Objective Measurement of Student Driving Performance using State Farm® Driver Feedback™ Instructor Edition

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Visionary Leadership

“To lead effectively, you must be unfailingly, unrealistically, even irrationally, optimistic.”

Quote from “The One Thing You Need to Know” by Marcus Buckingham
Visionary Leadership

“To effectively teach Drivers Ed, you must be unfailingly, unrealistically, even irrationally, optimistic.”
Assignment

Build a smartphone app that relates to auto safety
What?

 ✓ Quantify “invisible” driving behaviors

 ✓ Design a teen-friendly tool to self assess their driving behaviors

 ✓ Give parents an “unbiased” third-party tool for training their teen

 ✓ Enable, reinforce and incent driving behavior improvements
Why?

✓ Awareness of poor driving behaviors is the first step to improvement

✓ Potential for quicker learning and mastery of basic driving tasks – ABC’s of driving

✓ Potential for reduction of crash rates if people improve their ABC scores

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Challenges?

✓ Telematics devices are expensive

✓ Need to quantify acceleration, braking and cornering g-forces into a scoring model that is easy to understand

✓ Need an accurate scoring model
Solution

✓ Use a smartphone to record driving data

✓ Execute a driving experiment to capture the full range of driving behaviors

✓ Develop an accurate scoring model to quantify ABC driving behaviors at the trip level
MAR 2010

Data Logger App
Vehicles
Equipment syncs 4 video cameras with GPS and axis g-force data.
Eric

LAST 5 TRIPS

84

4:22
DURATION (h:m)

4
TRIPS

200.6
DISTANCE (mi)

Acceleration 94

Braking 89

Cornering 100

Developed by StateFarm
See How You Score

Your score is based on three factors:

- ACCELERATION
- BRAKING
- CORNERING

Want to score big?

→ Watch your speed – don’t slam on the gas!
→ Leave plenty of space between your car and the car in front of you.
→ Allow plenty of time for braking.
→ Be sure you’re not taking those turns too tight!
School
Tue, Mar 29, 2011
9:46AM
6 min
1.7 miles

85

- Acceleration: 80
- Braking: 80
- Cornering: 100
Accelerating too fast increases your chances of causing an accident, and puts other drivers and pedestrians at risk. Sudden changes in your speed make it hard for others to see and react to you. Too much acceleration wastes gas, too, and that could hurt your bank account.

The key to proper acceleration? Put your foot down gently and accelerate steadily until you reach your preferred speed.
Driver Feedback App

- Free self-assessment tool scores your acceleration, braking and cornering.
- Tracks your improvement to help you reduce your driving risk.

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State Farm
Consumer Research
Survey reveals:

61% OF PARENTS

want this app to be used during "Behind The Wheel" training

* Survey sourced from CFC, led by Renee Durst, Consumer Research, Strategic Resources, 2012, n=1000
59% of teens want to use this app during “Behind The Wheel” training.
1. First objective way to measure student driver performance over time

2. Instructors can share student progress with parents and other instructors to aid and improve learning process

3. Fun for students to see their progress by competing against themselves
4. Quantifiable metrics for improving teaching methods

5. Enables schools to evaluate effectiveness of the instructor and the program

6. Students can learn driving skills quicker with positive reinforcement
Work Flow

- Record Trip
- Create Note
- Stop Trip
- View/Compare Trips
- Email Trip to Parent or Guardian
- Email Reports to DEI (at user timing)
- Record Next Driver’s Trip
Record Trip
IMPORTANT: For your safety, do not place device on dashboard.
Create Note
View/Compare Trips
Chris Jacob

Overall Score: 64

Duration: 0:26
Trips: 1
Distance: 2.9

Acceleration: 72
Braking: 50
Cornering: 76
Saturday class

Speeds are estimates

50mph

Hide Speeds

Light Moderate Severe Interruption

Summary Map Alerts
Note - Stopped in Crosswalk

Acceleration
Acceleration
Acceleration
Acceleration
Acceleration

End Trip
<table>
<thead>
<tr>
<th>Reports</th>
<th>Drivers</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Kristen</td>
</tr>
<tr>
<td>Normal West</td>
<td>79</td>
</tr>
<tr>
<td>Tue, May 16, 2014 at 11:30 AM</td>
<td></td>
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<tr>
<td>First Trip</td>
<td>78</td>
</tr>
<tr>
<td>Fri, May 12, 2014 at 11:45 AM</td>
<td></td>
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<tr>
<td>Practice Trip</td>
<td>65</td>
</tr>
<tr>
<td>Tue, May 11, 2014 at 11:45 AM</td>
<td></td>
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<tr>
<td></td>
<td>Chris Jacob</td>
</tr>
<tr>
<td></td>
<td>Edward</td>
</tr>
<tr>
<td></td>
<td>Jack Dawson</td>
</tr>
</tbody>
</table>
Friday class (2)
Chris Jacob

79
Weekend Drive
Tue, May 16, 2014 at 11:30 AM

78
College Trip
Fri, May 12, 2014 at 11:45 AM

10:15
DURATION (h:m)
5.7
DISTANCE (mi)

Acceleration 50
Braking 78
Cornering 97

02:40
DURATION (h:m)
4.3
DISTANCE (mi)

Acceleration 50
Braking 77
Cornering 95
Email Trip to Parent or Guardian
Chris Jacob

Overall Score 64

Duration (h:m) 0:26
Trips 1
Distance (mi) 2.9

Acceleration 72
Braking 50
Cornering 76
RE: State Farm Driver Feedback Instructor Edition

scored your teen at 64 in their Behind the Wheel drive today.

