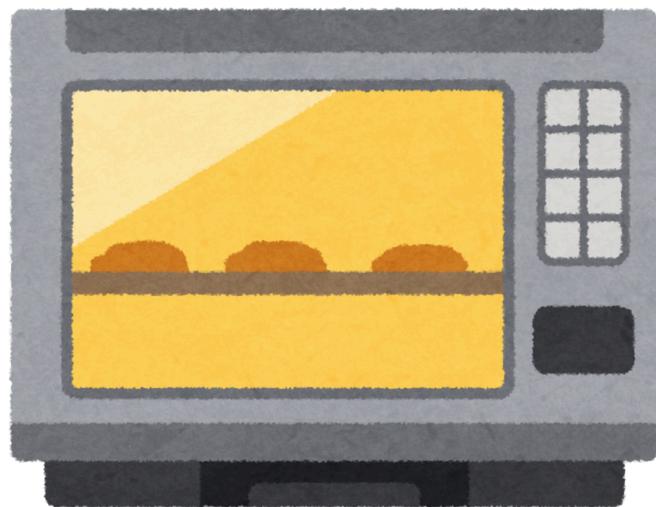
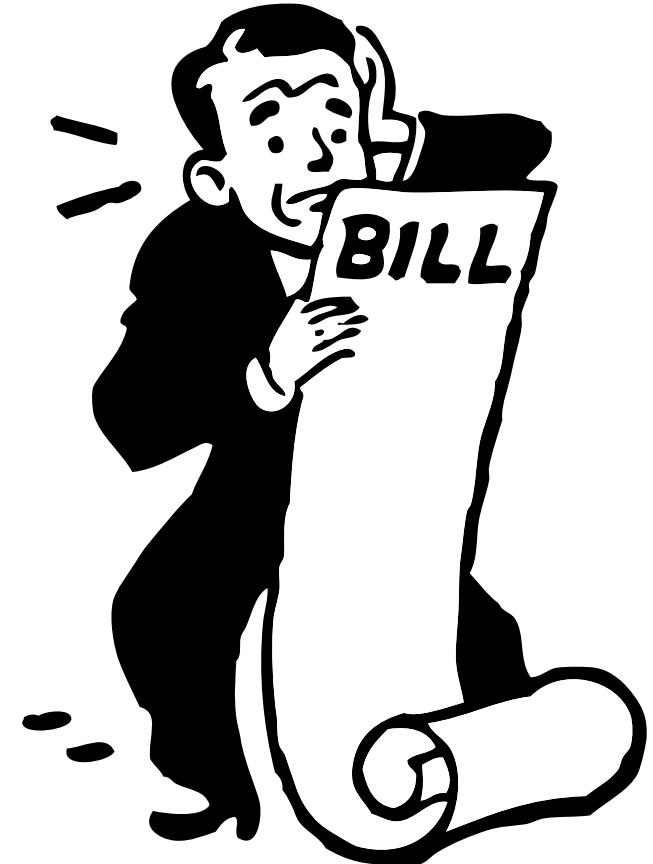
- Household electricity consumption is increasing rapidly.
- Electricity tariff varies across different time slots.
- Unplanned appliance usage increases peak-hour load and cost.
- Manual scheduling of appliances is inefficient and impractical.
- Smart scheduling can reduce electricity cost without affecting user comfort.





