

EMERGENCY VEHICLES ALWAYS HAVE THE RIGHT OF WAY.

Robison Detector

ENSC 305/440 – Capstone Project
December 16th, 2014

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Who are we? Vantek Team.

- Shayan Ebrahimi (CEO)
- Siavash Seyfollahi (COO)
- Gurinder Singh (CTO)
- Raj Wardhan (CFO)
- Kartick Verma (CIO)
- Shane Wu (CMO)

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Outline

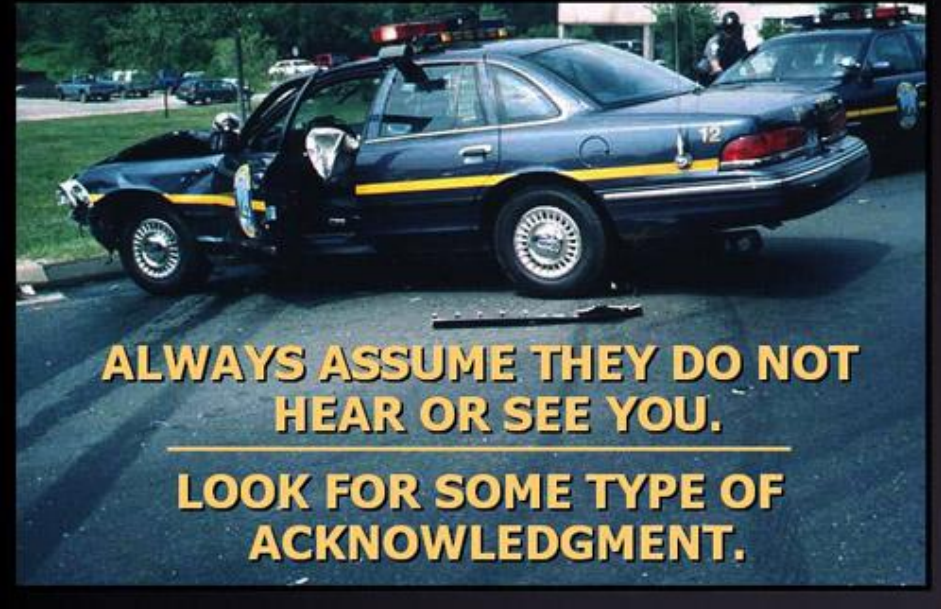
- Motivation
- Market & Competitions
- System Overview
- Project details
- Summary
- Future Work
- References & Acknowledgments
- Questions

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Motivation



Emergency Lights and Sirens



**ALWAYS ASSUME THEY DO NOT
HEAR OR SEE YOU.**

**LOOK FOR SOME TYPE OF
ACKNOWLEDGMENT.**

Noise disturbances like loud music or talking on the phone prevents drivers from hearing emergency sirens.

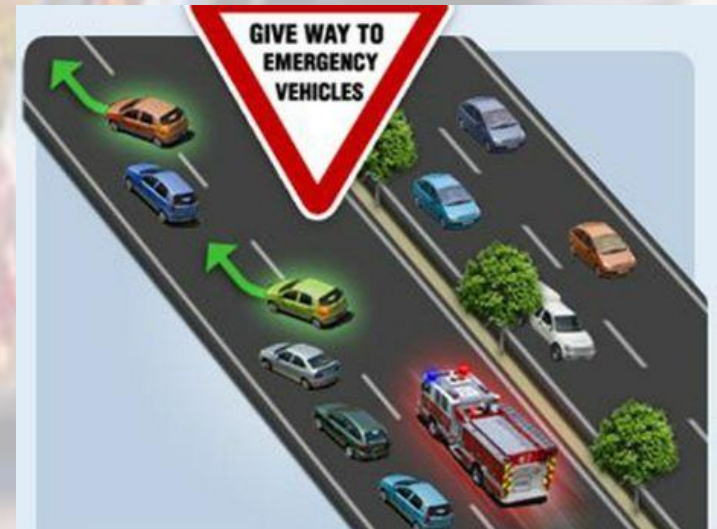


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Emergency vehicle collision statistics

	2009	2010		2011		2012		2009-2012
British Columbia			% change		% change		% change	% change
All vehicles	270,000	260,000	-3.7	260,000	nil	260,000	nil	-3.7
Total EV crashes	493	445	-9.7	402	-9.6	404	0.5	-18

- Collisions occur due to miscommunication



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Robison Detector

- Multiple siren detections
- Lowers the music
- Warns the driver with audio notification
- Increases the response time for drivers to yield

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Market

- Target consumers = Automobile manufacturers
- An add-on feature in motor vehicles
- Some similar existing patents but no actual siren detection product
- We will be **unique** in the market.

