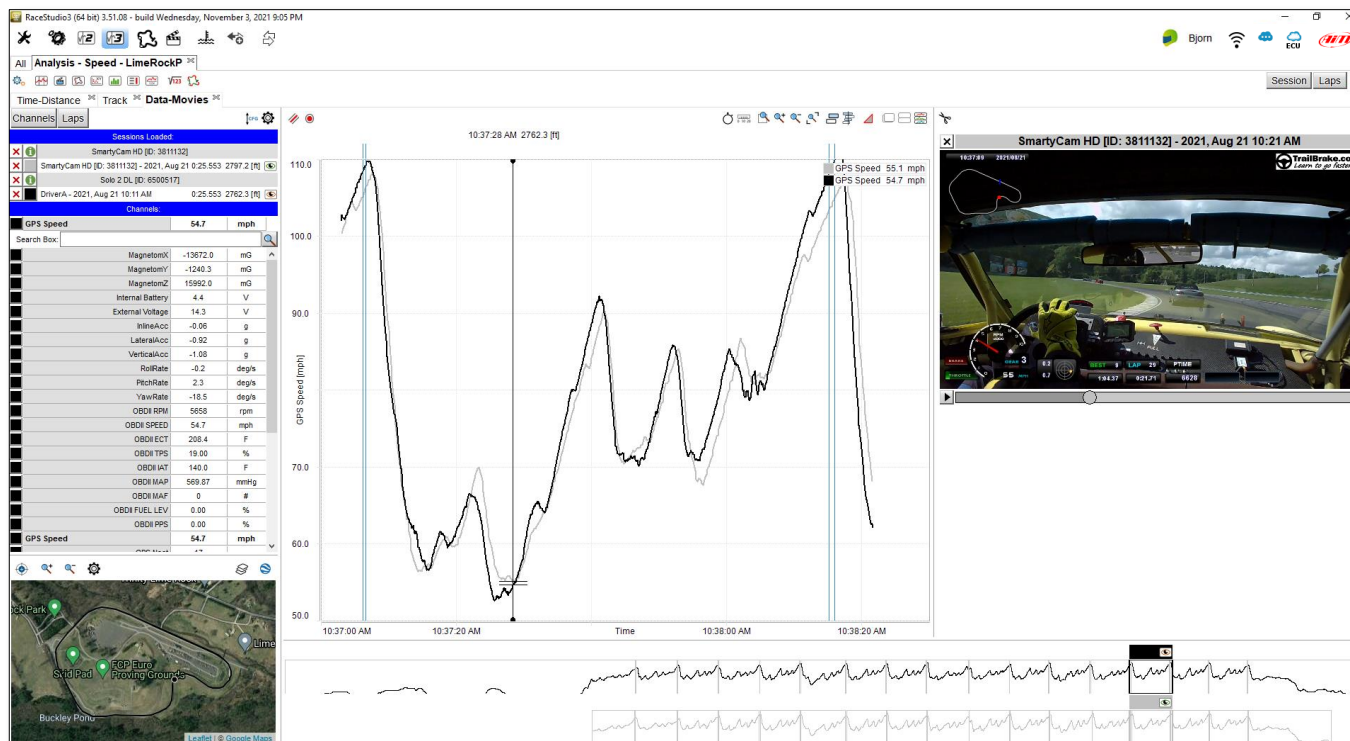


Data/Video Coaching Program



Designed by the Patroon Chapter - BMW Car Club of America



Host:

Roger Caddell

AiM Sports - National Training Manager

Guest:

Bjorn Zetterlund

Patroon Chapter – BMW CCA

Guest:

Matt Romanowski

TrailBrake.com



[aimsports.com](https://www.aimsports.com)

Tuesday December 7th, 2021

LearnFast™

Co-Host:

Bjorn Zetterlund

BMW CCA – Patroon Chapter

bjorn.zetterlund@ieee.org



- Bjorn Zetterlund, Ph.D., recently retired after 49 years as an electrical engineer and has been a lifelong motorsport enthusiast
- He started track driving at the first BMW CCA HPDE in 1974 at Lime Rock Park
- Bjorn began using data (g-analyst) and in-car video in 1987 and started instructing later that year
- Bjorn was the principal developer/presenter of the BMW CCA's Instructor Training School during 2007-2015 and over the past five years has been expanding the use of data acquisition for all
- Bjorn's introduction to AiM was with a Mychron3 on his Rotax RM1 kart in 2005.
- 1st Time AiM Sports Webinar Co-Host!



