In Australia, driver fatigue is a major safety hazard for the road transport industry, with 60-65% of all truck haulage accidents directly related to driver fatigue. This is despite heavy vehicle driver’s work and rest hours being written into law, with drivers required to comply via paper-based work diaries. Accuracy of diaries is often poor and changing driver behaviour is difficult, as tired drivers are often the worst judge of their own fatigue.

From 2017 the use of Electronic Work Diaries will be permitted. EWDs communicate with IVUs (Internal Vehicle Units) that accurately measure engine activity, speed, distance, and driving behaviour. Eyelid tracking through cameras fitted in the cab or special eyeglasses has also proven effective in measuring driver fatigue.

The challenge that this prototype addresses is how to present the information to the driver themselves to assist them in understanding their fatigue and encourage behavioural change. Drivers often have a poor education history with near 50% failing to complete high school. Providing a simple UI that alerts but does not distract the drivers is a crucial part of this IoT solution.

References:
https://en.wikipedia.org/wiki/Fatigue_Detection_Software
http://work.chron.com/degree-needed-truck-driver-22202.htm
Persona – Truck Driver

Steve
Heavy Vehicle Driver

“I’m always under pressure to get to my destination asap... I still want to get home to my family in one piece. I don’t have time or energy for complicated tech stuff.”

About

- Early 40s, young family, been a truckie all his life
- Left school early – didn’t finish high school
- Long multi-day trips delivering hazardous materials into rural Australia
- Uses a mobile phone to contact family and friends, and for basic consumer apps (Google Maps, Facebook, Instagram, Snapchat, etc.)

Responsibilities

- Deliver goods to destination
- Complete work diary
- Comply with driver hours and rest breaks
- Drive in safe and professional manner

Main Goals

- Stay safe on the roads
- Minimize delays in getting to destination
- Manage my own fatigue

Needs

- I need to know how long until my next break
- I need to find somewhere to stop
- I need to know if I have rested for long enough to continue
- I need to know if I’m complying with the law so I don’t get my boss or the police on my back

Pain Points

- It’s hard to watch the road and work out when I next need to break
- It can be hard to know how tired I am
- There are lots of rest stops but if I don’t know they are coming up I can miss them... and then I go over time to start my rest break
Point of View

As a Heavy Vehicle Driver

I need a way to manage my fatigue

so that I can stay safe on the roads, keep my boss & the authorities off my back, and get home to my family in one piece.
## User Experience Journey – Heavy Vehicle 2 day Truck Trip

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>Get into Truck</th>
<th>Driving along the road for hours (daytime)</th>
<th>Take a short break at the nearest Heavy Vehicle Rest Area</th>
<th>More driving, driving, driving</th>
<th>Deliver goods; Overnight rest break at a Motel</th>
<th>Pick up return delivery; Head home</th>
</tr>
</thead>
<tbody>
<tr>
<td>MINDSET</td>
<td>Alert, awake and ready to go!</td>
<td>Driving a truck is hard work... I’m getting tired</td>
<td>I need a cuppa, a stretch &amp; the gents!</td>
<td>I just want to get this job done</td>
<td>By the end of the day I’m famished &amp; exhausted</td>
<td>Finally! Now I just have to drop this off &amp; get home to my family</td>
</tr>
<tr>
<td>FEELING</td>
<td>😊</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOUCH POINTS</td>
<td>Trip plan; Truck and cab check; start work diary</td>
<td>Speed dial; GPS; Optional eyelid tracking</td>
<td>Interactive Rest area map <a href="http://www.rms.nsw.gov.au/roads/using-roads/trip-information/rest-areas/restareasmap/index.html">http://www.rms.nsw.gov.au/roads/using-roads/trip-information/rest-areas/restareasmap/index.html</a></td>
<td>Speed dial; GPS; Optional eyelid tracking</td>
<td>Talk to customer, other, truck drivers &amp; motel staff</td>
<td>Speed dial; GPS; Optional eyelid tracking; complete work diary</td>
</tr>
</tbody>
</table>
Prototype

Prototype screens for an IoT application to solve your PoV

Focus is on creating a very simple but effective UI that even someone with poor literacy can use.

Driver logs in on his phone by taking a photo of licence plate & putting finger on button for biometric reading

Once engine is started, next rest break is calculated and a countdown is shown. If the next required break is a short stop a cuppa (cup of tea) icon is shown - a well-known symbol due to the Driver Reviver program [http://www.driverreviver.com.au/](http://www.driverreviver.com.au/).

If the next required break is a 7 hour long rest break a bed icon is shown.

If the driver misses his rest time the time until break shows as negative, an alert text and icon is shown.

If the truck cab has fatigue detection software fitted or the driver is wearing eyelid tracking glasses and fatigue is detected, the screen turns amber and a warning to pull over is shown. Sounds may also be added such as audible beeps, or 10 second audio recordings of family or friends urging the driver to take a break, e.g. “Daddy please take a break now”.
When not driving, on his phone the driver can review a list of his trips showing how well he has complied with heavy vehicle law as a %age. Further details of the trip can be shown to review the work/rest pattern of the trip. Where fatigue was detected by fatigue detection software or eyelid tracking this can be highlighted against the work/rest pattern to reinforce the need for breaks.
My Work Diaries

<table>
<thead>
<tr>
<th>Start Date</th>
<th>Destination</th>
<th>Compliance %</th>
</tr>
</thead>
<tbody>
<tr>
<td>23/10/2016</td>
<td>Bourke</td>
<td>95%</td>
</tr>
<tr>
<td>Work Hours: 18:25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rest Hours: 10:05</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| 15/10/2016 | Adelaide    | 85%          |
| Work Hours: 28:50 |              |
| Rest Hours: 12:20 |              |

| 08/10/2016 | Parkes      | 100%         |
| Work Hours: 09:06 |            |
| Rest Hours: 02:05 |            |

My Work Rest Pattern

Start Date 23/10/2016 Sydney to Bourke

- Driving Sydney to Goulburn: 2 hours 05 minutes
- Short Break: 0 hours 20 minutes
- Driving Goulburn to Dubbo: 4 hours 40 minutes
  - Fatigued 4 hours 20 minutes
- Long Break: 07 hours 15 minutes
- Driving Dubbo to Bourke: 3 hours 05 minutes
- Delivery Destination reached