

Commercial Vehicle Tire Profile System

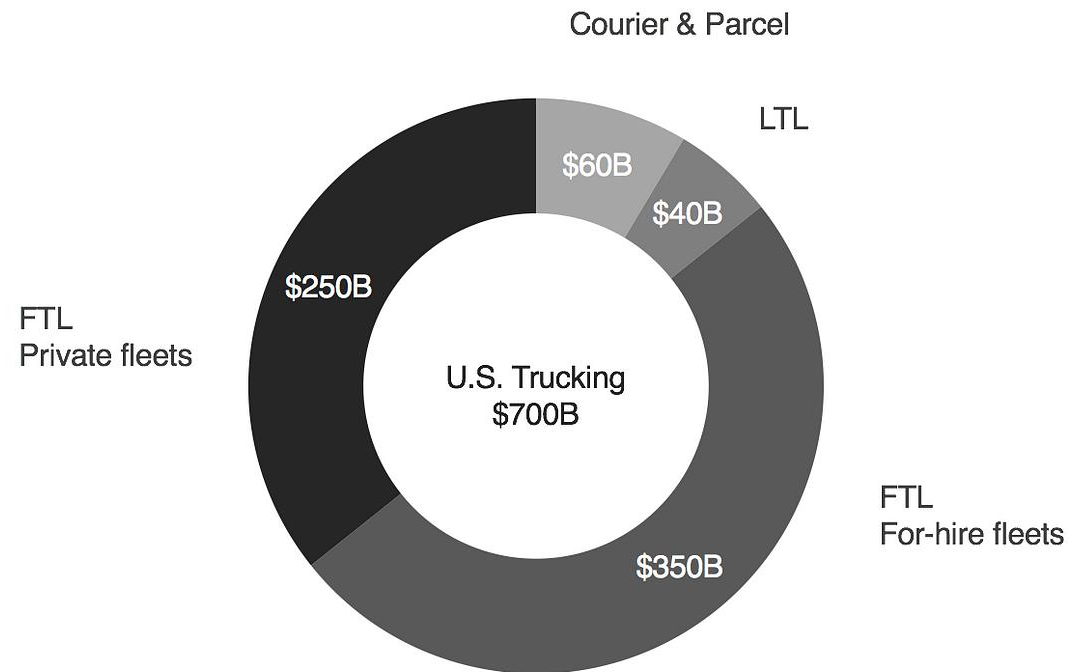
Tire safety & driving solution

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Background

Logistics = The Plumbing of our Economy



*Source : American Trucking Associations



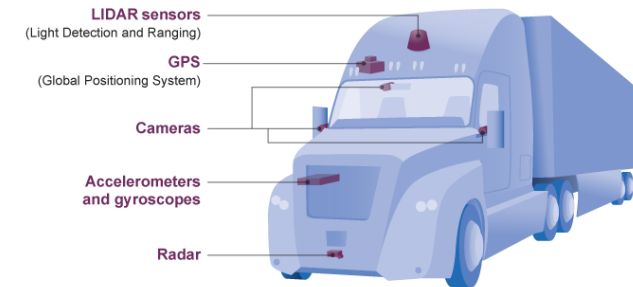
Problem

Weakness of truck operation:
tire safety + road information

Self-driving trucking issues

- The ultimate goal of fleet & autonomous truck is 24/7 operation
 - All-day / all-weather operation
- Categories of truck accidents:
 1. Driver errors
 2. Tire defects
 3. Road condition
 - Self-driving focuses on no human errors

Technologies for AV Trucks



*Source : GAO analysis of interviews with technology developers. GAO-19-161

Five Must-Know Facts About Truck Accident

- A 52% increase in these accidents has been noted since 2009.
- 74% of all fatal passenger vehicle cases include a large truck.
- Tire defects account for around 30% (the most common cause) of all truck-related accidents.
- Most of these accidents occur during the day – between noon and 3 PM, up to 19%
- 68% of all truck fatalities are passenger vehicle occupants.