[aimsports.com](https://www.aimsports.com)

BMW CCA Patroon Chapter

Bjorn Zetterlund

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Co-Host:

Matt Romanowski

www.TrailBrake.com

 @TrailBrakeMatt



- Leading Technical and Stocking AiM Sports Dealer
- Seminars, at Track Coaching, Offsite Support, Online Sales, Pro Racing DAG
- Advanced CAN and Sensor Integrations, PDM Setup/Config, and more!
- 13 Time AiM Sports Webinar Co-Host!



www.TrailBrake.com

Matt Romanowski

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Patroon Chapter - BMW CCA

- Harry Adalian
 - Al Dimisko
 - Bruce Kosakoski
 - Bjorn Zetterlund
- } Patroon Data Team

<https://patroonbmw.org/>

<https://bmwcca.org/>



Patroon HPDE – An Introduction

- 1978 - Began Holding Multiple High Performance Driving Education (HPDE) Annually
- 2007 - Introduced Data Acquisition into HPDE (Race-Technology DL1)
- 2018 - Purchased two **AiM Solo2 DL's** for Student & Instructor Use
- 2020 - Patroon Data Team Formalized - Began Weekly Video Conferences
 - Inspired by AiM Sports and Roger Starting Consistent Webinars in March 2020
- Race Studio 2 Analysis (RS2A) Remains Our Mainstay
- Exploring Race Studio 3 Analysis (RS3A) Beta Since July 2020 With Focus on...
 - Data/SmartyCam Integration
 - Enhanced Line Mapping
 - Outstanding Software/Hardware Support from Matt Romanowski!

Program Rationale

- Patroon's Data Program was Initially Designed for Solo Students & Instructors
 - Identify & Break Bad Habits
 - Develop More Effective & Up-to-Date Driving Techniques
 - No Emphasis on Lap Times
 - Challenges:
 - Hesitation to Use Data
 - Perception that Data is Difficult to Use
 - Trying to Bridge This Using Several Approaches
...Squiggly Lines / Heat Maps / Video
 - Attracting Experienced Drivers to Use Data Coaching
 - Only Moderate Interest in Mid-Run Groups
 - Some Invest in Data Hardware but Lack Analysis Skills