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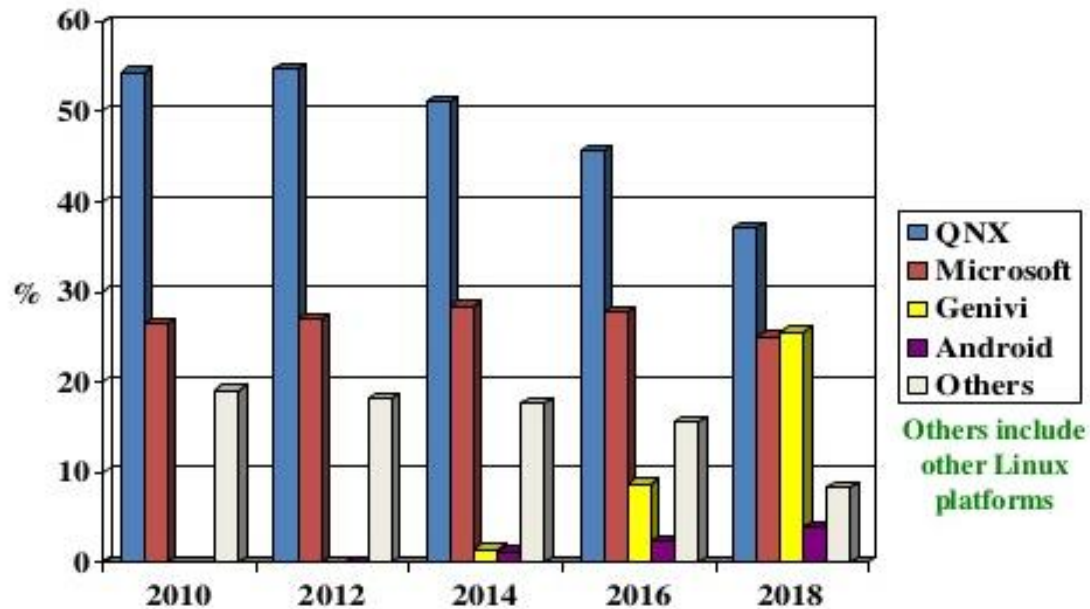
Existing Patents

Patent US 5710555 A – Siren Detector, Publication date: 20 Jan 1998

Patent US 6362749 B1 – Emergency vehicle detection system, Publication date: 26 Mar 2002

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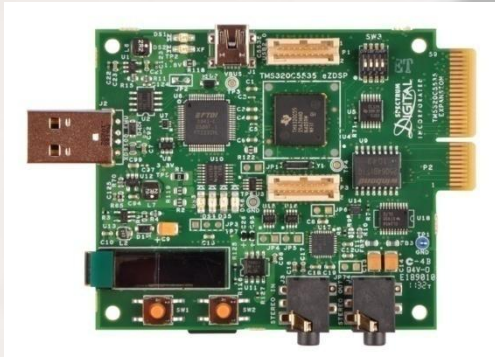
IVI system Market statistic