Problem Analysis

Self-driving truck tire issues



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- **Driving time :**
 - 8 → 24 hours a day
- **Tire replacement cycle :**
 - 1 year → 2.5 months
- **Tire defect accident rate :**
 - 30% → 70% more

- Tire of autonomous truck
 - Tire safety info
 - Gas & tire saving info
 - Road surface info

- Tire profile data
 - Tire mounted sensor
 - Real-time data analysis
 - Sensor power solution

Tire profile data = Tire defect & road surface info & driving info

Tires tell many things

Tire is only part to touch the road and
can tell valuable information by tire profile analysis



TPMS

(tire pressure, tire temperature)



Road surface

(Slippery Road,
Pothole depth)



Loosening lug nuts



Tire tread measurement



Wheel Alignment Optimization (gas/tire saving)



Wheel theft

Commercial Vehicle Real-time Tire Technology

Tire Condition
Wheel Alignment
Loosen Lug Nuts
Road Information

Smart Profiler

iSensor



Fleet case : operation saving + tire accidents prevention= \$134.5K/year

01

**BANF tire profile system reduces
cost of truck operation**

7% (\$11.5K) per year saving

02

**Annual operation and accidents
saving per truck**

\$123.5K/year

- Average annual rate of tire accidents – 1.6/year
- Tire accident compensation - \$70,000/accident

Factor

**Gas
15%**

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**Tire
10%**

...

**Main
-tenance
25%**

...

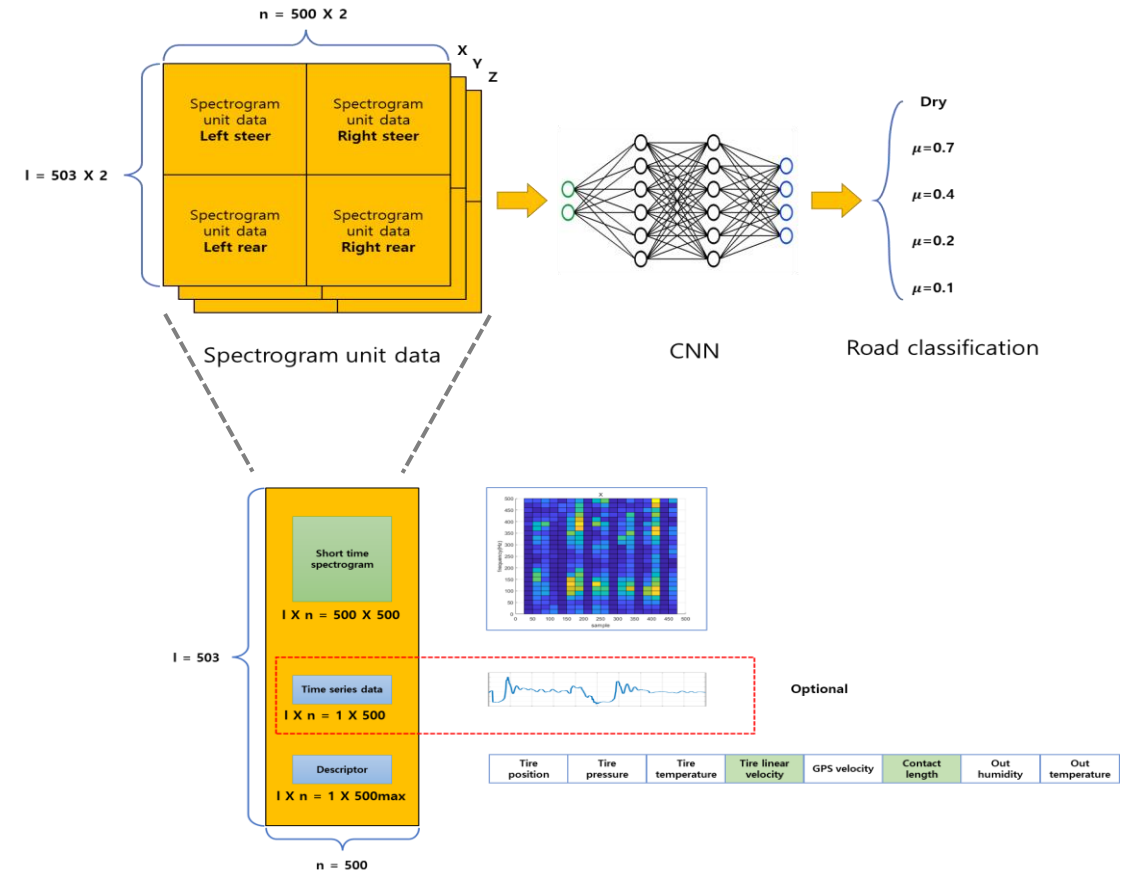
**Insurance
5%**

...