Objective of the Project

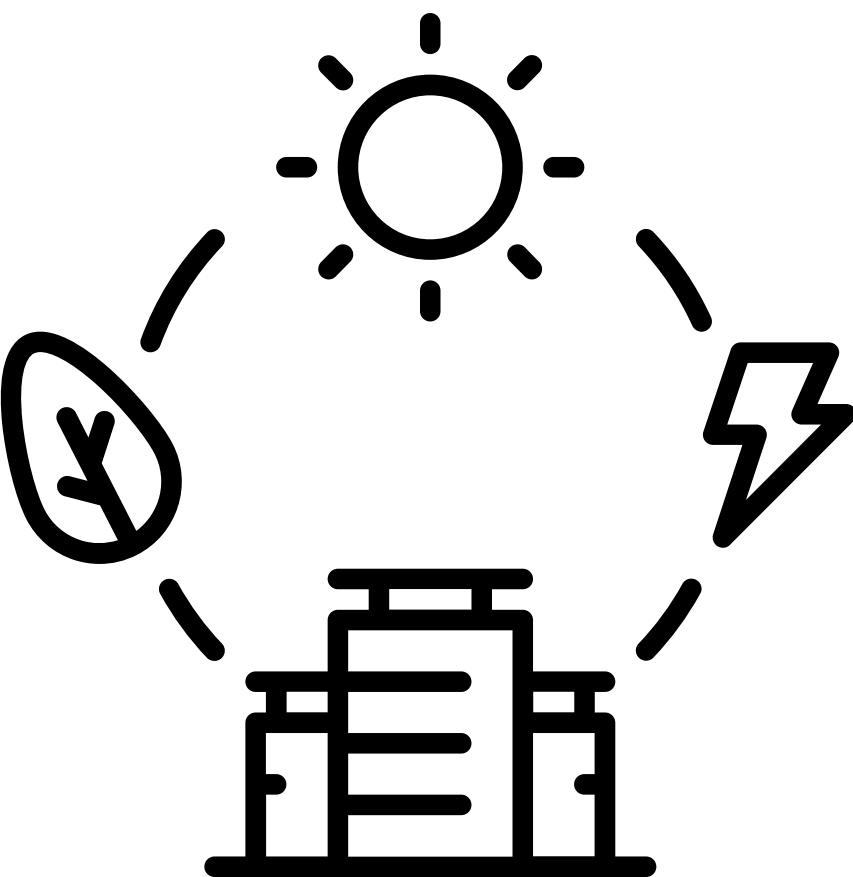
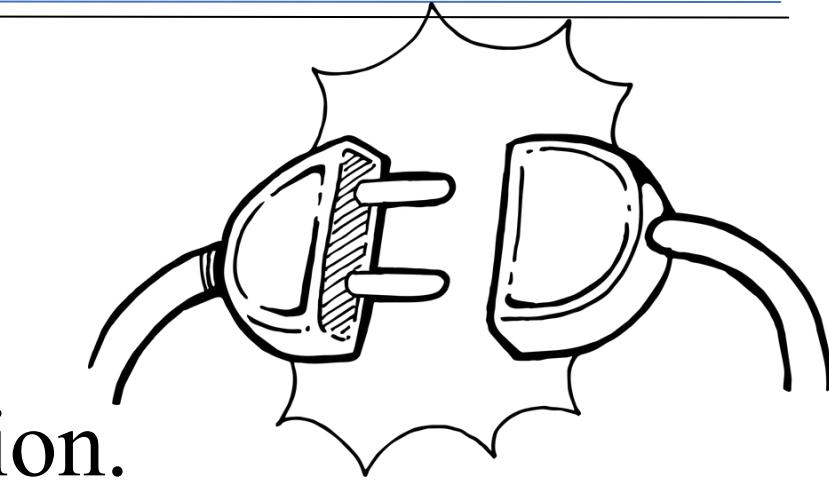
- To categorize household appliances based on usage behavior.
- To prioritize appliances using a Max Heap data structure.
- To assign appropriate time slots based on appliance category.
- To reduce overall electricity cost through optimized scheduling.
- To display the optimized schedule using a simple GUI.





