Safe ‘N Sound Driver

(S.N.S.D.)

Relativity Inc.

Team 3

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Overview

- Objective
- Specifications
- Product
- Limitations
- Hardware
- Circuit Diagram
- Pictorial tour
- PBasic Code
- Prototype Cost Analysis
- Conclusion and Improvements
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Objective

- Build a device that helps deaf drivers interpret where sound is coming from
  - Emergency Vehicles
  - Cars honking horns
  - Any loud noise

Specifications

- **Product has to be controlled by BS2**
- **Safety features**
  - Instantaneous shutdown safety switch
  - Software Feature to prevent damage to the BS2 and other components
- **User Interface**
  - Monitoring sound
- **User Control**
  - Controlling sensitivity
- **Analog Sensor**
  - Microphones
- **Digital Sensor**
  - Photoresistor (Light/Dark)
- **Use sensory feedback**
  - Indicates sound direction

What is the Safe ‘N Sound Driver?

- **Aid** for deaf and hard of hearing drivers
- Uses multiple microphones to detect direction of sound
- User Interface
  - Dashboard mounted display
  - Uses LEDs to indicate hazard direction
  - Bright LED to let the driver know a loud sound has occurred
    - Under low light settings, Bright LED is dimmed
- Settings for High / Low sensitivity
- Microphone Receptacle
  - Roof mountable – Magnetized
  - Aerodynamic
  - Water resistant
- Powered off the car cigarette lighter
  - quarter amp fuse included

Limitations

- **THIS IS AN AID ONLY – DO NOT RELY SOLELY ON THE *S.N.S.D.* THE DRIVER MUST PAY ATTENTION TO THE ROAD AT ALL TIMES**
- **Assumes only one audible road hazard at any given time**
- **Background noise level is moderate compared to hazard noise level**

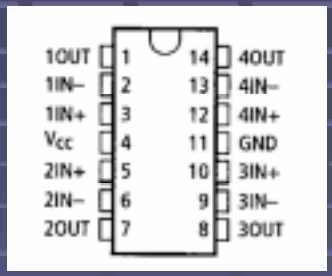
Key Hardware

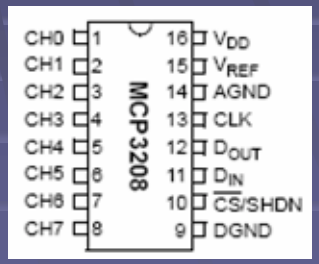
- 3 Microphones
  - Omni-directional
  - 70-10,000 Hz response
  - Requires 2-10VDC