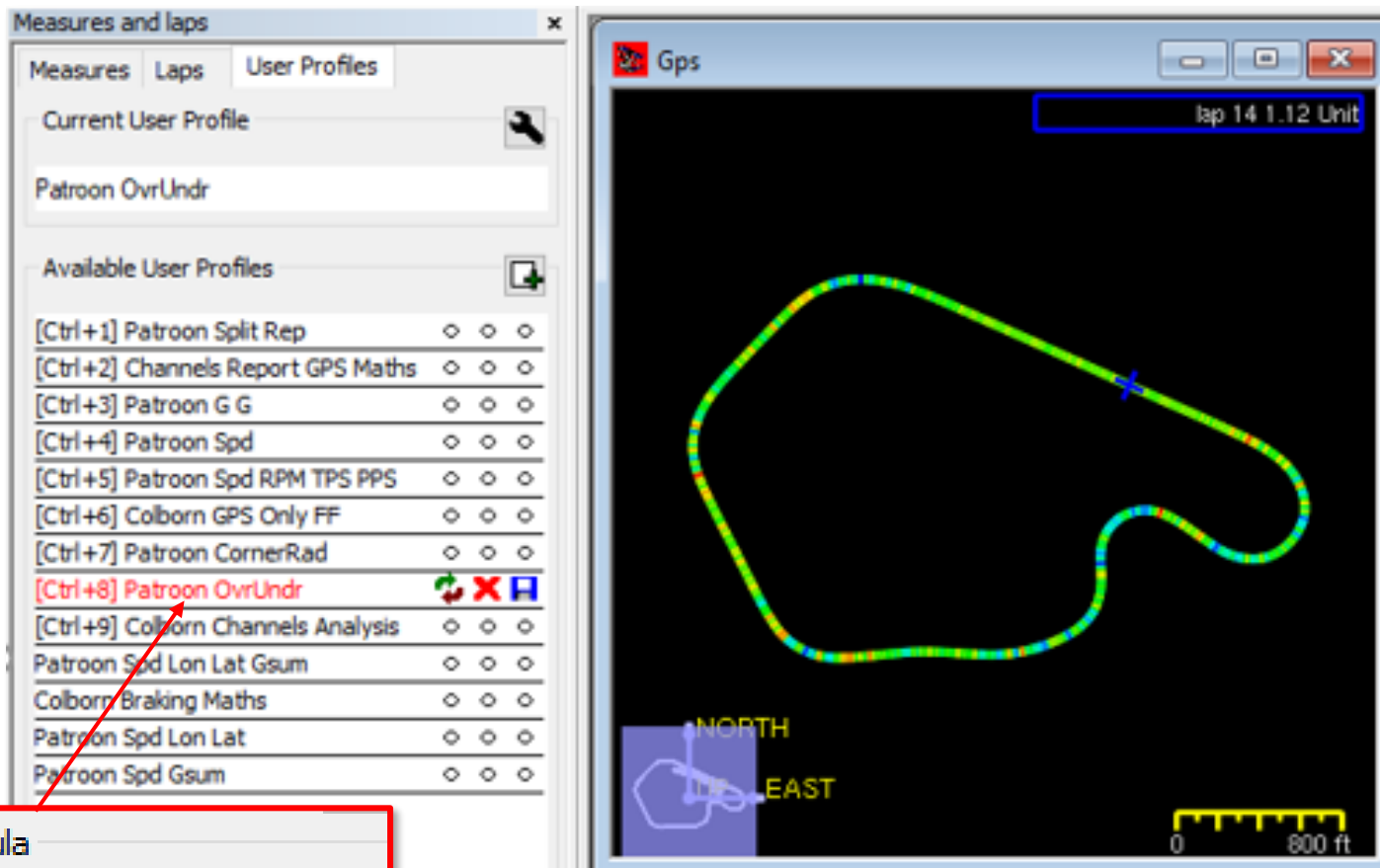
Program Methodology

- Patroon's Approach is to Focus on the Student
 - Pre-Event Interviews with Students
 - Delve into Their Goals and Objectives
 - Assess Their Working Knowledge of Data
 - Identify AiM COMMUNICATION PROTOCOL (If Applicable)
→ Program Before Event
 - Determine Day-of-Event Logistics for Coaching Sessions
 - Adaptable Goal Setting, Validation, Remediation/Development Plan During Event
 - Students are Provided all Run Data/Math Channels/User Profiles for Self Study
 - Offer Post-Event Web Video Chat to Review Data and Future Plans
- Patroon Maintains a Run File & Video Repository on Google Drive
 - 38 Drivers Using 7 Data Platforms – 34 with AiM Data
 - Data from 12+ Tracks
 - TrackAttack for Cross Platform Comparisons

Using Race Studio 2 Analysis

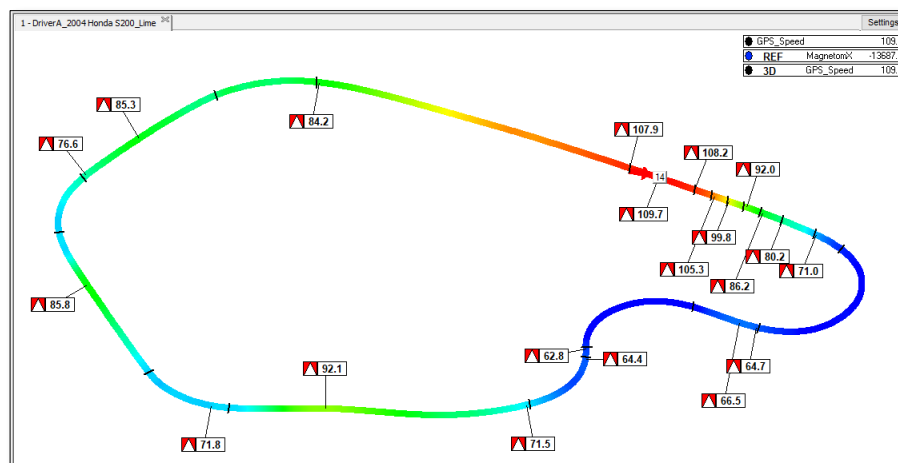
- Using RS2A with Custom:
 - User Profiles
 - Math Channels
 - Track Segment Maps

Using Race Studio 2 Analysis



Using Race Studio 2 Analysis

- Using RS2A with Custom:
 - User Profiles
 - Math Channels
 - Track Segment Map of Lime Rock that Identifies Braking Markers

