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Innovative safety systems for forest industry

PROXIMITY DETECTION AND WARNING SYSTEM ASSESSMENT IN A SAW MILL OPERATION

Vladimir Strimbu, Kevin Blackburn - 2016

Outline

- Background
- Objectives
- Methodology
- Results
- Discussions
- Questions

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Background

- Safety management in busy worksites where rolling equipment and pedestrian could interfere (e.g. saw mill yards, infeed/outfeed areas, shipping areas) needs solutions
- Poor visibility and blind spots could be compensated using Proximity Detection and Alert Technologies (PDAT)
- PDAT is already used by other industries (e.g. construction, mining).

Objectives

Technology testing: the Hit-Not proximity detection system

- Assess the correlation between the calibrated distance and the actual triggered alert distance
- Assess how different types of obstacles affect alert distance

- false alarms rate and missed alarms rate

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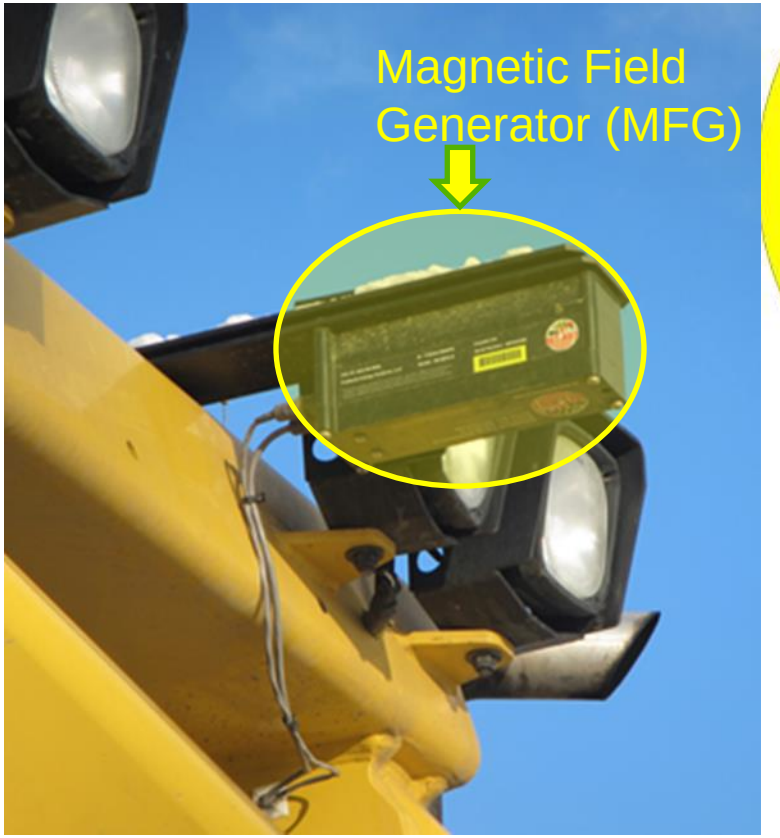
Methodology

- The Hit-Not system



Personal Alarm Device (PAD)

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Methodology: site and equipment

- Prince George Canfor's sawmill
- Planner outfeed and shipping area (over 1000 m^3/day)
- Busy space (4-5 active forklifts, rail cars, trucks.

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Methodology: approach and technics

- Static method
  - Preferred method by most studies conducted
  - Accurate measurements
  - Not real working conditions

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Methodology: approach and tools cont.