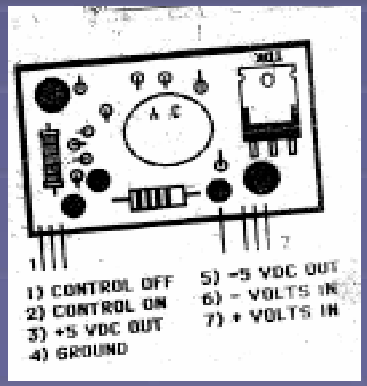
- Photoresistor

Key Hardware 2

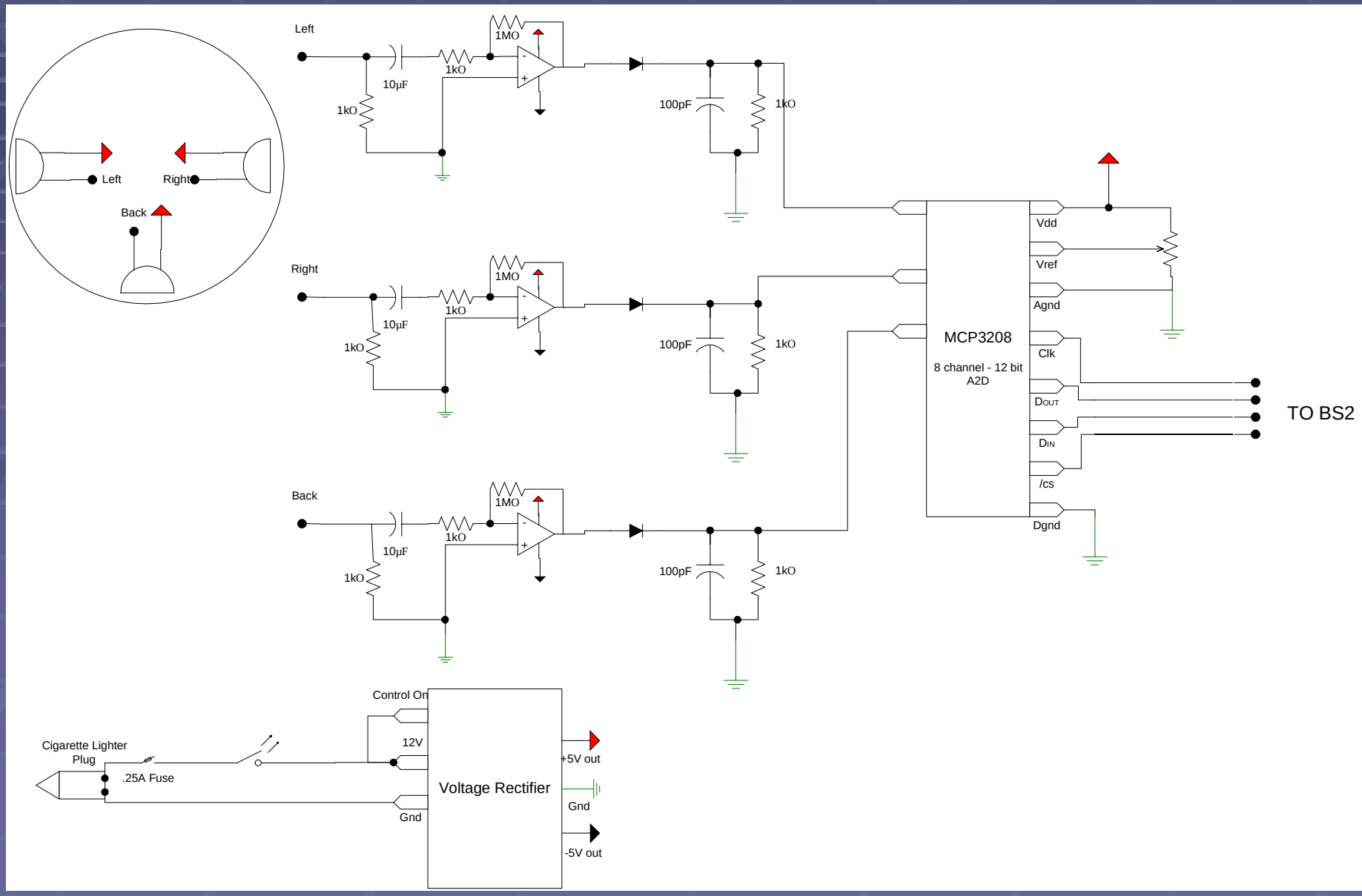
- LM324 Quad Op Amp
- MPC3208 Analog to Digital Converter
  - 8 Channel addressable
  - 12 Bit A2D
  - Minimum clock frequency 10 kHz
- +/- 5 Volt Power rectifier