plus

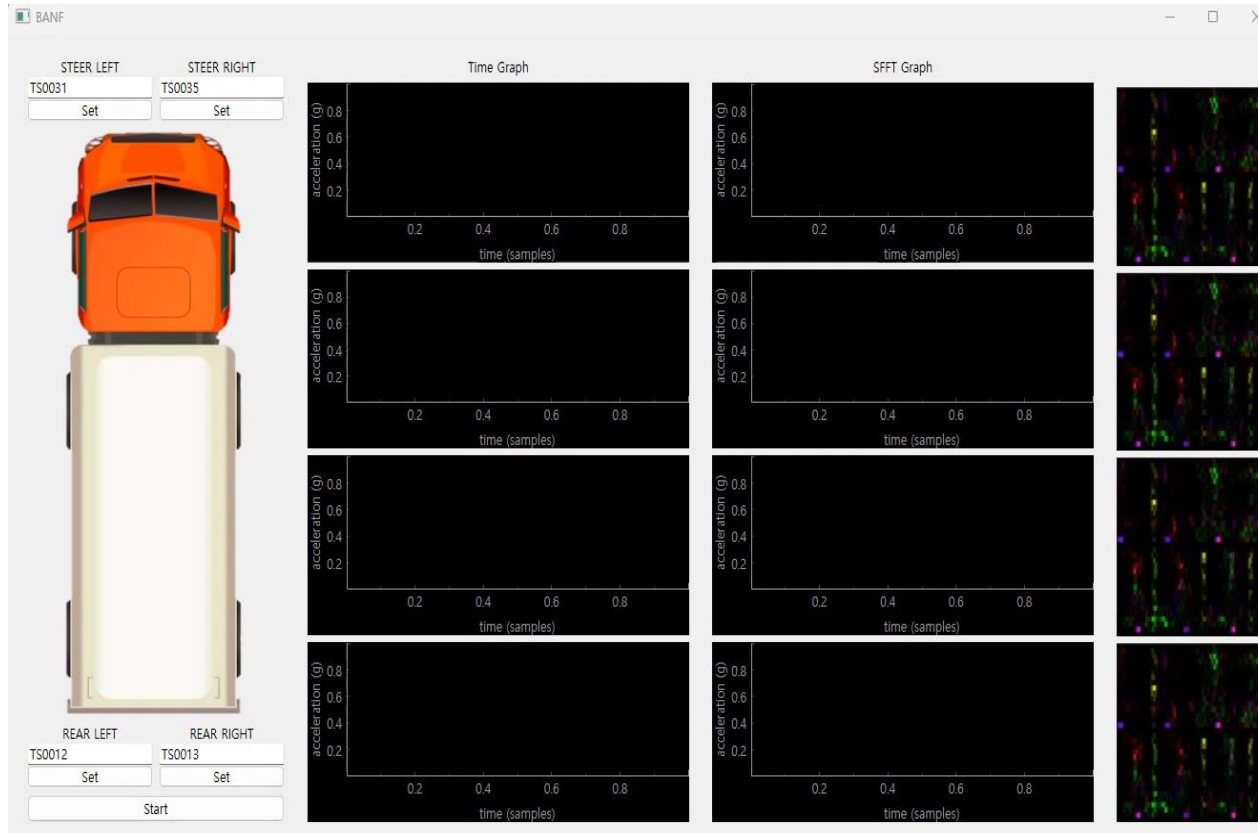
- Down time
- Revenue loss
- Labor Efficiencies

Neural Network Approach & Analysis



Business Map

Road Profile / Road Management



Performance metrics for road classification algorithm

	Precision (%)	Recall (%)	F1-Score (%)
Reference	96	99	97
$\mu 0.1$	100	84	91
$\mu 0.2$	96	90	93
$\mu 0.4$	90	87	88
$\mu 0.7$	72	91	80
Accuracy	90		
Macro avg	91	90	90
Weighted avg	91	90	90





Raised USD \$6 Million

WE ventures



Adam You CEO

- Seoul National University E.E Masters and Bachelors
- LS Group Senior Researcher
- Korea Electronic Consortium Member
- Korea Wireless Consortium Forum Member



Ron Lee VP

- 500 Global, Startup Growth Manager
- Mind the Bridge, Investment Manager
- Zephyrus Lab, Investment Manager
- CJ E&M, Global Business Expansion



Tire safety system for all day fleet and road safety

Easy to Integrate

Free testing

Global Reference

Life Saving & Cost Saving





Tire profile data by

BANF

Tire
Safety
AI