Problem & Clinical Need

The problem is:
- 50% HAI rate in low-resource areas
- No standardization for donated autoclaves

The device needs to be:
- Effective
  - Goal: Record if conditions of 121 °C and 15 psi are maintained for 30 min
- Affordable
  - Goal: Average < $3 per cycle, the cost of the standard Bowie-Dick test
- Safe, without language barrier
  - Goal: Thermally insulated device with red/green binary readout
- Reusable
  - Goal: External, physical indicating device attachable to a variety of units that functions for months, not one cycle

Description of Market

Target Market: Low-Resource Hospitals
- Average income < $3500USD/yr per person
- Roughly 2,700 large area hospitals
- Estimated 2 autoclaves per hospital
- Limited demand based on device lifetime

Design Attributes

Functionality

- AND logic gate allows timer to begin counting once both conditions have been met
- Timer ceases counting if one or both conditions drop below threshold
- Sensors calibrated independently establishing functionality beyond necessary range
- Simplicity of circuit minimizes potential breakage
- Ceramic insulation and thermal putty prevent technician injury

Novelty

- External, after-market device
- Compatible with multiple autoclaves via pipe fittings
- Use of processor for device adaptable to different conditions
- Binary indication coupled with indication of which, if either, condition was not met

Estimated Cost of Production

<table>
<thead>
<tr>
<th>Wholesale Raw Materials:</th>
<th>$42.36/device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor:</td>
<td>$50/device</td>
</tr>
<tr>
<td>Equipment &amp; Space:</td>
<td>$5/device</td>
</tr>
<tr>
<td>Total:</td>
<td>$97.36/device</td>
</tr>
</tbody>
</table>

This is based on 500 units/year. This would change based on demand.

Acknowledgements

We would like to thank Dr. Zapanta for his guidance on this project and over the past four years. We would also like to thank Krista Rouchussen for her insight, Matt Cline for use of his lab, the other BME Design TAs and students for their support.

References
