# Pixida I

Science Hack 2019 - Team **Greta TUMberg**

Problem Statement

- How can we make driving more eco-friendly?

- What makes a car ride detrimental to the environment?

- How can we use complex algorithms, gamification and user-friendliness to encourage good driving behaviour?

➡ Create a web app allowing users to track, share and compare their driving behaviours and examine methods to improve based on a calculated *Eco Score*
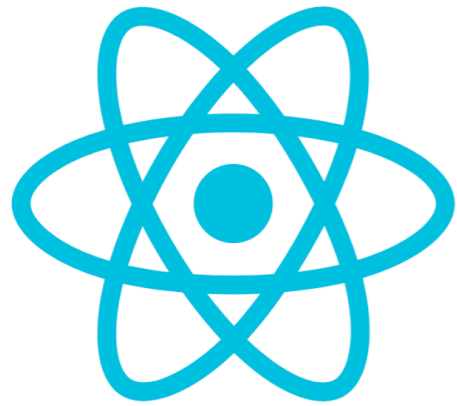
Software Stack

Approach

- Calculate *Eco Score* per trip

- Examine *Eco Score* trend per user

- Social network enabling statistical comparison of *Eco Score* amongst friends and others

- Live track an ongoing trip:

  - Calculate live *Eco Score*

  - Communicate speeding, breaking and accelerating behaviour

  - Give live recommendations for improvement

The Algorithm (1)

- Sharp accelerations *(AS)* - $a(t) > 1.1 m/s^2$

- Sharp deceleration *(DS)* - $a(t) < -1.1 m/s^2$

- Long-Time Accelerations *(LA)* - $T_a > 5s$

- Long-Time Idling *(LI)* - $T_i > 60s$

- Low Speed *(LS)* - $avg(v(t), \ldots, v(t-59)) \leq 23 km/h$

- Frequent Start and Stop *(SS)*

The Algorithm (2)

- High-Speed Cruising *(HS)*

  (i) $avg(v(t), v(t-1), v(t-2), v(t-3), v(t-4)) \geq 60km/h$

  (ii) $max(a(t), a(t-1), a(t-2), a(t-3), a(t-4)) \leq 0.28m/s^2$

- Starting Moderately *(SM)*

  (i) $10km/h \leq v(t) - v(t-4) \leq 20km/h$

  (ii) $max(a(t), a(t-1), a(t-2), a(t-3), a(t-4)) \leq 1.1m/s^2$

- Breaking Moderately *(BM)*

  (i) $-25km/h/s \leq s(t) - s(t-4) \leq -15km/h/s$

  (ii) $min(a(t), a(t-1), a(t-2), a(t-3), a(t-4)) \geq 1.1m/s^2$

$$Score_E = 80.549 - 6.927F_1 + 1.455F_2 + 0.565F_3$$

$$F_1 = 0.181N_{AS} + 0.184N_{DS} + 0.187N_{LA} + 0.167N_{LI}$$
$$+ 0.195N_{LS} - 0.172N_{HS} - 0.01N_{SM}$$
$$+ 0.088N_{SS} + 0.06N_{BM}$$

$$F_2 = 0.155N_{AS} + 0.227N_{DS} - 0.038N_{LA} - 0.175N_{LI}$$
$$- 0.068N_{LS} + 0.138N_{HS} + 0.375N_{SM}$$
$$- 0.322N_{SS} + 0.592N_{BM}$$

$$F_3 = 0.145N_{AS} + 0.217N_{DS} - 0.129N_{LA} - 0.183N_{LI}$$
$$- 0.136N_{LS} + 0.270N_{HS} - 0.681N_{SM}$$
$$+ 0.367N_{SS} + 0.369N_{BM},$$

Tweaking the Algorithm