- Dynamic method
  - Not much literature available
  - Real life operating conditions
  - Low accuracy, complex setting, large amount of data

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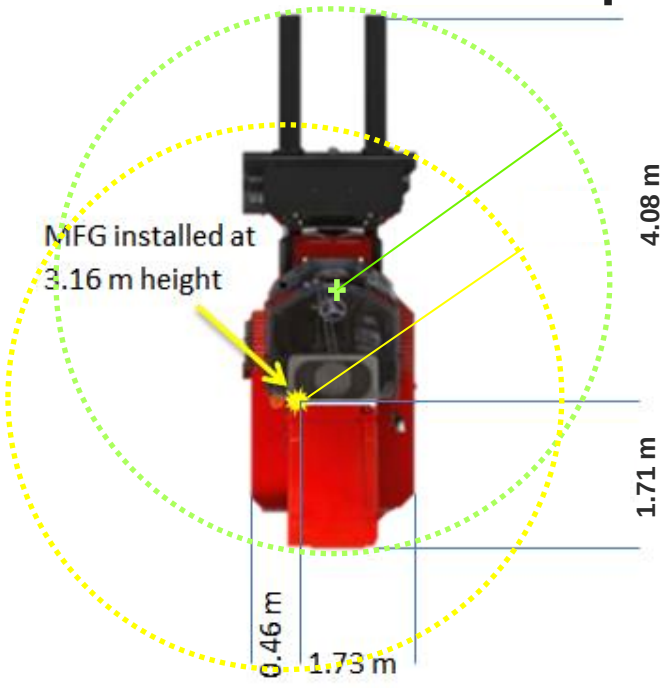
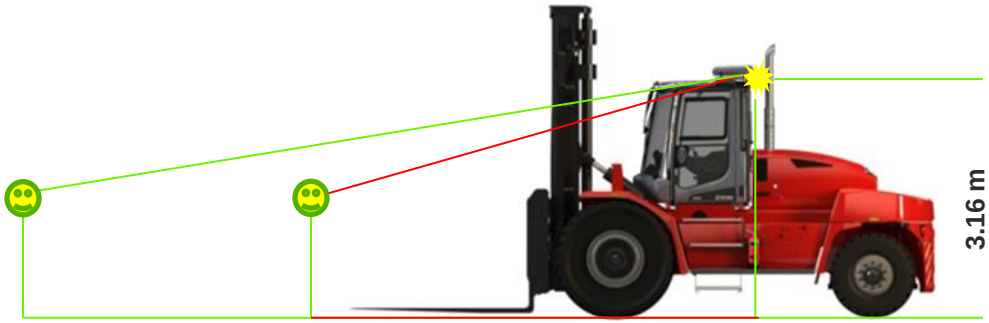
Results: equipment & safe zones shape

- off-central and high location of the MFG affect distance
- PAD-to-vehicle distance depends on forklift and load's shape