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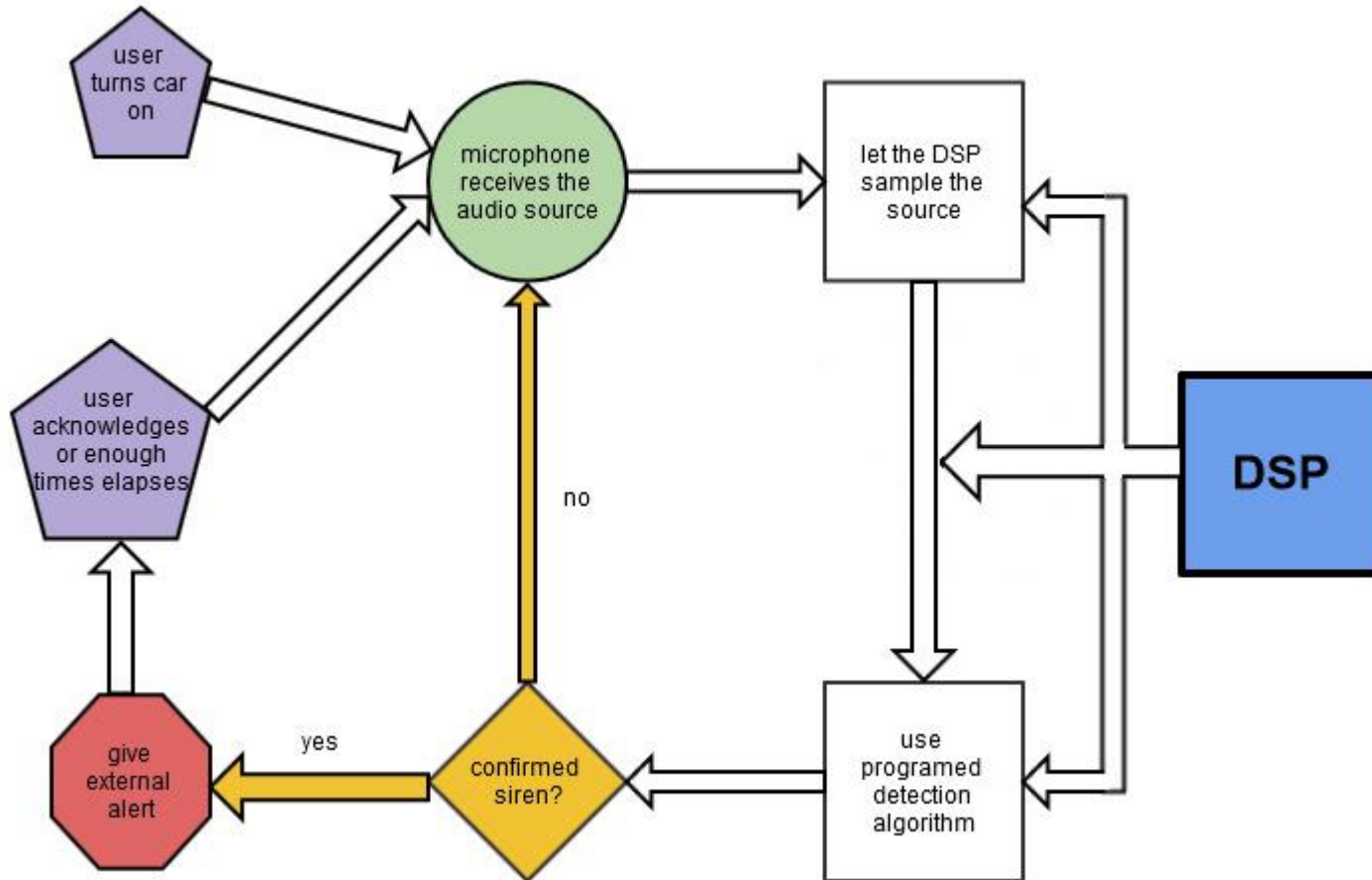
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System