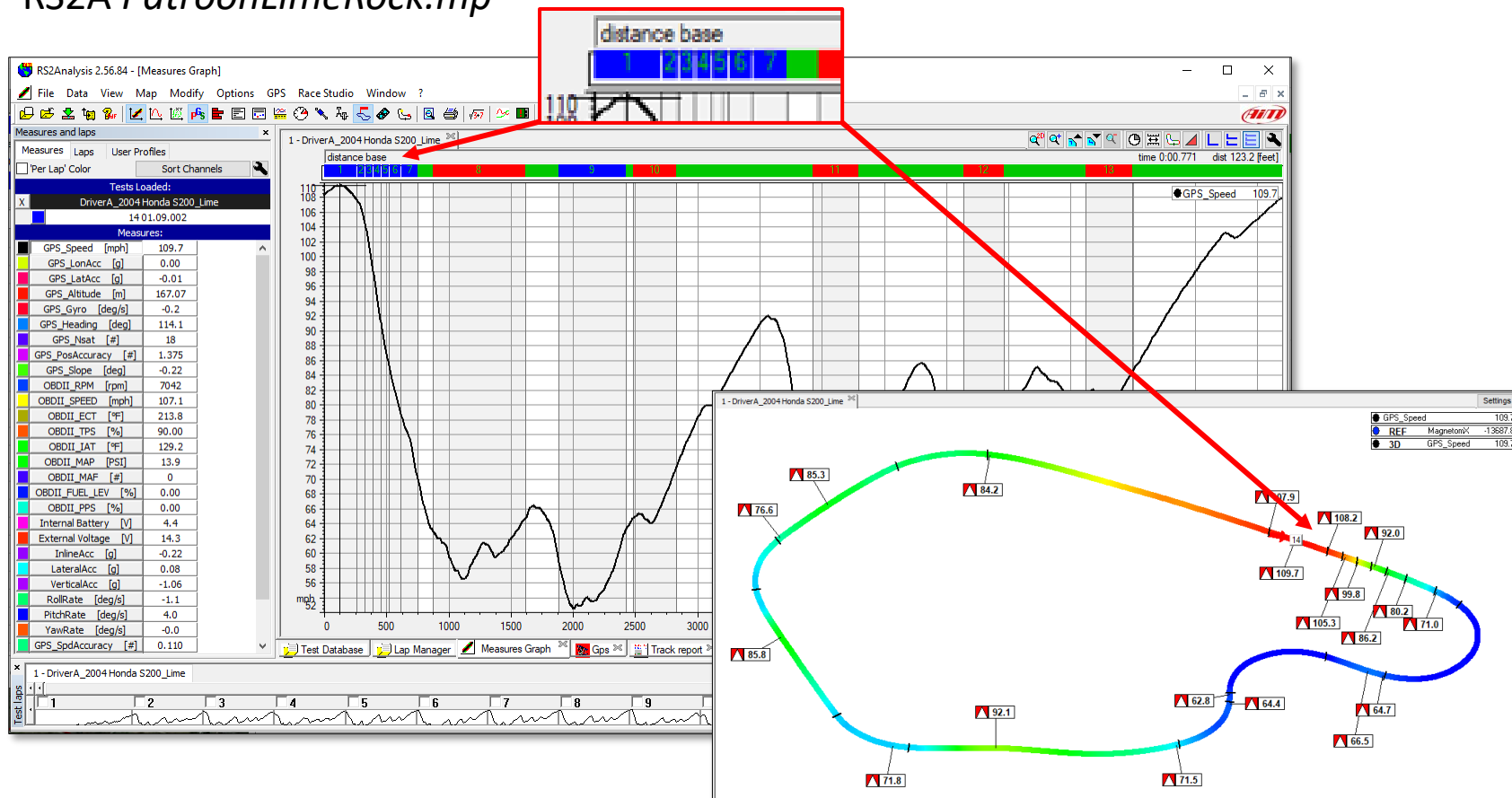


Custom Track Map Segments



Race Studio 2 Analysis Example

RS2A PatroonLimeRock.mp



Patroon BMW CCA Data Coaching Program

RS2 Custom Track Map Segments

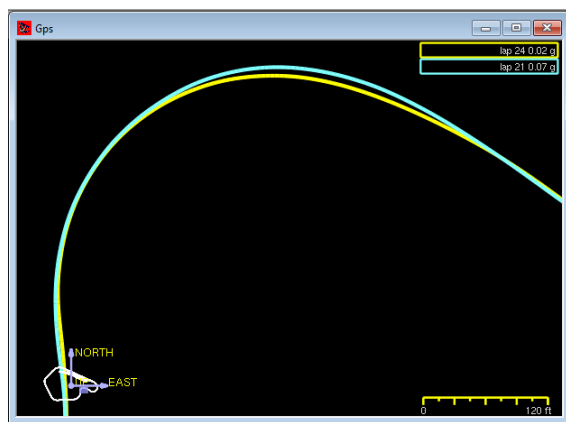
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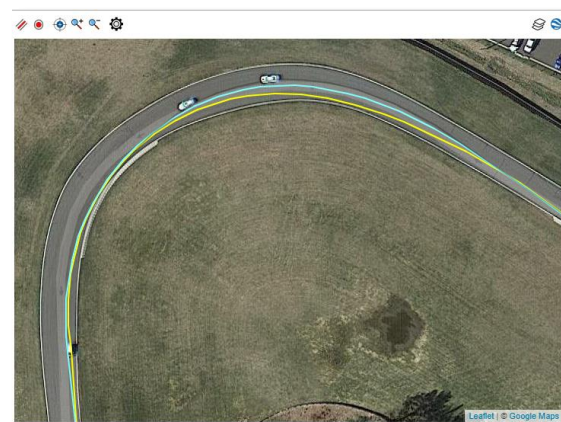
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Using Race Studio 3 Analysis

