



ENSC 440 Project Demo

RAHS-Remote Automotive Heating System

Group Members:

Andrew Piechnik

Patrick Krzesinski

Joe Kuo

Team Introduction

Andrew Piechnik, Chief Financial Officer

- Funding and Documentation
- Packaging and Integration

Patrick Krzesinski, Chief Executive Officer

- Hardware Design
- Testing and Implementation of Heater System

Joe Kuo, Chief Technology Officer

- Software Design
- Testing and Implementation of Alarm System

Outline

- Background & Motivation
- Features
- Project Design
- Target market
- Budget and scheduling

Problem



Solution



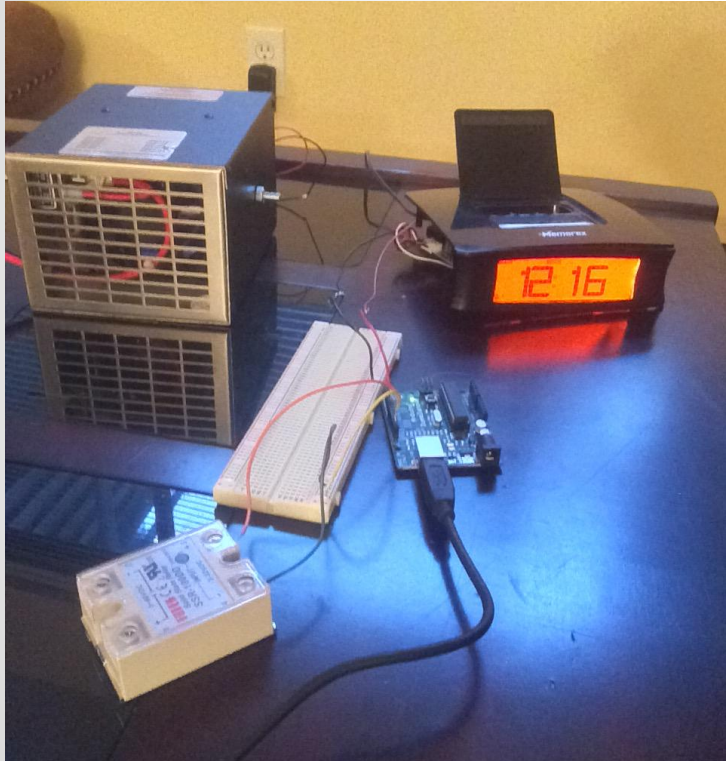
Motivation

- Average number of days with temperatures below 0°C in British Columbia: **150 days**
- At an average idling time of 15min/day this results in **37.5 Hours per Annum** of engine idle time.

Engine Size	Liters per hour	Liters per year	Cost per year
4 cylinder	1.25	47	57.5
V6	1.32	49.5	62.5
V8	2	75	93.75

- **910,800 tonnes of CO2** released into our atmosphere from warming up our vehicles in the morning in just Canada alone.

Project Overview



Main Components of product:

- 12V DC Heater
- User Interface Display
- RF remote control
- 100A DC Relay Switch
- 12V DC Car Battery