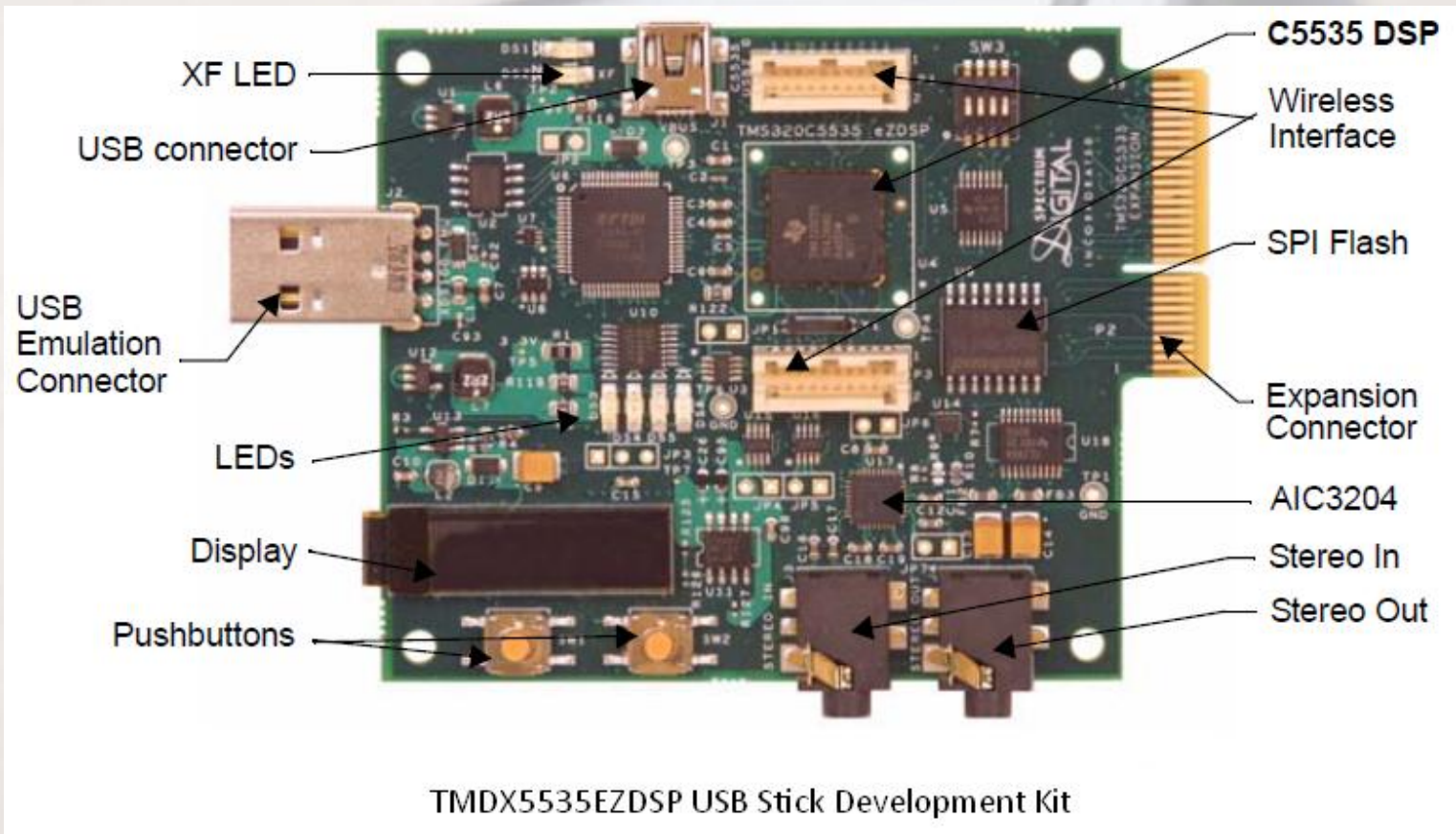
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System Overview



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eZdsp C5535



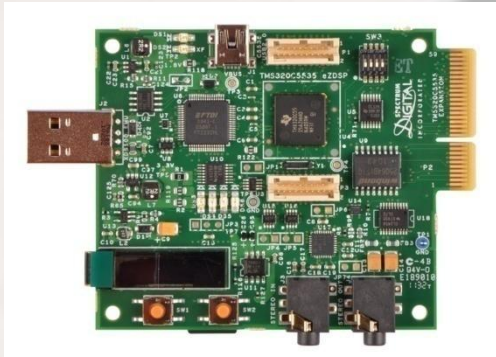
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- Algorithm (confidential)



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Gateway



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BlackBerry Z10



- QNX In-Vehicle Infotainment system in all QNX based cars are using the same platform as BlackBerry Z10 with the same audio management.
- That is the reason for using the Z10 as our target device.