- **Custom Track Split Maps**
 - Lime Rock Track Map Expanded in RS3A
 - To Show and Study Student's Control Inputs Relative to Easily Identifiable Track Features, e.g., Braking Markers, Apex and Track-Out Curbing
 - Also Allows Identifying Effectively:
 - Locations of, e.g., V_{MIN} , Time to Max LonAcc, etc.
 - In Development: Statistics (Mean/Median/ 3σ) to Identify Characteristics of Novice/Intermediate/Advanced Driving
 - Driven Line on Google Map



RS2A → RS3A



Custom Track Map Segments



Race Studio 3 Analysis Example

RS3A Patroon_LRP_Splits_27.amss

Google Map Allows Creating Segments by
Simply Aligning Segment Start/Stop with Cursor



Patroon BMW CCA Data Coaching Program

RS3A Custom Track Map Segments



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Using Race Studio 3 Analysis



Video/Data Integration

- **Video/Data Integration in Lead/Follow** (Student/Coach) Instruction
 - Safety of In-Car Instruction/Coaching of Experienced/Solo-Level Drivers (and Instructors) Is a Growing Concern
 - **Lead/Follow** Approach Came Under Active Discussion pre-Covid
 - Initiated by Harry Showing the Data Team a Video of Him at Lime Rock Recorded from a **Follow** Car
 - Instructor in Follow Car can Often See Brake Application/Release Points, Turn-ins, Position/Angle at Apex, Track Usage, Instability (e.g., Under Throttle Steering) Better than From In-Car

Video/Data Integration

Lead/Follow



Harry Patching Out!



Video/Data Integration



Lead/Follow

- Video/Data Integration in **Lead/Follow** (Student/Coach) Instruction
 - Safety Concerns about In-Car Instruction/Coaching of Experienced/Solo-Level Drivers (and Instructors)
 - **Lead/Follow** Approach Came Under Active Discussion pre-Covid
 - Initiated by Harry Showing the Data Team a Video of Him at Lime Rock Recorded from a **Follow** Car
 - Instructor in **Follow** Car can Often See Brake Application/Release Points, Turn-ins, Position/Angle at Apex, Track Usage, Yaw Variation (e.g., During Throttle Steering) Better than In Car



Video/Data Integration

Lead/Follow

On the Apex in Turn 6 at Watkins Glen?



Video/Data Integration



Lead/Follow

From the Follow Car → **Not Quite!**



Patroon BMW CCA Data Coaching Program

RS3A Video/Data Integration



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Video/Data Integration

Lead/Follow



- Video/Data Integration in **Lead/Follow** (Student/Coach) Instruction, cont.
 - Major Issue → (In the Past) Synching Video from **Follow** Car With Data from **Lead** Car
 - Doable, but NOT within Time Constraints at HPDE
- RS3A Capability Introduced by Emiliano in his July 9, 2020 Update created → **“Aha!” moment** for Data Team
 - World Timing allows Synchronizing Data/Video from **Lead** and **Follow** Cars
- Data Team contacted Matt Romanowski for Help
 - Matt Came Through with:
 - Solo2 DLs, SmartyCam HDs, Mounts and Expertise On-Site For Patroon’s August 2020 HPDE at Lime Rock

Video/Data Integration

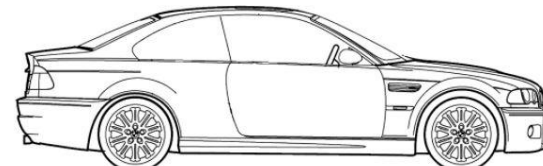
Hardware Configuration



Follow Car



Lead Car



Minimum	SmartyCam HD + GPS Module	Solo2
Upgraded	SmartyCam HD + Solo2 DL	Solo2 DL
Dual Video	SmartyCam HD + Solo2 DL	SmartyCam HD + Solo2 DL

Video/Data Integration

Hardware Configuration



SmartyCam FOV Options
120°/84°/67°



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Patroon BMW CCA Data Coaching Program

