To Predict ▸ To Design ▸ To Perform

College of Engineering
Department of Mechanical & Industrial Engineering

ME, ECE, BE Capstone Design Programs

# TEAM #3: INSTANT AIR

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RK Baker Group

## Background

Entering a hot car poses a health threat to children, the elderly, and pets.

**Objective:** Design an easy to use and inexpensive system that provides cooling to the interior of an automobile prior to entry.

## Potential Customers

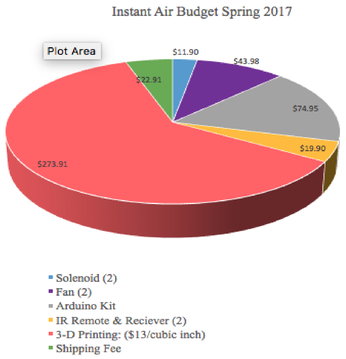
- Elderly
- Parents
- Pet owners

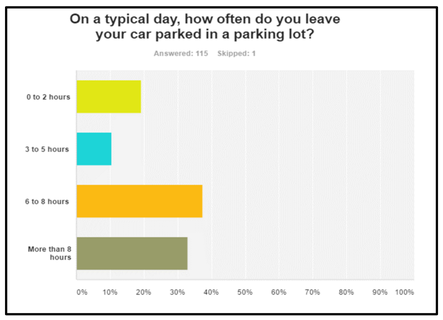
## Budget and Market Research

- Total Budget: $3000.00

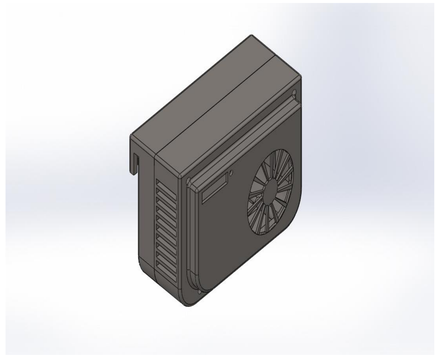
Total Cost: $470.46

| Market Analysis | |
|---|---|
| **Region of U.S with highest heat related child deaths** | Southeast States: Louisiana, Texas, Georgia |
| **Number of people who own cars in U.S** | 81.1% |
| **Dogs owned in the U.S as pets** | 36.5% |
| **Cats owned in the U.S as pets** | 30.4% |
| **Target Population** | Millennial parents and pet owners ages 17-35 |
| **Median male income of target population** | $31,000 |
| **Median female income of target population** | $17,000 |




## SolidWorks and Prototype Models



Full view of Instant Air

Instant Air view from outside vehicle

DC Brushless Fan

Instant Air on the Car Window

Rubber Strip

## Functional Requirements

- Circulation of air in and out of vehicle
  - Fast acting
  - Cools area to comfortable temperature
- Maintain Safety
  - System must perform in a safe manner and prevent any form of harm
- Cost Effective
  - System should be affordable to use, repair and maintain
- Automatic Operation

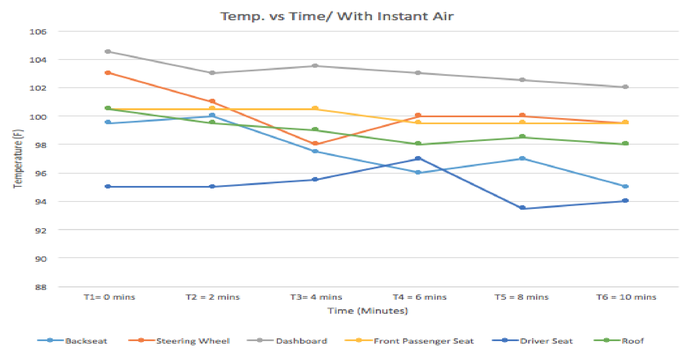
## Testing and Validation

- Fan
  - Performance test for temperature drop, power, and time
- Casing
  - Stress test
  - Impact test
- Effectiveness: Cools vehicle significantly (To -10 $^0$F) or Maintain temperature from rising from set temperature

## Engineering Specifications and Analysis

| Specification | Measurement |
|---|---|
| **Change in temperature** | 10°-20°F |
| **Max system temperature** | 140$^0$F |
| **Cost of 1 unit** | < $150 |
| **Standard lead-acid car battery** | 45 AH and 480 -510 WH at 12V |
| **Max operation time** | 45-60 Minutes |
| **Max box length** | **8in** |
| **Max box height** | **6 in** |

Efficiency Test: This test measured the temperature change of different parts of the car when the system was active in 2 minutes time interval: the results are shown below:




| September | October | November | December | January | February | March | April |
|---|---|---|---|---|---|---|---|
| Reasearch | Engineering Specifications | Research | Redesigning | Begin Building/ Purchasing | Begin Manufacturing | Begin Testing | Final Adjusting |