

# PLAID.

Precise Low-Resource Autoclave Inspecting Device



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## Problem & Clinical Need

The problem is:

- 50% HAI rate in low-resource areas<sup>1</sup>
- No standardization for donated autoclaves<sup>3</sup>

The device needs are:

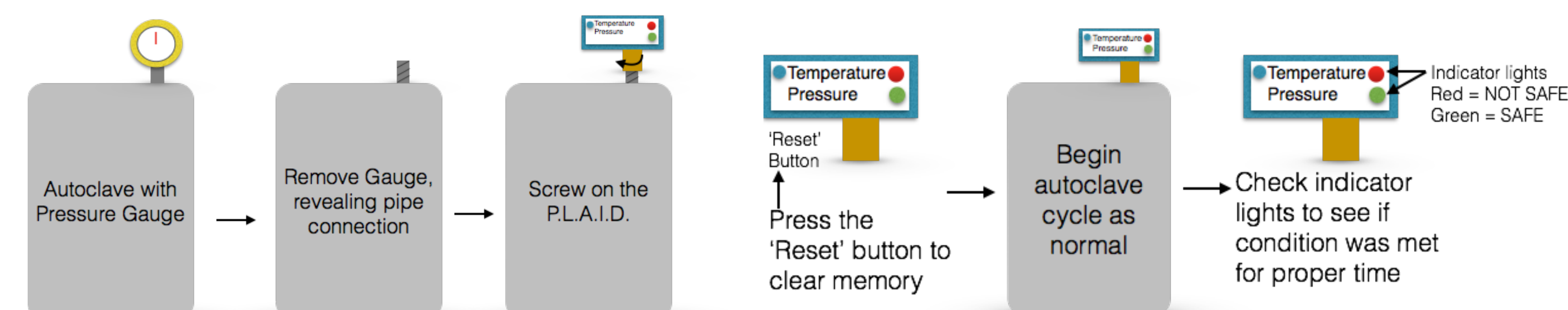
- Effective
  - Goal: Record if conditions of 121 °C and 15 psi are maintained for 30 min
- Affordable
  - Goal: Average < \$3 per cycle, the cost of the standard Bowie-Dick test
- Safe, without language barrier
  - Goal: Thermally insulated device with red/green binary readout
- Reusable
  - Goal: External, 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<sup>4</sup>
- Roughly 2,700 large area hospitals<sup>4</sup>
- Estimated 2 autoclaves per hospital<sup>4</sup>
- Limited demand based on device lifetime