Overall = 64   Accel = 72   Braking = 50   Cornering = 76

Chris drove on the interstate for the first time. Great student with a great attitude! Ask him about his drive and what he learned today.

Regards,

John Doe, Drivers Education Instructor
District 254, Arlington Heights
Manage Drivers
Instructor Name

Kim David

Email Address (Optional)

Receive copies of reports and summaries?

Delete

Save
Type to find a driver

Chris Jacob

Edward

Jessy Anderson
Manage Groups
Driver Name
Jessy Anderson

Email Address (Optional)
jess.ander@gmail.com

Groups
Friday group
3_Group New

Select Group

Save
Select groups

- Friday group (4)
- Friends (2)
- Office (0)
- 25 March Wed (0)
- 3_Group New (0)
Monday group (4)

Select a driver to record a trip

Chris Jacob

Edward

John Smith
Send DEI Reports via Email
Overall Score 59

- Duration (h:m): 0:26
- Trips: 1
- Distance (mi): 2.9

- Acceleration: 50%
- Braking: 79%
- Cornering: 89%
<table>
<thead>
<tr>
<th>Group</th>
<th>Count</th>
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<tr>
<td>Monday Group</td>
<td>4</td>
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<tr>
<td>Office Drive</td>
<td>2</td>
</tr>
<tr>
<td>Test Group</td>
<td>0</td>
</tr>
<tr>
<td>25 Mar Wed</td>
<td>0</td>
</tr>
</tbody>
</table>

Total: 64, 50, 73, 55
Industry Research and Driver Performance Monitoring
“The great majority of non-fatal accidents resulted from errors in attention, visual search, speed relative to conditions, hazard recognition, and emergency maneuvers…”

YOUNG NOVICE DRIVERS: CARELESS OR CLUELESS?
A. James McKnight, A. Scott McKnight
Research

Among crashes with a teen driver error:

• Twenty-one percent occurred due to lack of scanning that is needed to detect and respond to hazards.

• Twenty-one percent occurred due to going too fast for road conditions, (for example, driving too fast to respond to others, or to successfully navigate a curve).

• Twenty percent occurred due to being distracted by something inside or outside the vehicle.

State Farm Tools

• Tool for parents – what to teach their kids
• Learn, plan, practice, log
• Focused learning on important skills

• Tool for teens
• Web-based interactive tool
• Focused on hazard detection
Skills – Road Trips Tutorials

TUTORIALS IN HIGHWAYS

<table>
<thead>
<tr>
<th>TUTORIAL</th>
<th>DESCRIPTION</th>
<th>ENVIRONMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scanning/Reading Signs</td>
<td>Know where the signs are on a highway and be able to read them quickly</td>
<td>Highways</td>
</tr>
<tr>
<td>Disruptions in Highway Traffic</td>
<td>React to changes in traffic due to lane closures, accidents, and work zones</td>
<td>Highways</td>
</tr>
<tr>
<td>Entering &amp; Exiting Highways</td>
<td>Learn to safely enter and exit highways</td>
<td>Highways</td>
</tr>
<tr>
<td>Anticipating Others’ Behavior</td>
<td>Understand the cues from other drivers on the highway</td>
<td>Highways</td>
</tr>
<tr>
<td>Lane Changing</td>
<td>Learn to move from one lane to another</td>
<td>Highways</td>
</tr>
<tr>
<td>Six Second Rule</td>
<td>Leave six seconds between their car and the car ahead</td>
<td>Highways</td>
</tr>
<tr>
<td>Speed Management</td>
<td>Adjust speed according to the traffic and road conditions</td>
<td>Highways</td>
</tr>
<tr>
<td>Skill</td>
<td>Metric</td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>-------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Scanning</td>
<td>gaze fixation length</td>
<td></td>
</tr>
<tr>
<td>Following distance</td>
<td>average time to collision</td>
<td></td>
</tr>
<tr>
<td>Speed management</td>
<td>average speed or number of times speed limit exceeded.</td>
<td></td>
</tr>
<tr>
<td>Lane management</td>
<td>number of lane departure warnings</td>
<td></td>
</tr>
</tbody>
</table>
Computer vision is a branch of computer science concerned with processing and interpretation of images from the real world.
Performance Measurement

• Scanning – eye tracking hardware or computer vision solution – demo 1, demo 2
• Following distance – iOnRoad or Drivea
• Speed management – navigation systems, iOnRoad, Drivea
• Lane management – iOnRoad, Drivea
Thank you for your attention!

Questions?