Features

Warm Vehicle



Alarm clock



Remote Control

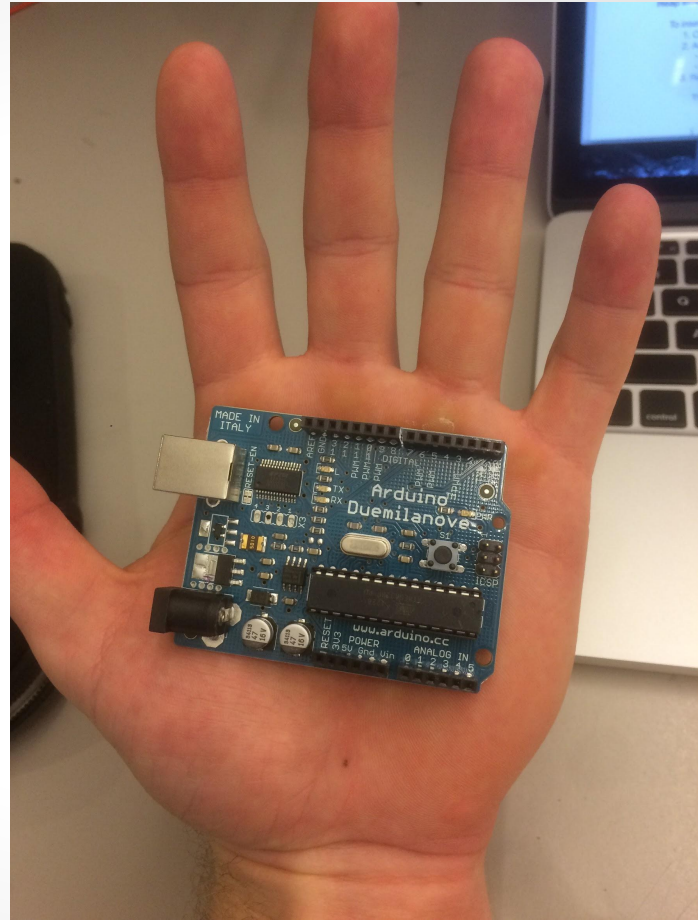


Temperature Sensor



Design

Controller



Battery and Power

- 2 Standard lithium 9V batteries
- Standard JST connections
- Long lasting
- Easy to replace



Battery and Power

- Deep cycle
- 80Ah Rated
- 12V Car Battery

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- connect to car alternator
 - charge while you drive



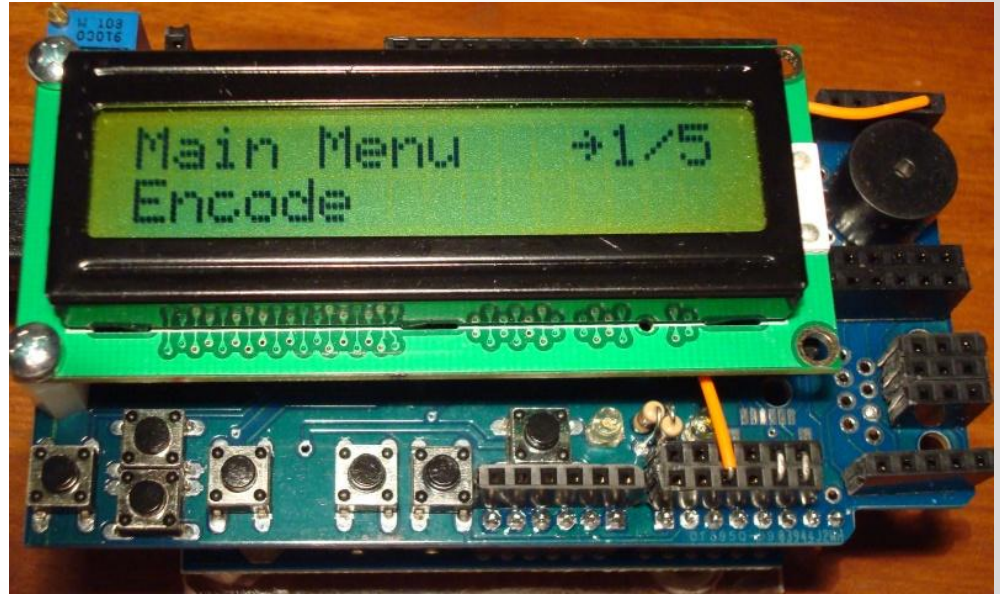
Relay + Switching

- 100A rated DC Solid State Relay
- 3V DC input
- SSRs offer improved system reliability
- No moving parts or contacts to degrade
- Provide improved system life-cycle costs,
- Simplified designs reduced power supply
- Reduced heat dissipation requirements.



User Interface

- 20x4 LCD screen
- 7 interactive buttons
- Mounted directly to controller



Remote Control

- RF transmitter
- Toggle on/off
- Connects directly to Microcontroller
- Range +200m