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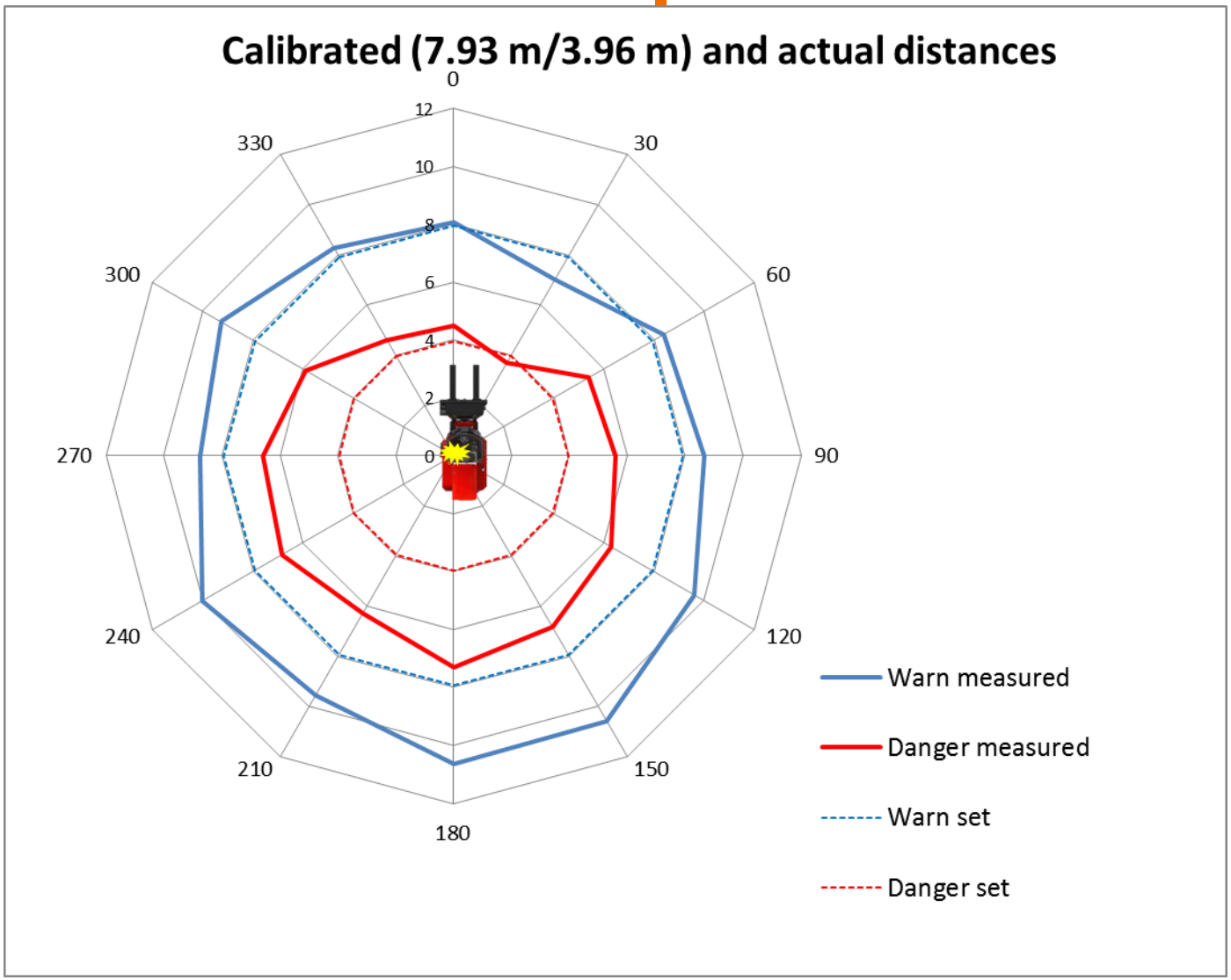
Results: static test - open area