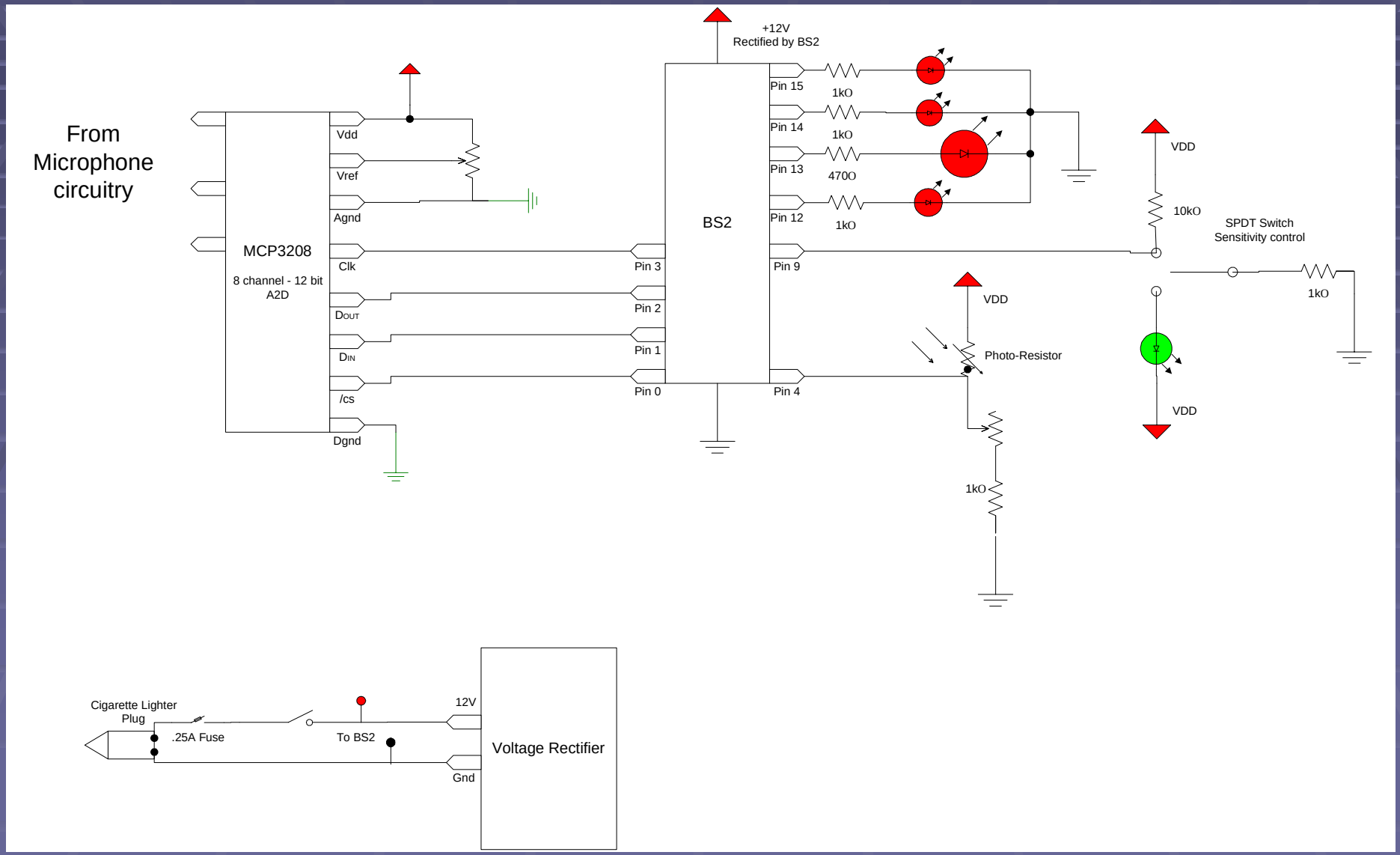




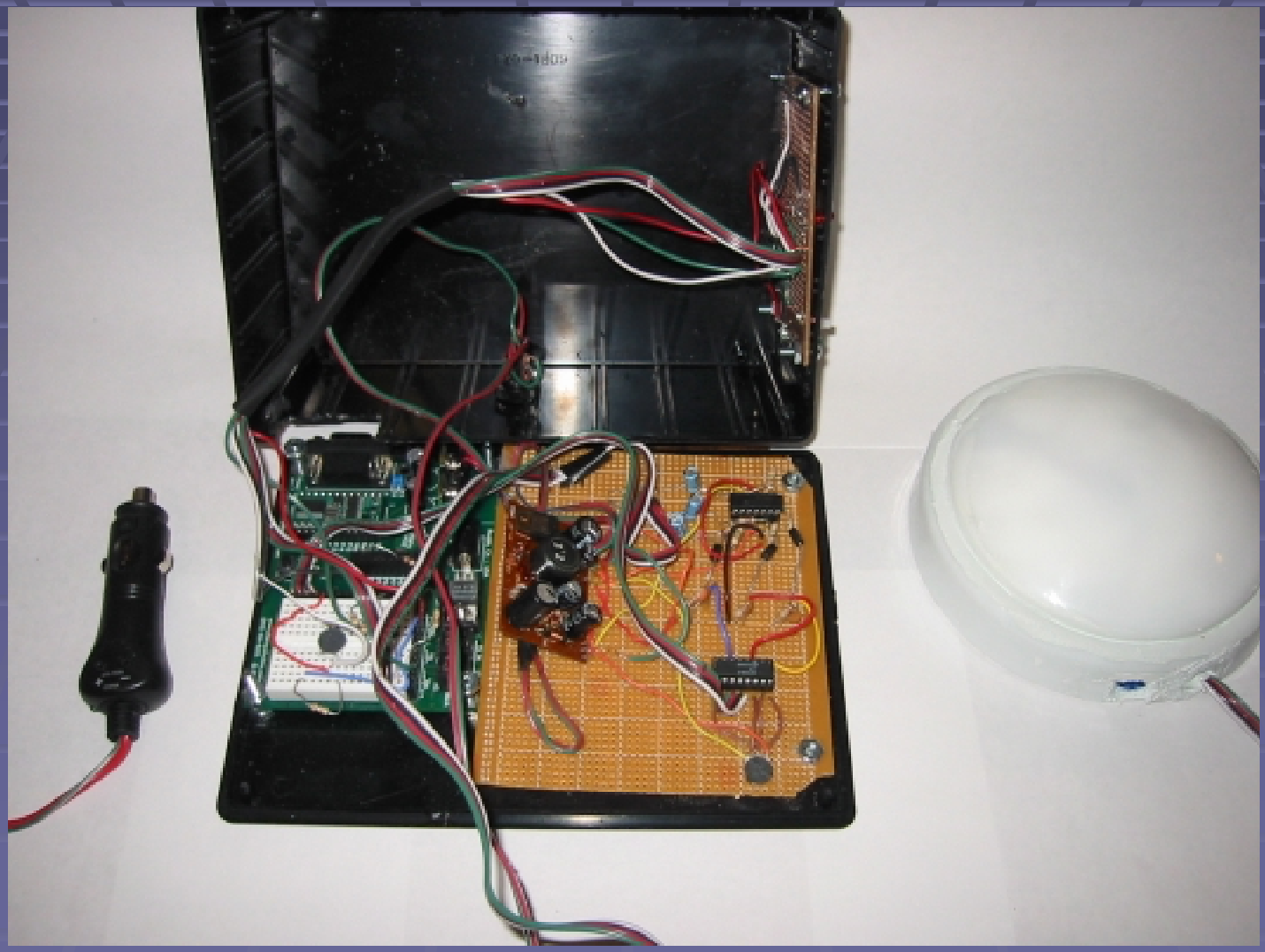