Literature Review

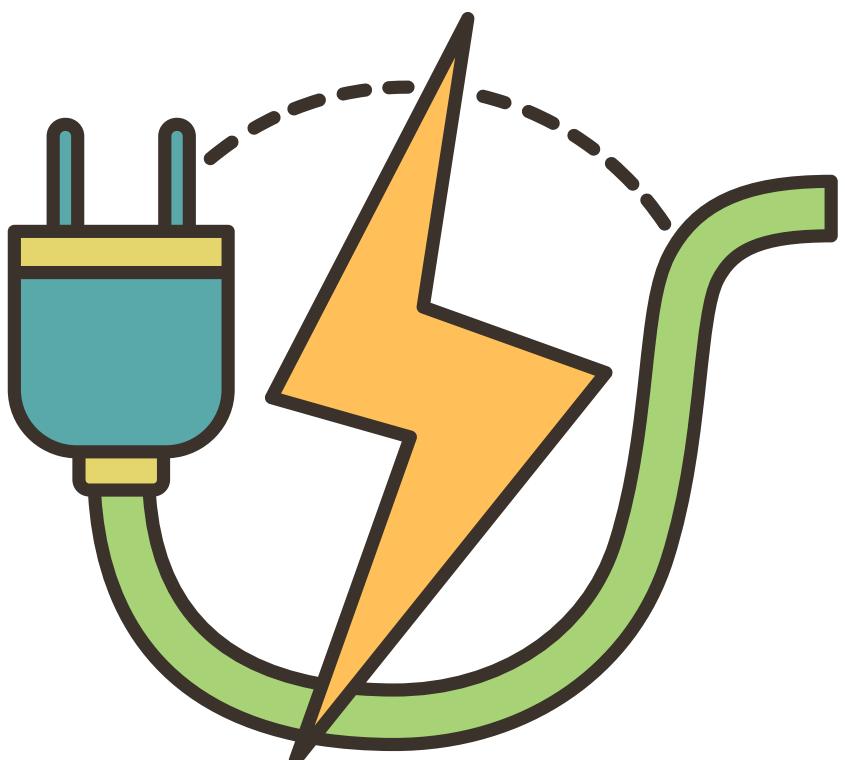
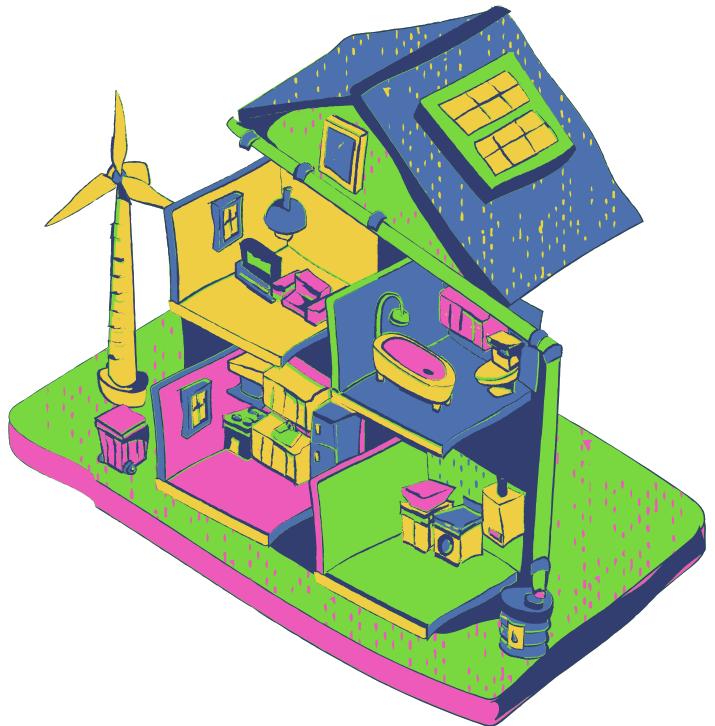
- Traditional energy management relies on manual user control.
- Time-of-Use tariff based scheduling has been studied for cost reduction.
- Priority-based scheduling is commonly used in operating systems.
- Data structures like heaps are effective for priority handling.
- Existing systems lack simple user-level implementation for homes.