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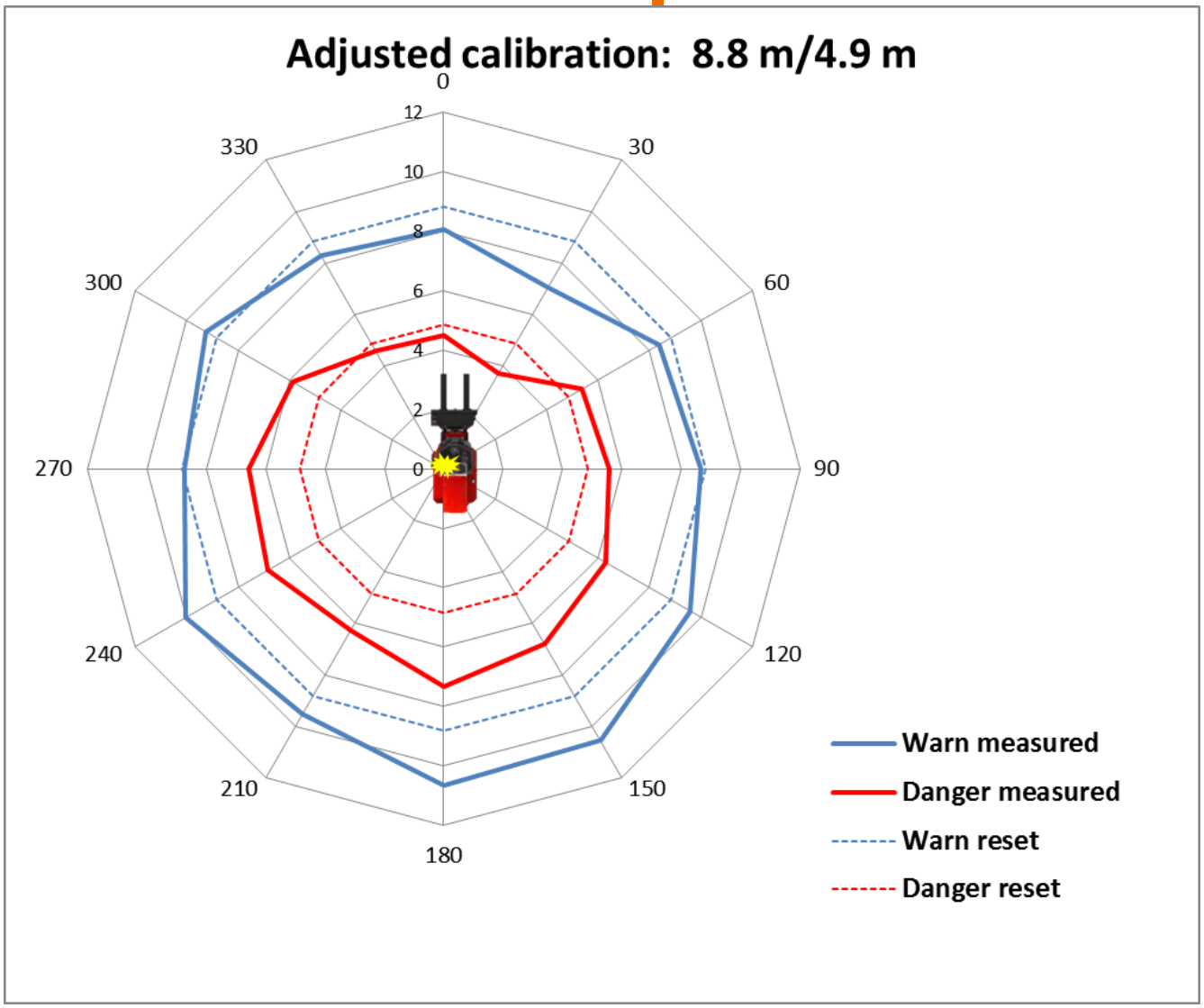
Results: static test - open area cont.