## Design Attributes



### Installation

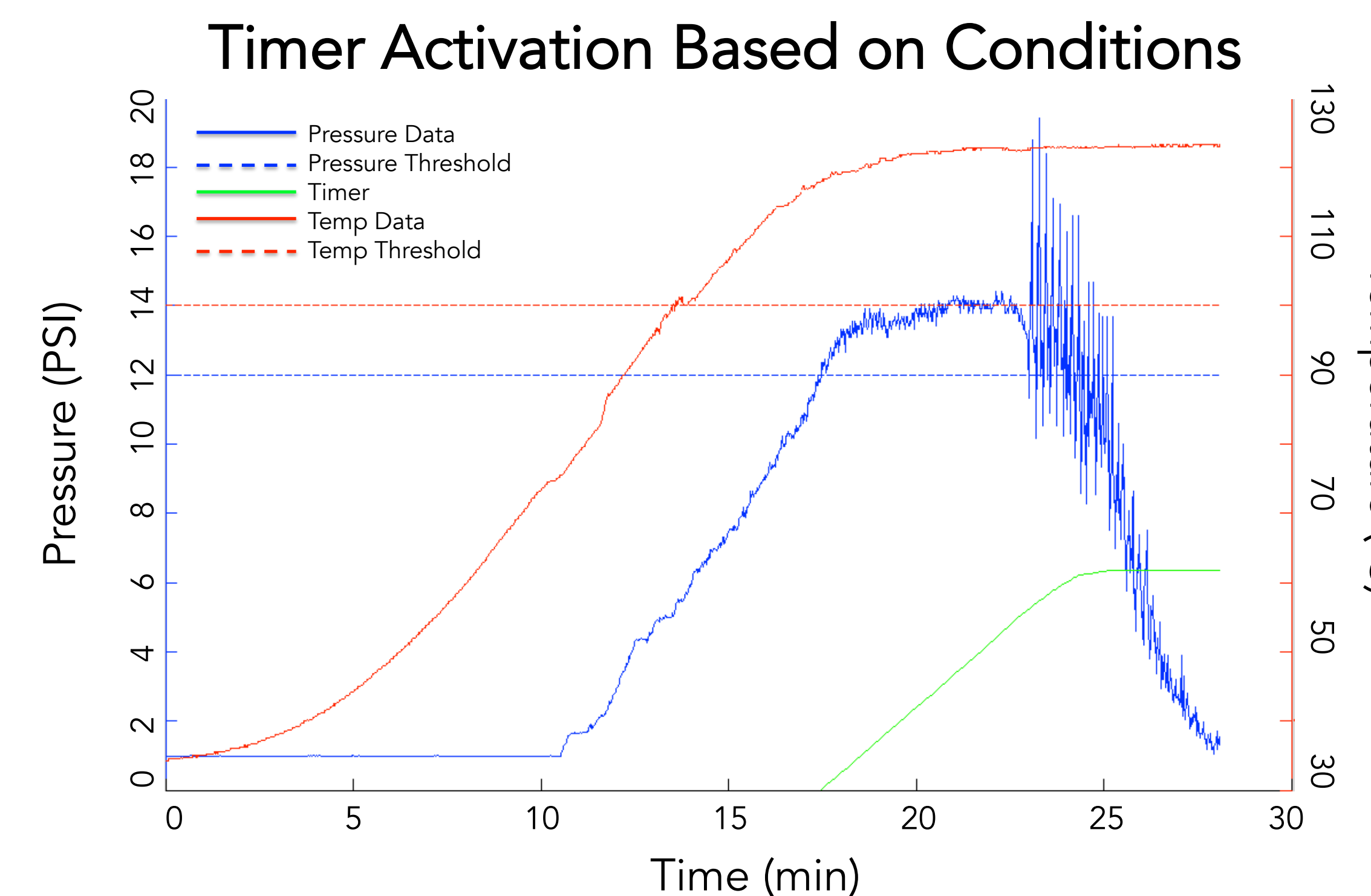
- Connects to standard pipe fittings
- No external wiring
- Thermally insulated device

### Use

- 1 Reset button, 1 Wake button
- Color differentiated LED output
- Numerical Temp & Pressure to assist in diagnosing failures

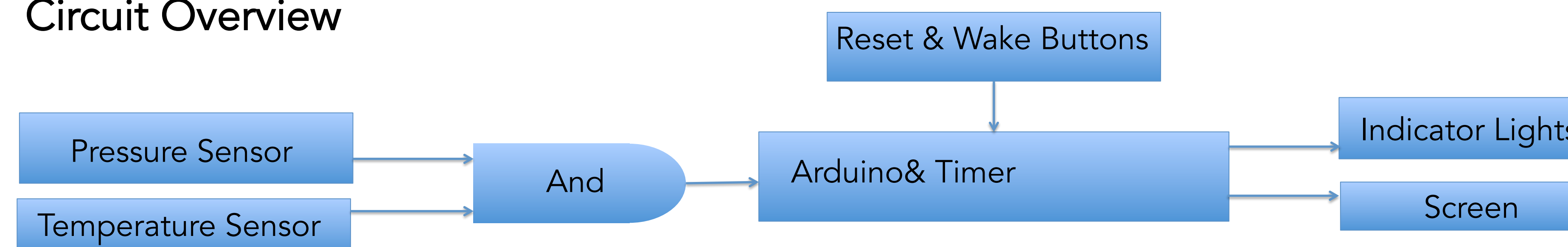
## Functionality

- 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



Graph of conditions over time with Temperature Threshold = 100°C and Pressure Threshold = 12 PSI to show activation of the timer and functionality of AND gate

## Circuit Overview



Basic diagram showing flow of information from sensors to the display. The Arduino interprets the temperature and pressure and compares to pre-programmed thresholds. Green & red LEDs indicate if conditions were met.



### The Device: Now & the Future

- Screen would eventually be integrated into housing
- Circuitry will be more compact; housing not much larger than the user interface

## 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

Wholesale Raw Materials:	\$42.36/device
Labor:	\$50/device
Equipment & Space:	\$5/device

**Total: \$97.36/device**

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 Rochussen for her insight, Matt Cline for use of his lab, the other BME Design TAs and students for their support.

## References

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