Circuit Diagram 1: Hazard Detection



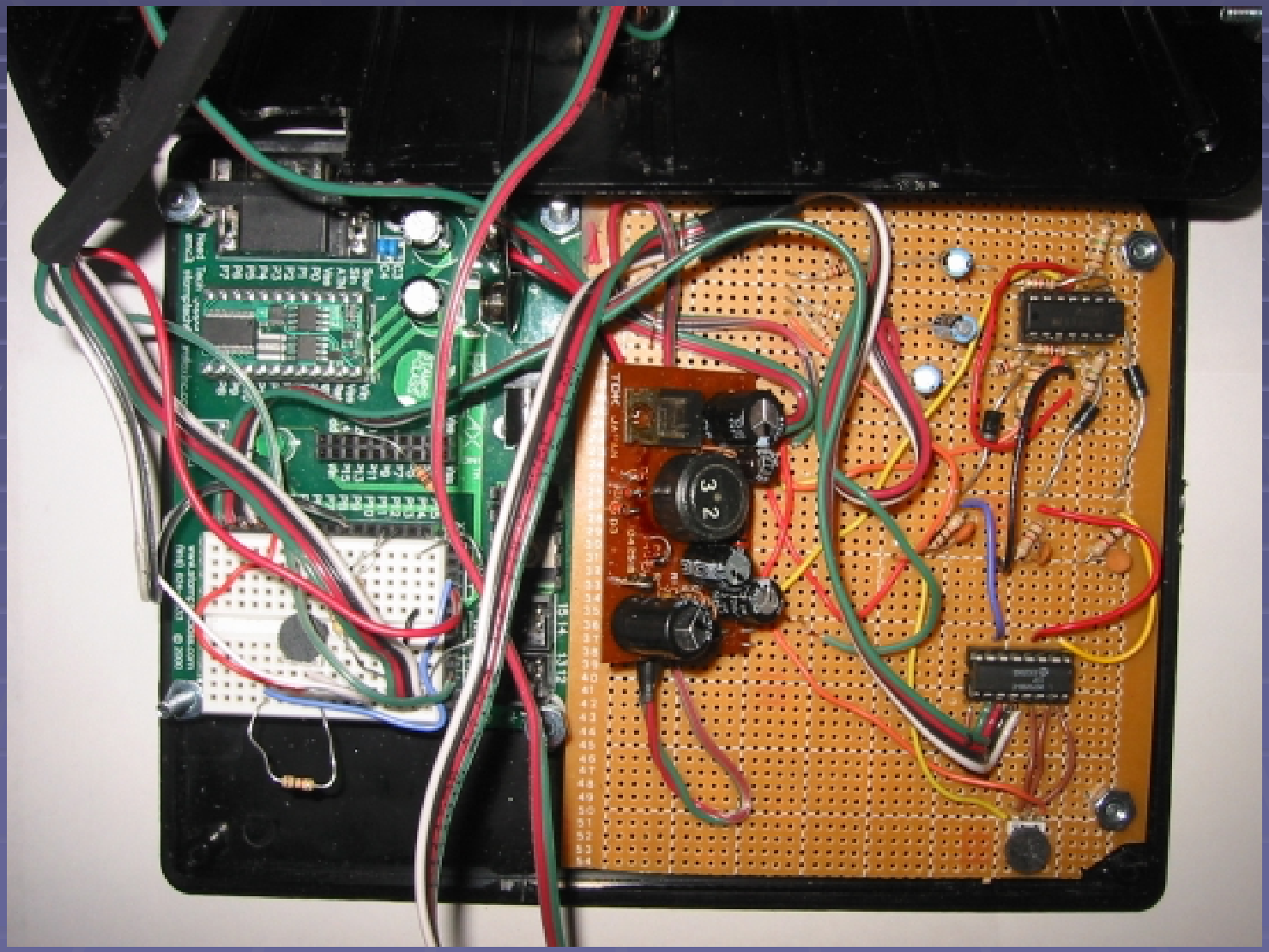
Circuit Diagram 2: BS2 and User Interface