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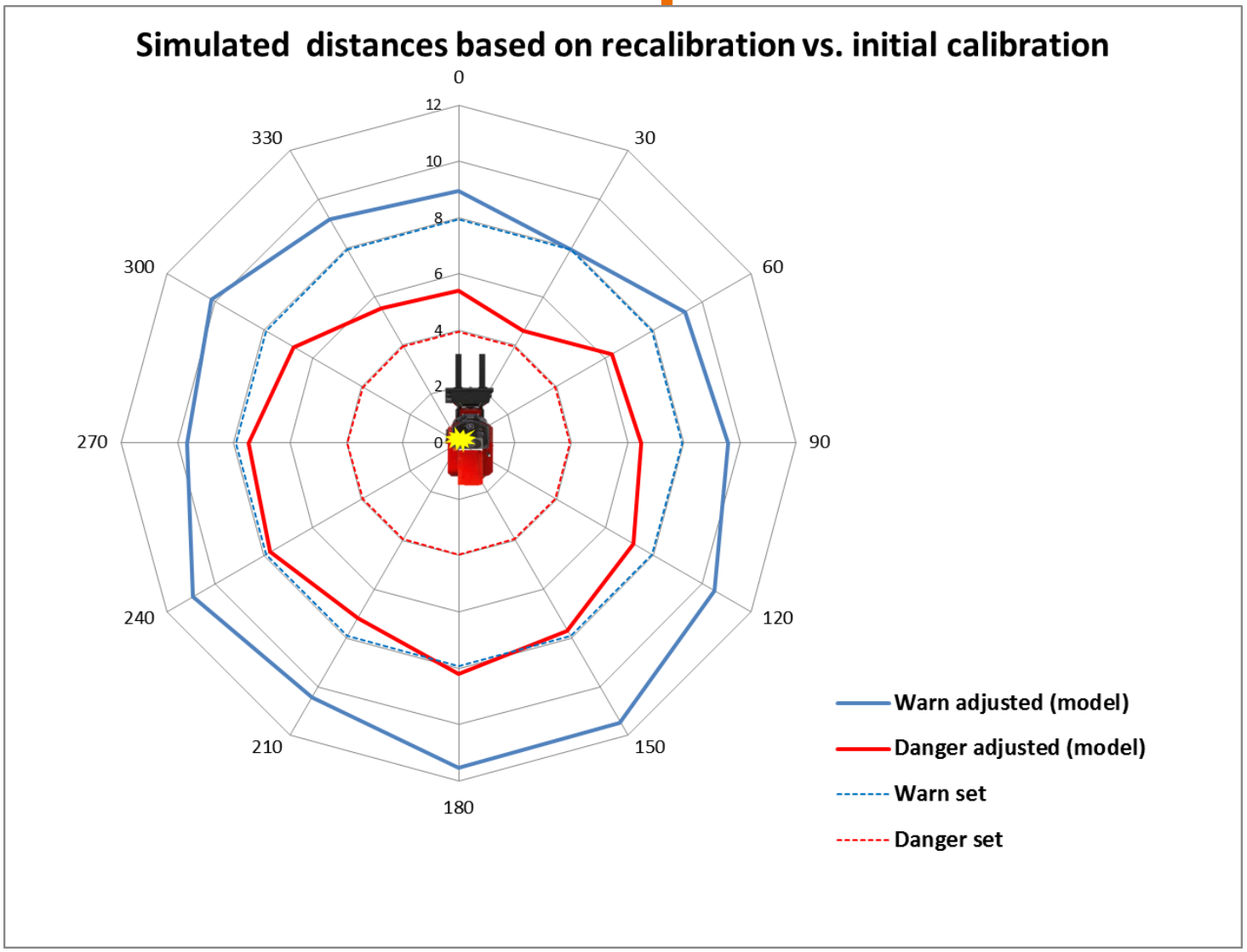
Results: static test - open area cont.