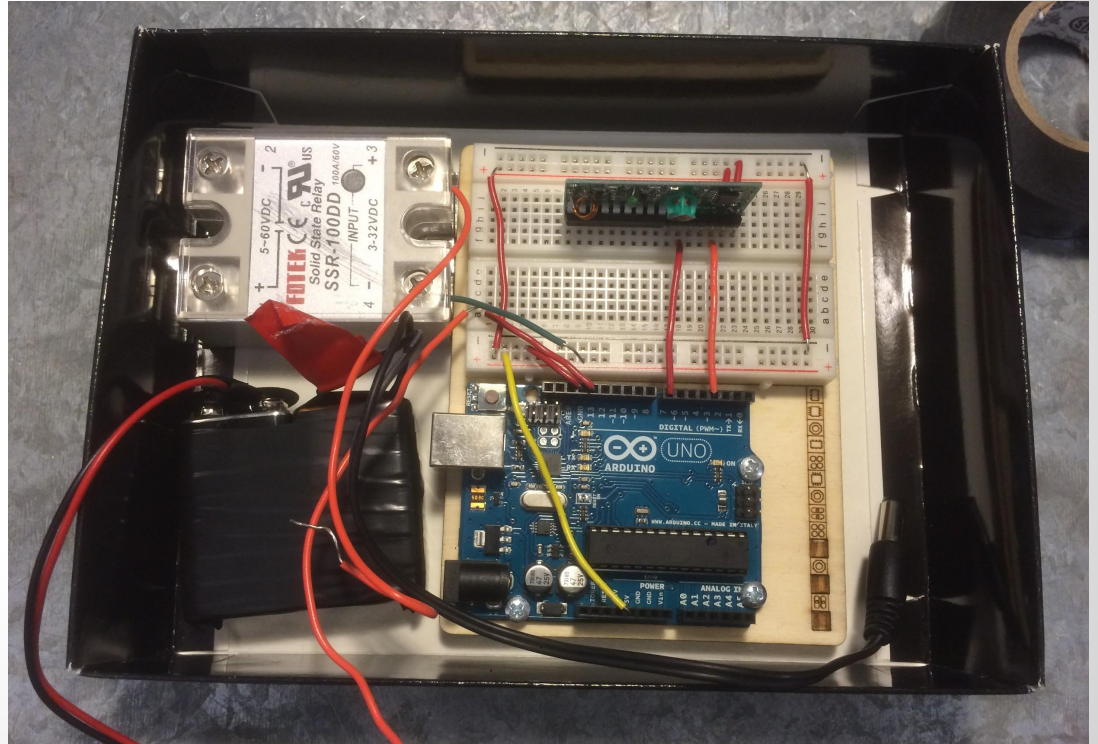
Packaging

- Easy to open and shut
- Access to electrical components if need of replacement
- All interior components fastened tight



Anti-Static Enclosure

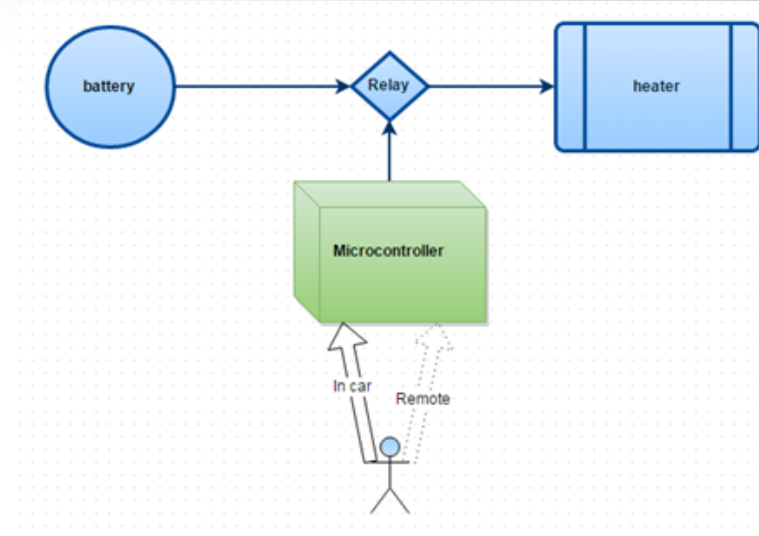
- Control Unit Casing Dimensions:
127mm x 203mm
- Control Unit Casing Weight :
<400g



High Level System Design

Major advantage of system:

- remotely control the heater from home
- pre-set the alarm to start the heater
- No excess usage of battery
- No burning fossil fuels



Market

Targeted Clientele:

- **Anyone with car**
- **Anyone who dislikes entering a cold vehicle**
- **Anyone living in cold mild climates**

Future Ideal System:

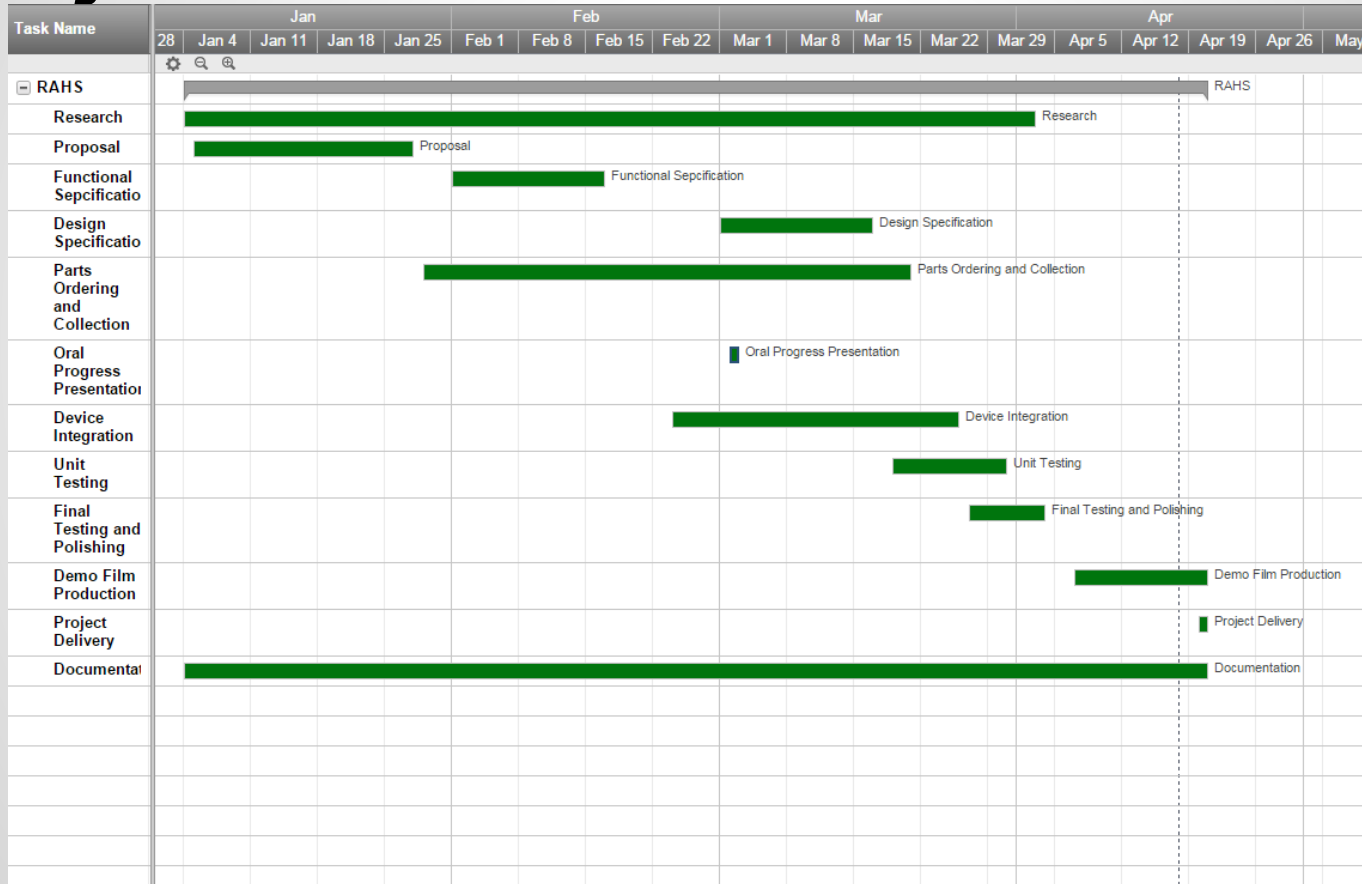
- Heater (Connecting to 12V cigarette socket)
- User Interface (Smartphone application)
- Remote Control (Smartphone access)
- Secondary Battery connected directly to alternator (recharge while driving)