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BlackBerry App

- Lowers volume once the siren detected
- Plays alert
- Resumes the music volume after notification

Expected Costs

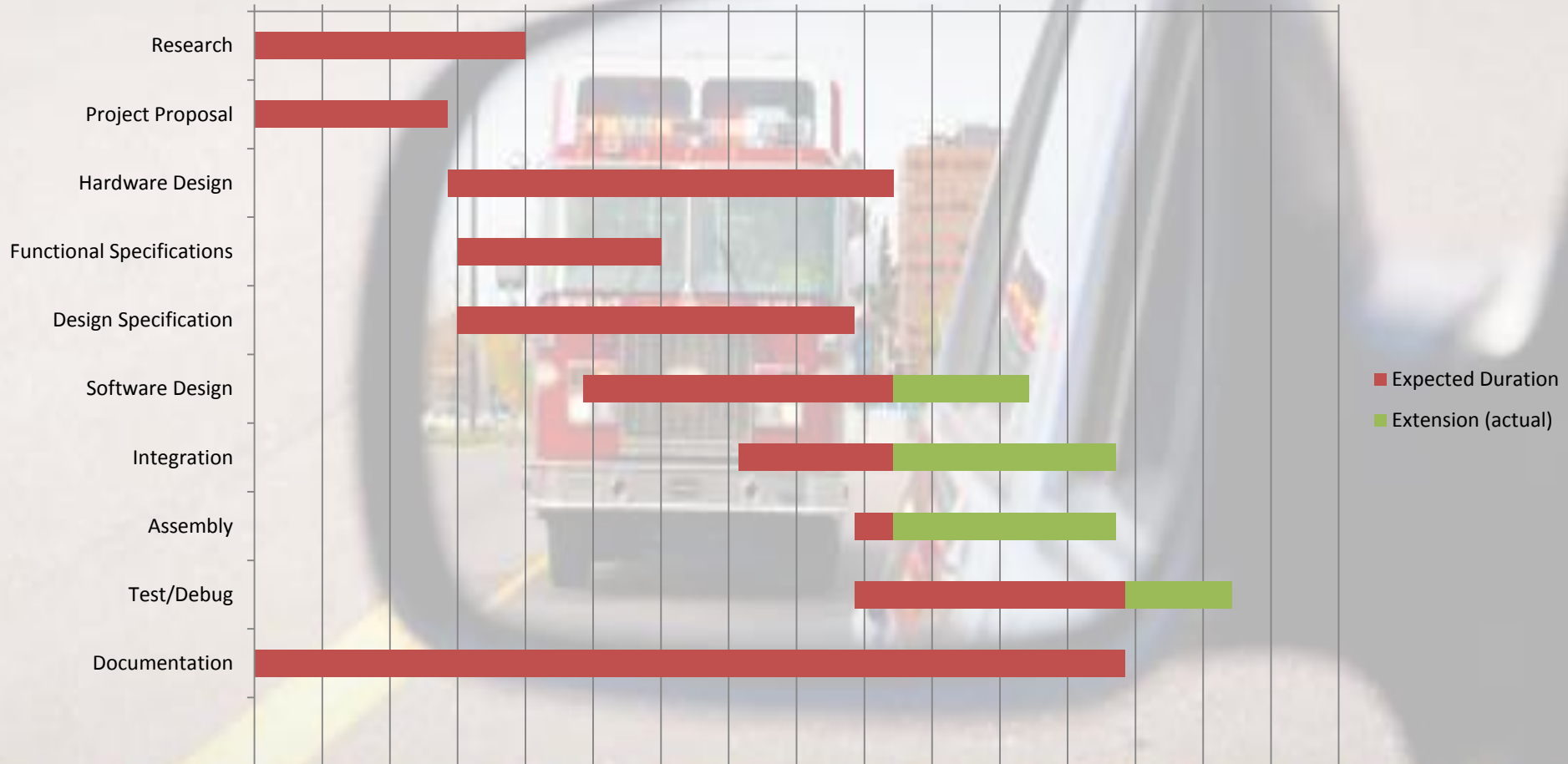
ESSEF funding : \$350

Component	Expected Cost	Actual Cost
MSP430 Lauch Pad	\$43	\$40.36
eZdsp C5535	N/A	\$122.8
Kit Eval Aud Booster Pack C5000	\$60	\$56.34
The BluPack Booster Pack	\$7	N/A
BT Boosterpack	\$20	N/A
HC05 Bluetooth Module	\$10	N/A
Hazardous Light	\$20	N/A
Manual Push Buttons	\$5	N/A
LCD displays	\$50	N/A
Microphone sensor	\$30	N/A
Car enclosure (for integration)	\$100	N/A
Speaker	N/A	\$100
Shipping costs	\$150	\$36.86
Total cost	\$495	\$376.36