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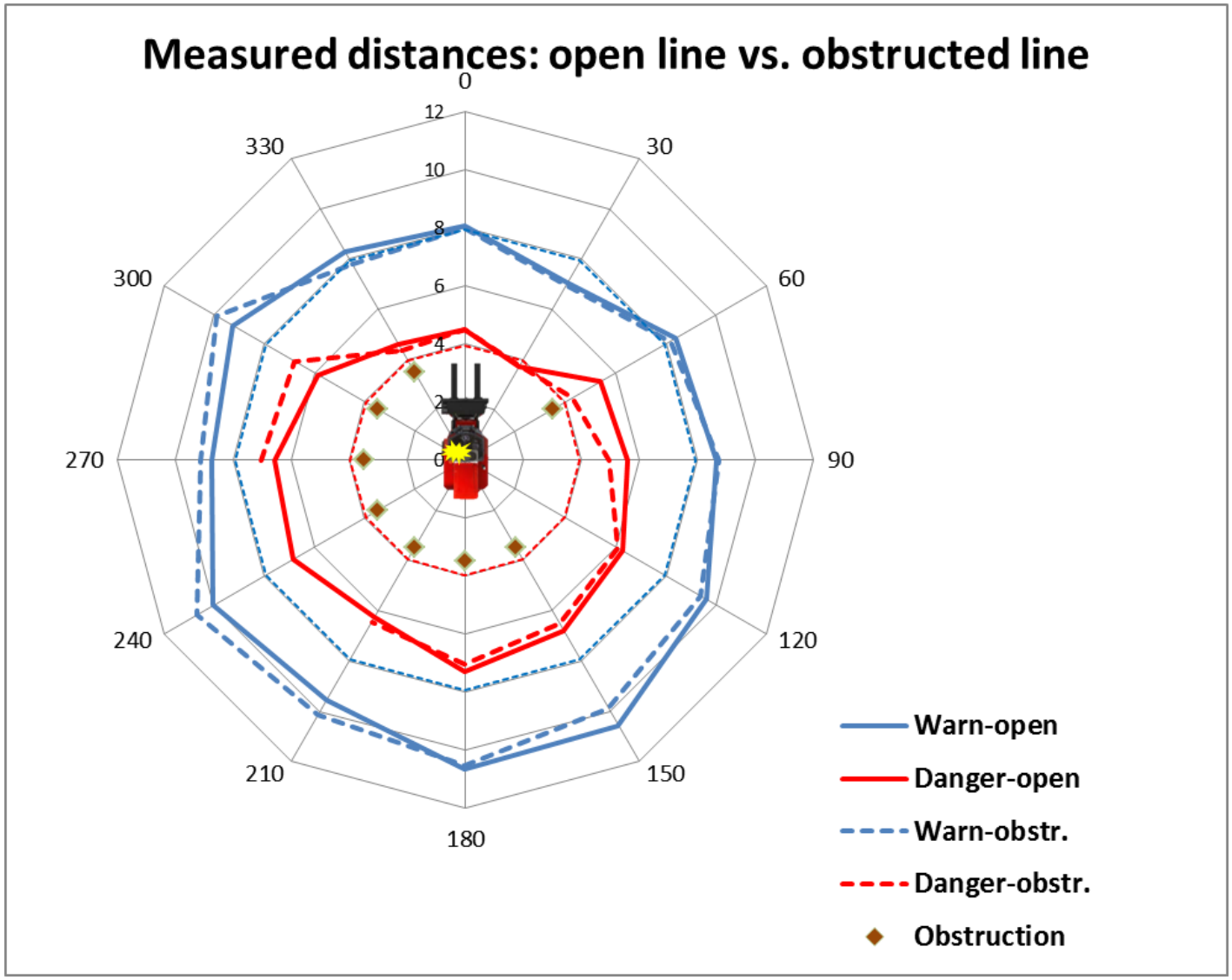
Results: static test – obstructed



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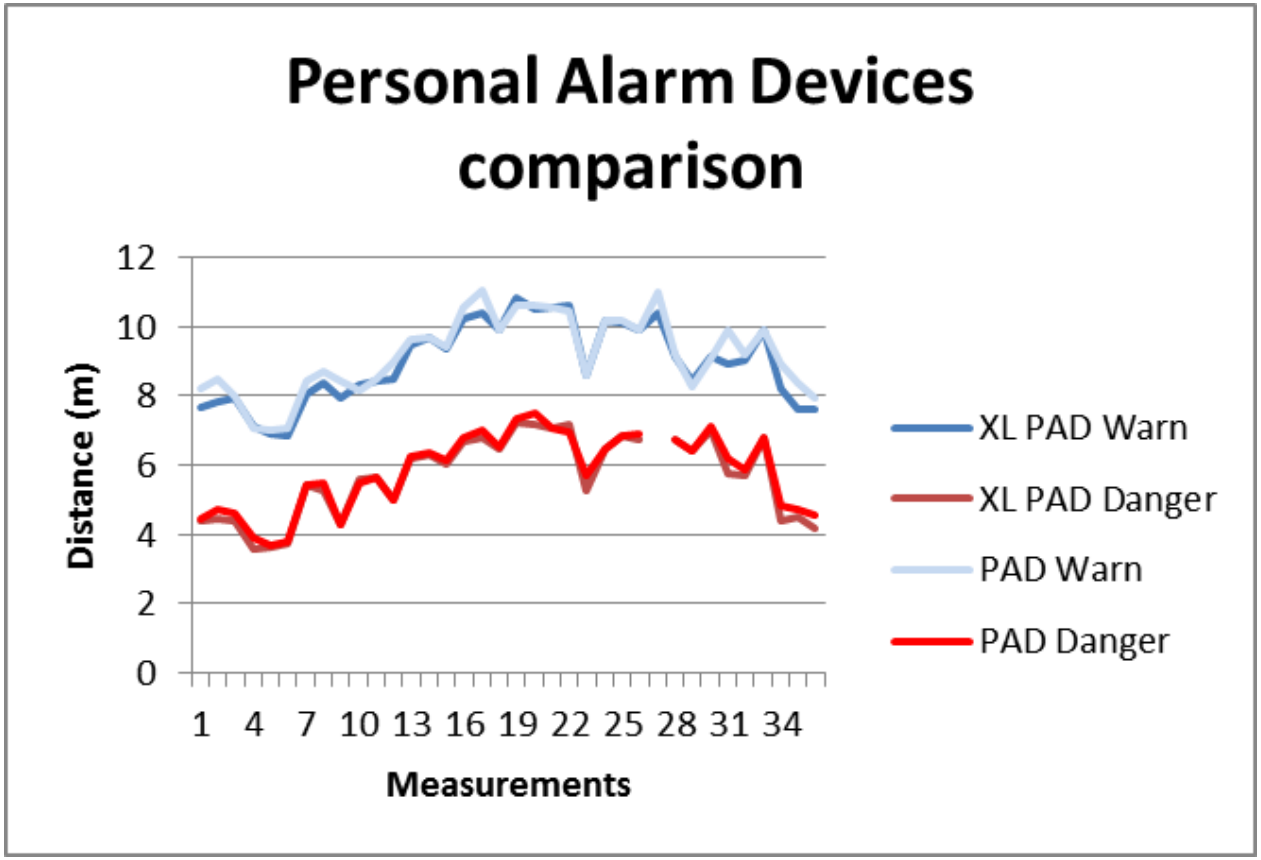
Results: static test – PAD vs. XL PAD