Pictorial Tour: Safe N’ Sound Driver



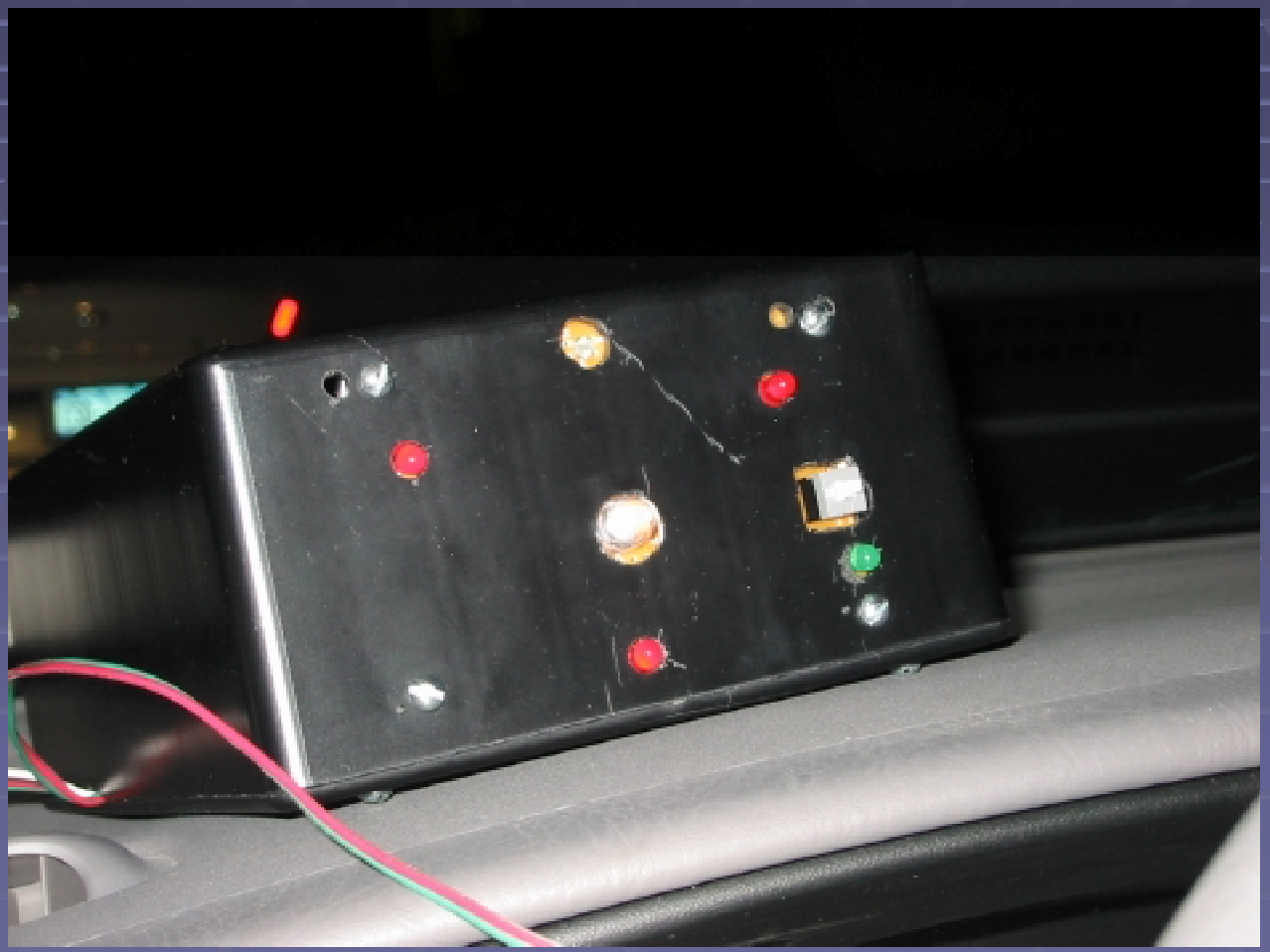
Pictorial Tour: Main Circuitry 1



Pictorial Tour: User Interface Casing

Pictorial Tour: Microphone Receptacle

Pictorial Tour: User Interface Casing in Car



Pictorial Tour: Microphone Receptacle on Car

Pictorial Tour: Interfaced with Cigarette Lighter

PBasic Code

Code for Safe N Sound Driver

Prototype Cost Analysis

Product	Quantity	Unit Price	Total Cost
BS2,Board of Education and kit	1	$130.00	$130.00
Omni-directional Microphone	3	$2.49	$7.47
Solder	1	$2.99	$2.99
Soldering tip	1	$1.99	$1.99
1/4 Amp Fuse	1	$1.59	$1.59
Fuse Holder	1	$1.99	$1.99
Illuminated Power Switch	1	$3.69	$3.69
Casing Hardware	1	$2.38	$2.38
PC Boards	1	$6.98	$6.98
IC Pin Socket	2	$0.99	$1.98
Shrink Wire Tubing	1	$1.95	$1.95
Casing	1	$6.99	$6.99
Wire	1	$3.99	$3.99
Velcro	1	$1.49	$1.49
Cigarette lighter plug	1	$3.49	$3.49
Cigarette lighter outlet	1	$6.49	$6.49
Capacitors	3	$0.99	$2.97
Epoxy Paste	1	$4.99	$4.99
Super Bright Jumbo LED	1	$2.59	$2.59
Power Rectifier	1	$1.00	$1.00
Diodes	1	$2.49	$2.49
Microphone Casing	1	$9.97	$9.97
Magnets	2	$1.00	$2.00
Various Resistors/Capacitors/LEDs etc	1	$5.00	$5.00
Battery Clip	1	$1.39	$1.39
Analog to Digital Converter	1	$18.00	$18.00
		SUBTOTAL	**$235.86**
		TAX (8.625%)	**$20.34**
		TOTAL	**$256.20**
Projected Mass Produced Price	**$50**		

Driving Safely - Priceless

Conclusion and Improvements

- Prototype was a success
- Multiple LEDs in each direction for sound level
- More accurate microphones
- Wireless connection between user interface and roof mounting
- Ability to interpret different sounds
  - Scan for frequencies reserved for communication by emergency personnel

Acknowledgements

- Chani Herman
  - Deaf Driver - Inspiration for the Safe ‘N Sound Driver
- The Christian Music Web
  - http://www.christianmusicweb.com/microphones/mic_project.html
  - Interfacing a condenser Microphone
- Hong Wong
  - Graduate Assistant, Department of Mechanical Engineering, Polytechnic University.
  - Power Rectifier
  - Guidance
- Graphics: Radio Shack, Microchip Technology Inc., Marlin P. Jones& Assoc. Inc., and http://members.tripod.com/~fencer1/page8.html