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Timelines

2-Sep 9-Sep 16-Sep 23-Sep 30-Sep 7-Oct 14-Oct 21-Oct 28-Oct 4-Nov 11-Nov 18-Nov 25-Nov 2-Dec 9-Dec 16-Dec 23-Dec



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Testing Video

- Thanks to Rob Howland, director of BC Ambulance Services.
- We had a chance to test our DSP subsystem with realistic scenarios with ambulance sirens.

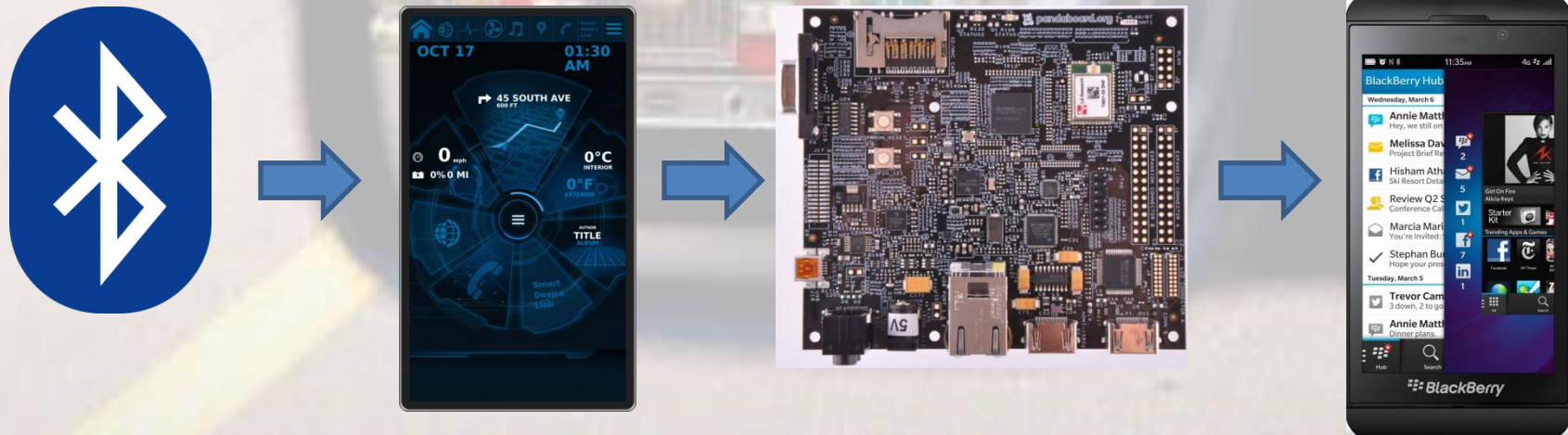
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Major changes

- Hardware component



- Alert subsystem



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Summary

- Our device can hopefully be used to save hundreds of lives every year
- Many potential features can be implemented and improved in the future
- The algorithm is applicable for other applications

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Future Work

- Improvement
 - Visual notification
 - Positioning
- Optimization
 - Customized DSP

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Acknowledgments

- **Craig Scratchley**
 - Senior Lecturer, School of Engineering Science
 - Advisor of Z10 subsystem implementation
- **Reza Mohammadnia**
 - Teacher Assistant, PhD Student, Electronics Engineering
 - Advices for DSP implementation
 - Hardware Design
- **Rob Lamoureux**
 - President of Burnaby Firefighters
 - Advised on algorithm
- **Rob Howland**
 - Director of BC Ambulance Service
 - Support for realistic ambulance siren testing



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Questions?



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References

- [1] Injury Risk of Traffic Accidents Involving Emergency Vehicles in Alberta
<http://www.ctrf.ca/conferences/2010Toronto/2010Proceedings/4YasminAnowarTayInjuryRiskofTraffic.pdf>
- [2] Emergency Motor Vehicle Crashes in British Columbia
<https://www.ufv.ca/media/assets/cjsr/Crash-Study.pdf>