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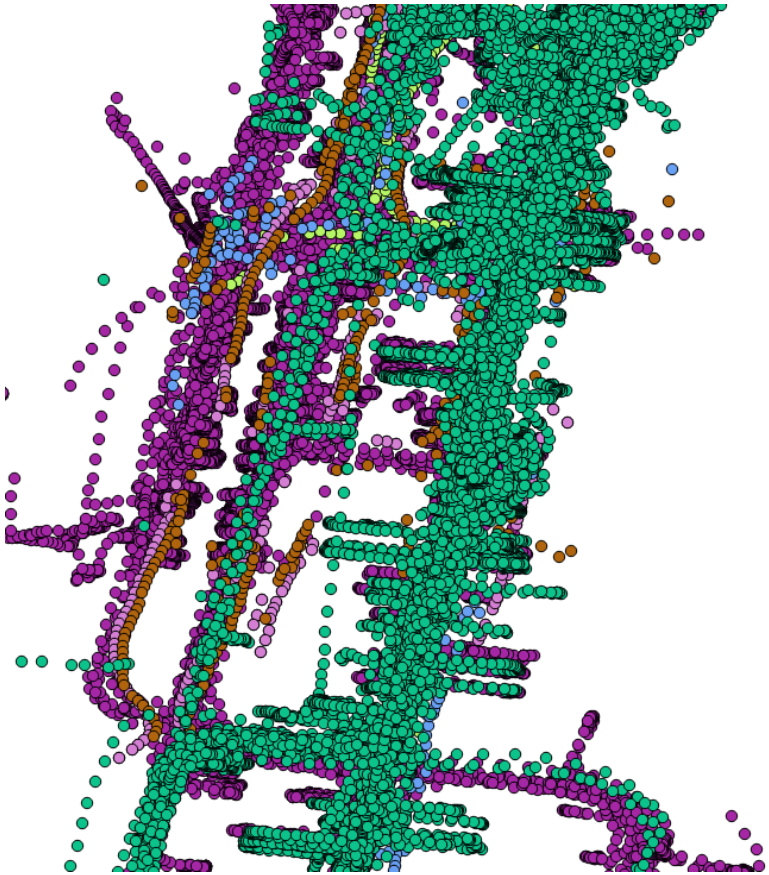
Results: dynamic test

- About 60,000 forklift points
- Over 1500 pedestrian points
- GIS analysis based on static test measurements



Attribute table - Ped1aK1106Isection :: Features total: 117467, filter...