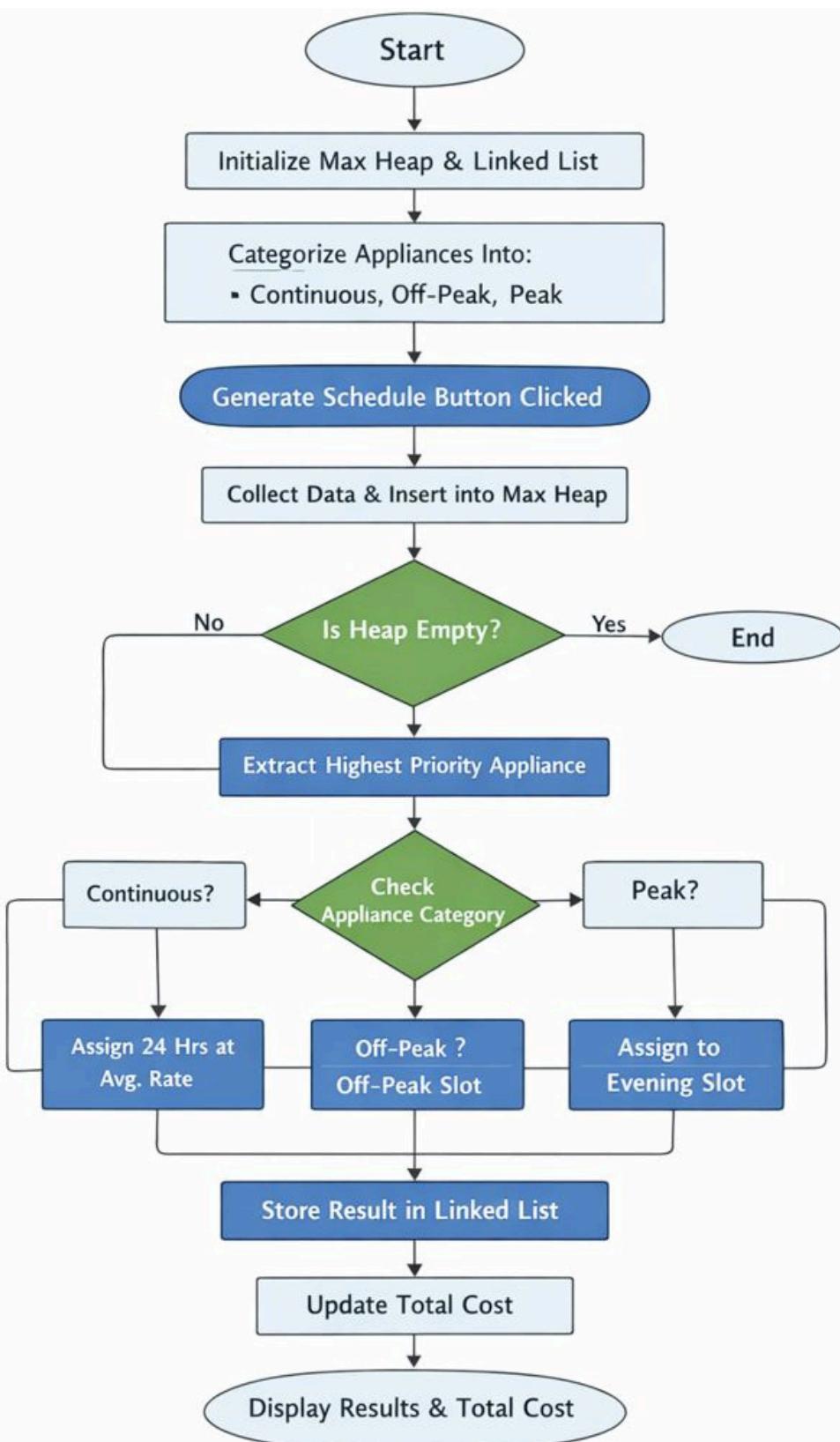


Proposed Methodology

- User enters appliance details through the GUI.
- Appliances are categorized as Peak, Off-Peak, or Continuous.
- Appliance data is inserted into a Max Heap based on priority.
- Highest priority appliance is extracted first.
- Time slot is assigned based on appliance category.
- Electricity cost is calculated for each appliance.
- Optimized schedule is stored and displayed.