RS3A Video/Data Integration

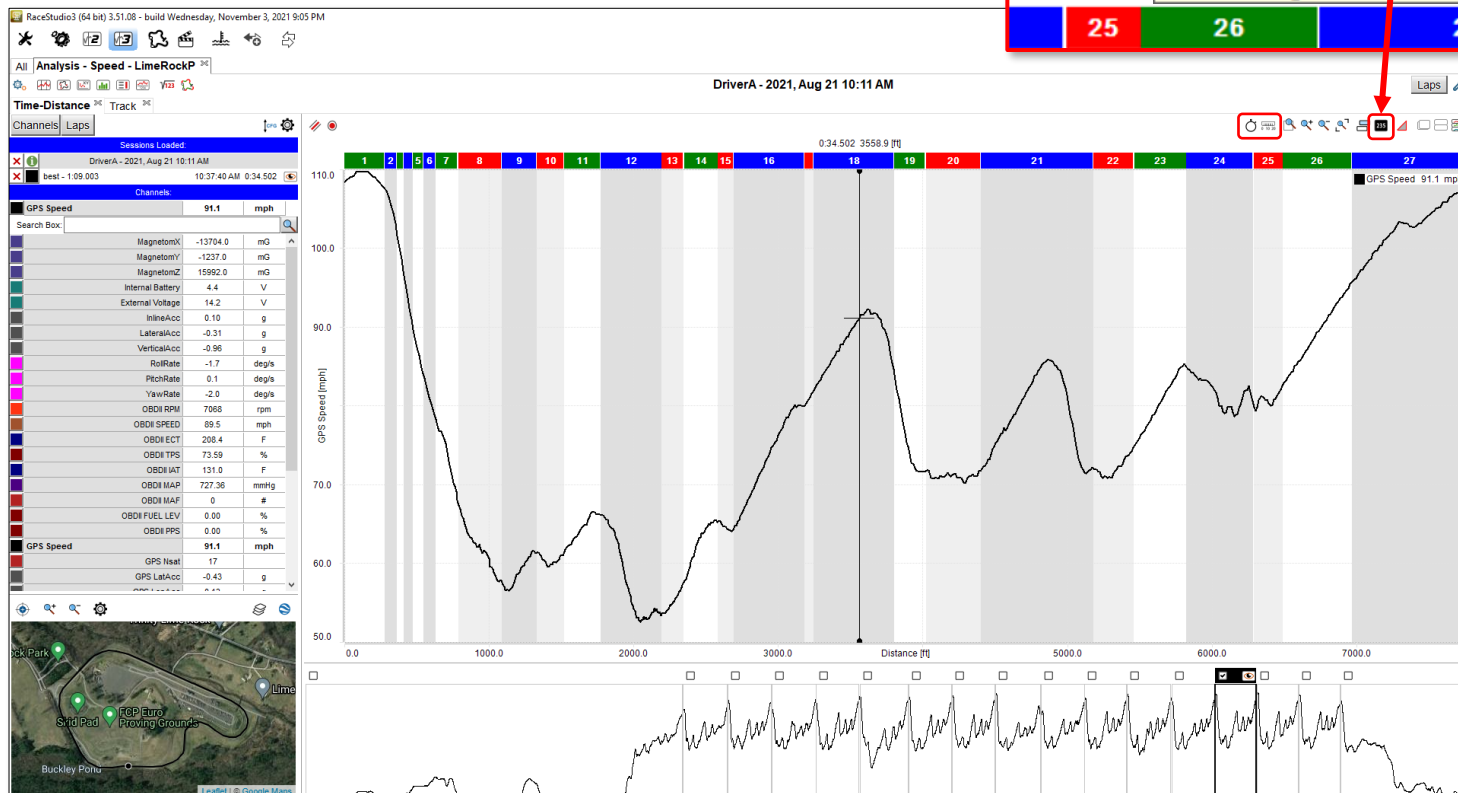
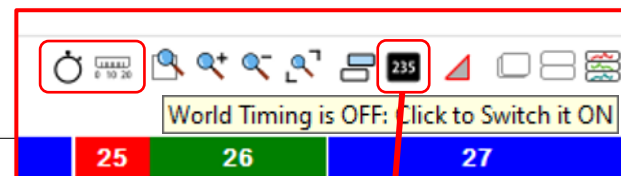
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Video/Data Integration