	Time2	ID	MACHINE	LATTITUDE	LONGITUDE	
0	17:23:01	15821.00000	41.00000	53.99525	-122.69212	201
1	17:23:01	15818.00000	41.00000	53.99526	-122.69212	201
2	17:23:01	15815.00000	41.00000	53.99526	-122.69212	201
3	17:23:01	15817.00000	41.00000	53.99526	-122.69212	201
4	17:23:01	15816.00000	41.00000	53.99526	-122.69212	201
	17:23:01	15819.00000	41.00000	53.99526	-122.69212	201

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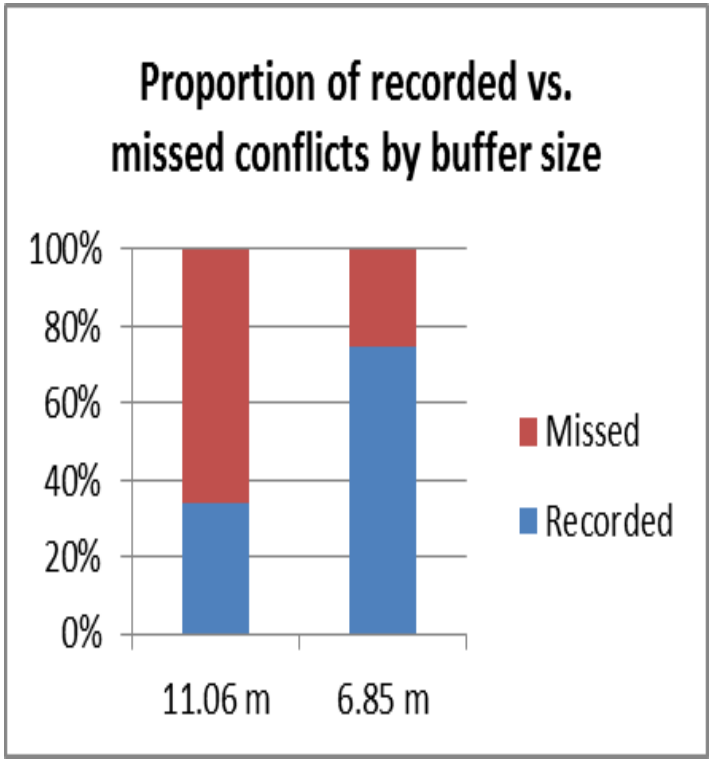
Results: dynamic test cont.

- GPS accuracy (2-3 m) quite low compared to buffer sizes
- Data logger not effective
- Average traveling speed: main roads (15.5 km/h), secondary roads (7.8 km/h)



- Corresponding minimum braking distances (model): 10-11 meters (main roads), 4-5 meters secondary roads

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Conclusions

- A buffer (e.g. 90 cm) can be used to ensure that all alerts are within a safe limit.
- Device generally functioned as per manufacturer's parameters
- Good readings through obstacles
- Device should centered on the machine for appropriate and accurate readings
- Dynamic data was unreliable. Improved GPS and data logger tech needed.

Conclusions cont.

- Speeds were accurately measured
- System distance settings should adjusted for machine speed and braking distance
- It is anticipated that the range could be extended for conditions and still provide reliable results.
- Additional standards and safety controls are still advised.

Discussions

- Underground powerlines appear to induce false alarms
- System cannot make a difference between one PAD or multiple PADs within its range
- XL PAD's cord occasionally bothers
- Operators prefer to have the warning module closer to the dashboard
- Potential improvements: multiple pre-set calibrations (long-short range) easy to switch, PAD identification capability

Aknowledgements

- Prince George CANFOR's sawmill team
- Frederick Energy, LLC (Hit-Not Proximity Detection manufacturer)

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