Workflow



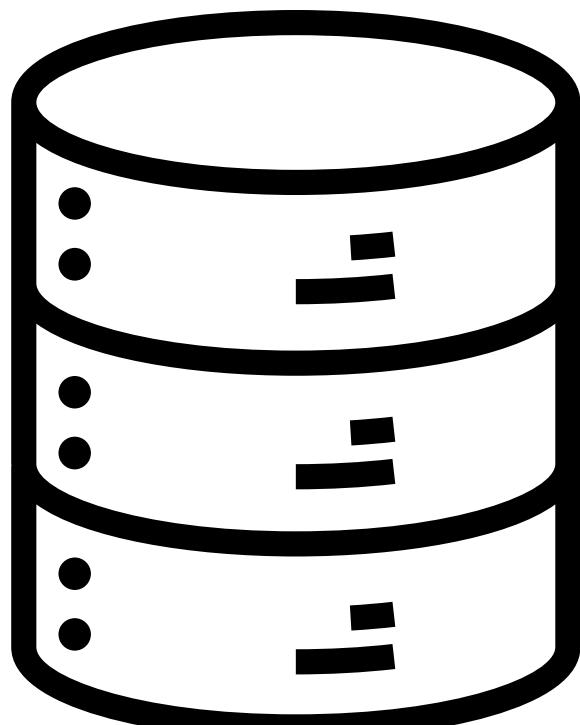
Algorithms that are being used:

- Priority-based scheduling
- Max Heap insertion & extraction
- Greedy time-slot assignment
- Electricity cost calculation



Data Structures used

- Max Heap- Used to prioritize appliances based on priority value, ensuring that the highest priority appliance is scheduled first.
- Linked List- Used to store the optimized appliance schedule sequentially for display.
- ArrayList- Used to manage dynamic appliance input panels in the graphical user interface.
- Arrays- Used to store fixed electricity tariff values and corresponding time slot names.





Results

Smart Home Electricity Optimizer (Category Based)

Smart Home Scheduler

Number of Appliances: 3

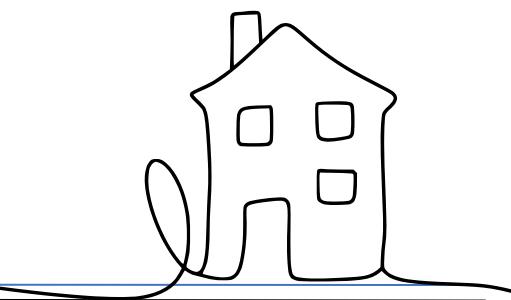
Appliance	Name	Type	Power (W)	Priority	Duration (h)
Appliance 1	fridge	Both/Continuous	200	10	24
Appliance 2	washing machine	Off-Peak (Flexible)	500	4	2
Appliance 3	ac	Peak Hours (Individual)	1500	7	4

[ALWAYS ON] fridge	Run 24/7 (Continuous) Cost: ₹54.00
[PEAK-TIME] ac	Evening (Slot 3) Cost: ₹72.00
[OFF-PEAK] washing machine	Off-Peak (Slot 1) Cost: ₹5.00