Lead/Follow Instruction



World Timing is the **Key** New Capability in RS3A



Patroon BMW CCA Data Coaching Program

RS3A Video/Data Integration

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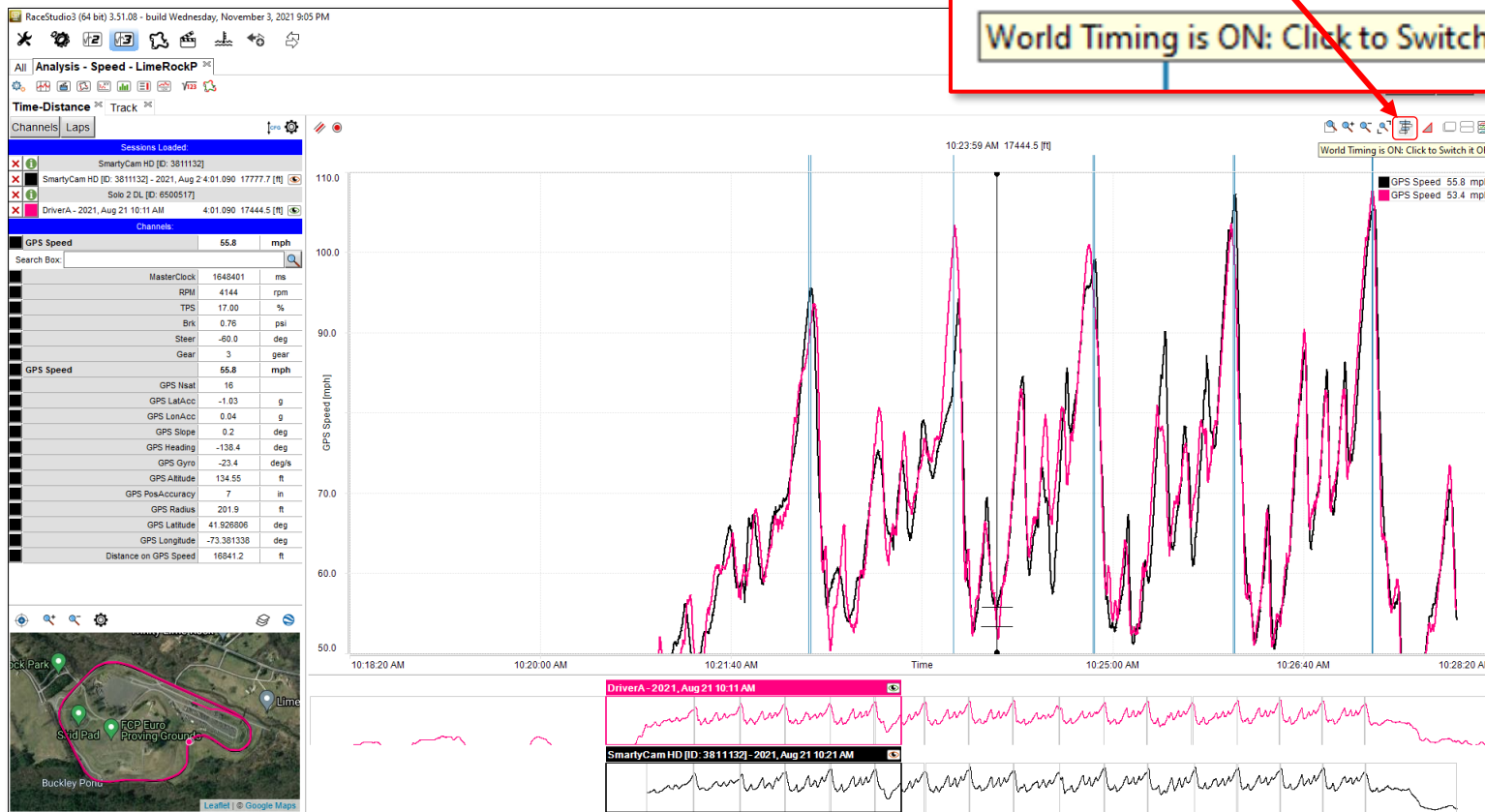
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Video/Data Integration