Project specific Budget

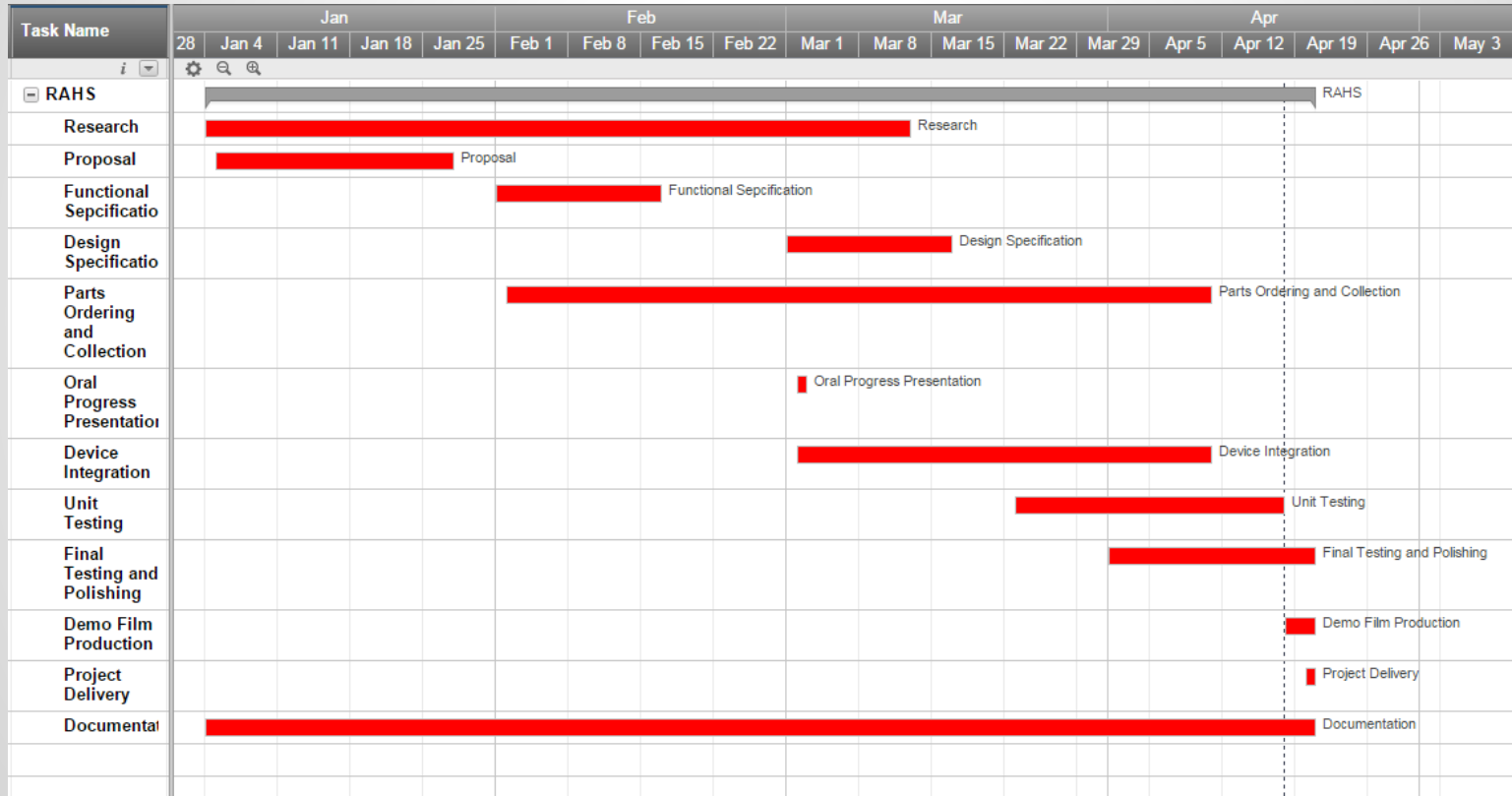
Original Equipment List	Estimated Cost
Bravo View 1600W Power Inverter	\$95
King Electric 1500W Shop heater	\$99
MotoMaster Eliminator Automotive Battery	\$109.99
Motomaster 4 Gauge Booster Cable, 16-ft	\$39.99
Simple RF M4 Receiver – 315 MHz	\$4.95
Outdoor RF Power Remote Control, 1 Outlet	\$23.50
Alarm Clock Timex 121S	\$29.99
Total Cost	\$402.42

Actual Equipment List	Estimated Cost
Microcontroller/Arudino	\$80
DC Thermal 12 Volt Cab Heater	\$190
RF Transmitter and Receiver	\$10
Relay Switch	\$60
Alarm Clock Timex 121S	\$20
Total Cost	\$350

Project Timeline Estimate



Project Timeline Actual



Summary

- **RAHS**
- Good for environment, Good for society
- Timeline
 - Delivery date: April 20, 2015
- Actual Budget:
 - \$410