TOTAL ESTIMATED COST: ₹131.00

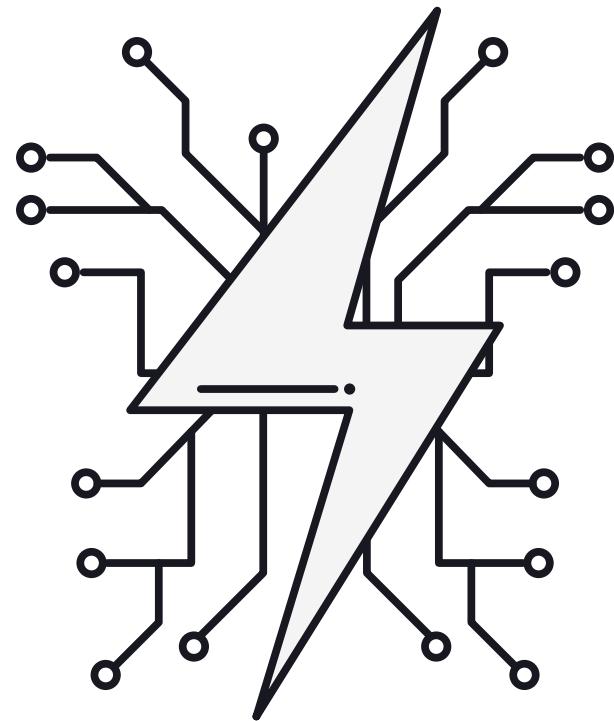
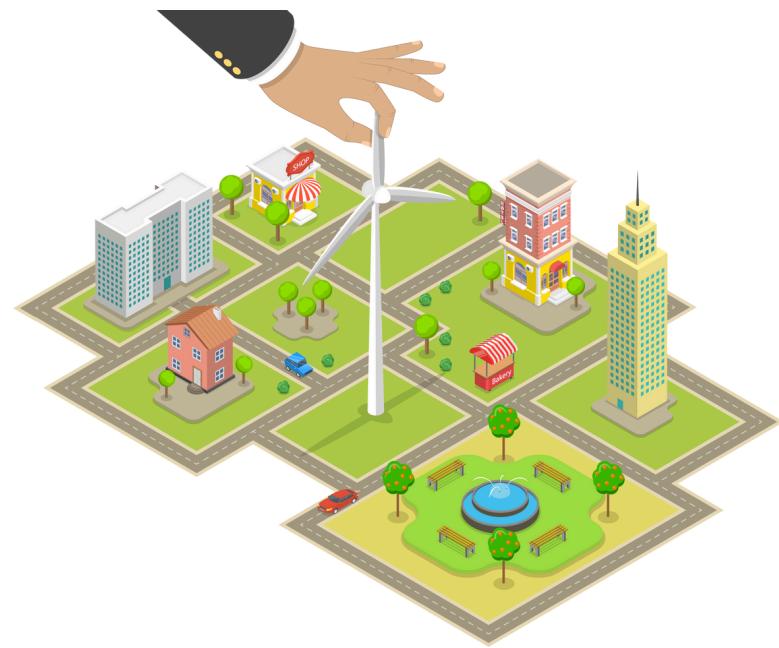


Applications and Future Scope



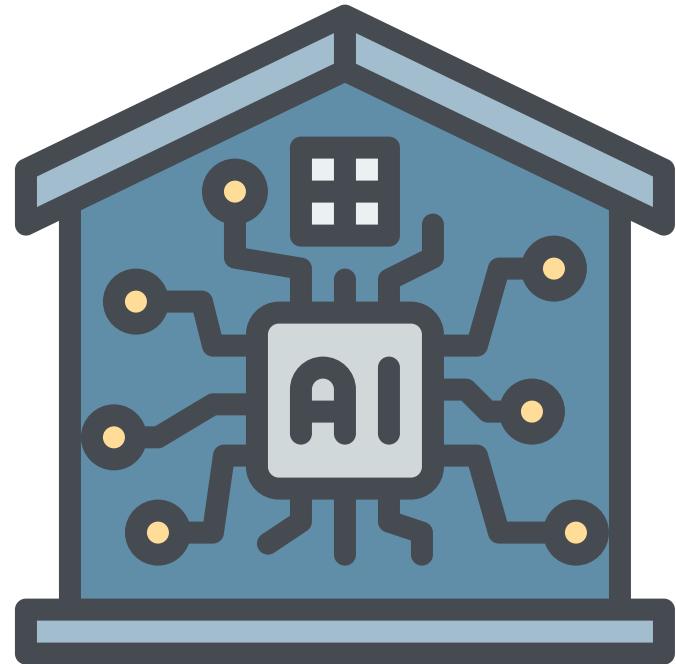
Applications

- Smart home energy management systems
- Residential electricity cost optimization
- Automated appliance scheduling
- Energy-aware home automation setups



Future Scope

- Integration with real-time smart meters
- Dynamic tariff-based scheduling
- Mobile or web-based user interface
- AI-based prediction of appliance usage patterns



Thank You

