thermoSmart is an after-market home heating system that creates temperature zones in single zone homes.

Our main goal is to increase the efficiency of forced hot-air home heating systems while simultaneously improving the comfort of the users.

**The Parts**

- **Coordinator**
  The Coordinator syncs all smartGrates and smartTemps in the user’s home in a central location.

- **smartGrate**
  The louvers of the smartGrate automatically adjust to increase or decrease airflow into a room.

- **smartTemp**
  The smartTemp allows a user to adjust their desired temperature within a room.

- **HVAC Controller**
  The HVAC Controller interfaces with the furnace and signals the furnace to turn on or off.

**Orange Team**

Team Members:
- Paul Blascovich
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Team Instructors:
- Martin Culpepper
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**General Product Overview**

Saving energy does not require sacrifices in comfort!
Control Algorithm

Our control algorithm allows a home to reduce heat-up time by up to 15%!

Optimum positions of the smartGrate's louvers are determined from:
- current room temperature
- change in room temperature
- desired temperature of the room

Louvers have three possible opening positions: 20°, 55°, and 90°

The Algorithm:
- If $T_{\text{desired}} - T_{\text{current}} > T_{\text{current}} - T_{\text{past}}$, then $\theta = 90^\circ$
- If $T_{\text{desired}} - T_{\text{current}} < 0$, then $\theta = 20^\circ$
- In all other cases, $\theta = 55^\circ$

Simulation of Room Temperature

The room starts from 59º F. Its desired temperature is 74º F.

Communications

The four components of the thermoSmart system communicate wirelessly using the SMAC standard.

1. Each smartTemp sends the current and desired temperature of their room to the Coordinator.
2. The Coordinator calculates the optimum grate louver position and sends this value to the smartGrate servo.
3. When all rooms have reached desired temperature, the Coordinator sends a signal to the HVAC Controller to turn the furnace off.

Pricing

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<tr>
<th>Pack</th>
<th>Description</th>
<th>Price</th>
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<tr>
<td>Basic Pack</td>
<td>2 smartGrates, 2 smartTemps, 1 Coordinator</td>
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<tr>
<td>HVAC Controller</td>
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<td>Expansion Pack</td>
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<td>Premium Pack</td>
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