Behind the Wheels
An open platform to quantify on-the-road driving behavior and to promote behavior change of adolescents using smartphone, gamification, and big data
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Teen drivers have 3X higher crash rate than drivers 20 or older age per mile & almost 42% of teens use smartphones behind the wheel [1]
Existing methods for driving detection require specialized device connecting to the on-board diagnostic (OBD) portal – high cost and proprietary.
The apps in the market are used by insurance companies – not focused on driving behavior change and research

We propose a smartphone-based data collection, event detection and gamification (for feedback and education) platform to promote safe driving behavior of teens and to advance driving safety research

Literature & Market research

- Smartphone sensors are highly accurate in detecting events
- Gamification is promising, yet not enough studies on its efficacy
- Low cost, feedback mechanism and influence of role model are effective
- Determining risky driving behavior thresholds based on sensor data:

<table>
<thead>
<tr>
<th>Event Type</th>
<th>Threshold sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low (a)</td>
</tr>
<tr>
<td>Acceleration</td>
<td>0.1 g</td>
</tr>
<tr>
<td>Braking</td>
<td>-0.2 g</td>
</tr>
<tr>
<td>Turning</td>
<td>0.1 g</td>
</tr>
</tbody>
</table>

Apps in the market

- Ingenie
- SafeDrive
- EverDrive
- Driving Curve

Preliminary results

- Event detection - Discrete wavelet transform algorithm
- User perception - Research model for understanding teen’s perception towards a gamified solution

Impact

Increase the awareness of driving safety and change driving behaviors of adolescents
- Short term: develop and validate the program in the US; reaching 1,000,000 adolescents in three years; for a total cost of $2M
- Long term: annually reaching 10 million adolescents globally in 10 countries at a low operating cost of 100,000 USD per year per country

Big Data Collection for R&D
- We will create the largest driving corpus in the world with approximately 3 million drivers in the next five years

<table>
<thead>
<tr>
<th>Simulators</th>
<th>TeenSafe</th>
<th>Allstate</th>
<th>BTW</th>
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</thead>
<tbody>
<tr>
<td>Condition</td>
<td>off-the-road</td>
<td>on-the-road</td>
<td>on-the-road</td>
</tr>
<tr>
<td>History</td>
<td>1990s</td>
<td>2010s</td>
<td>2015</td>
</tr>
<tr>
<td>Device</td>
<td>Specialized</td>
<td>Specialized</td>
<td>Smartphone</td>
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<tr>
<td>Platform</td>
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