Lead/Follow Instruction



Options Change



Patroon BMW CCA Data Coaching Program

RS3A Video/Data Integration

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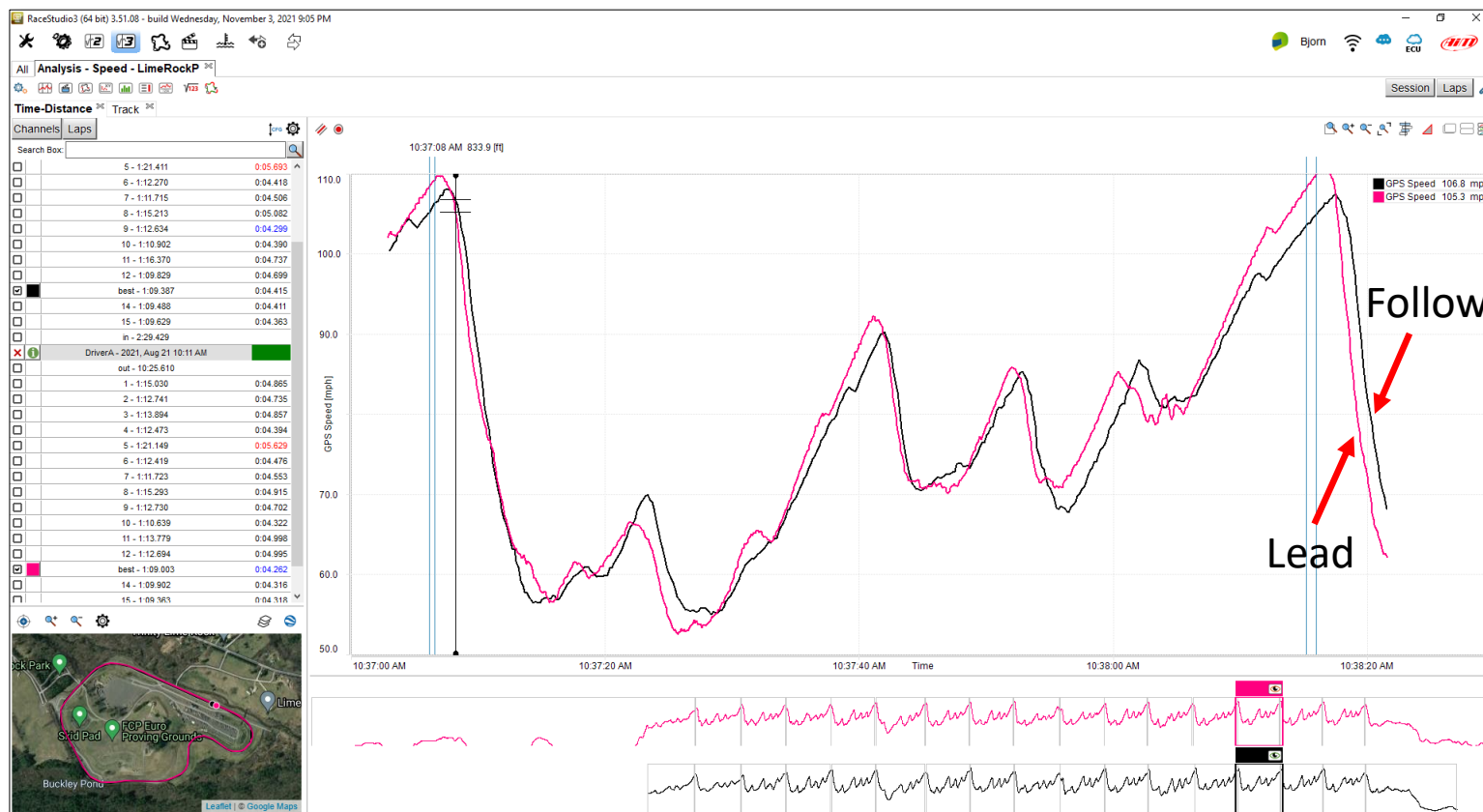
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Video/Data Integration

Lead/Follow Instruction



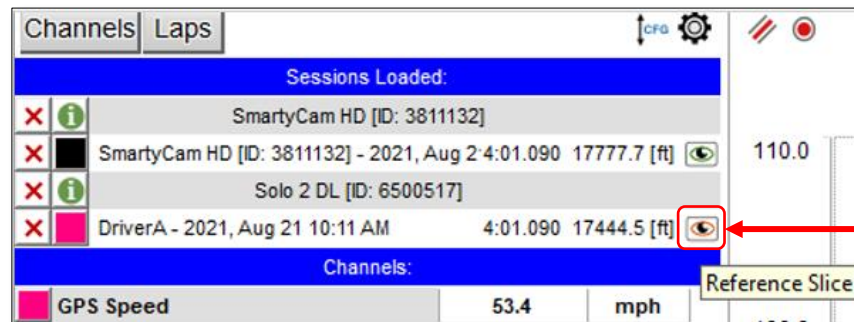
Zoom to Area of Interest



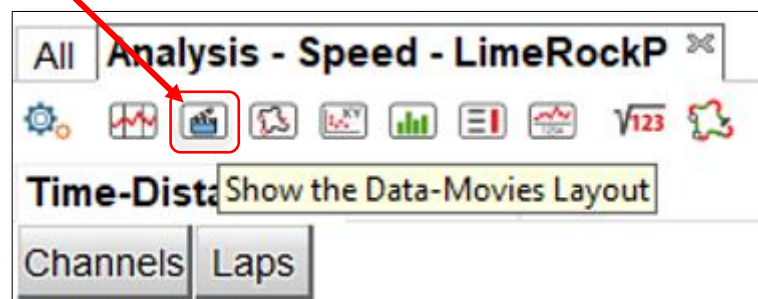
Video/Data Integration

Lead/Follow Instruction

Move to Channels Tab to Select Lead Car as Reference Slice

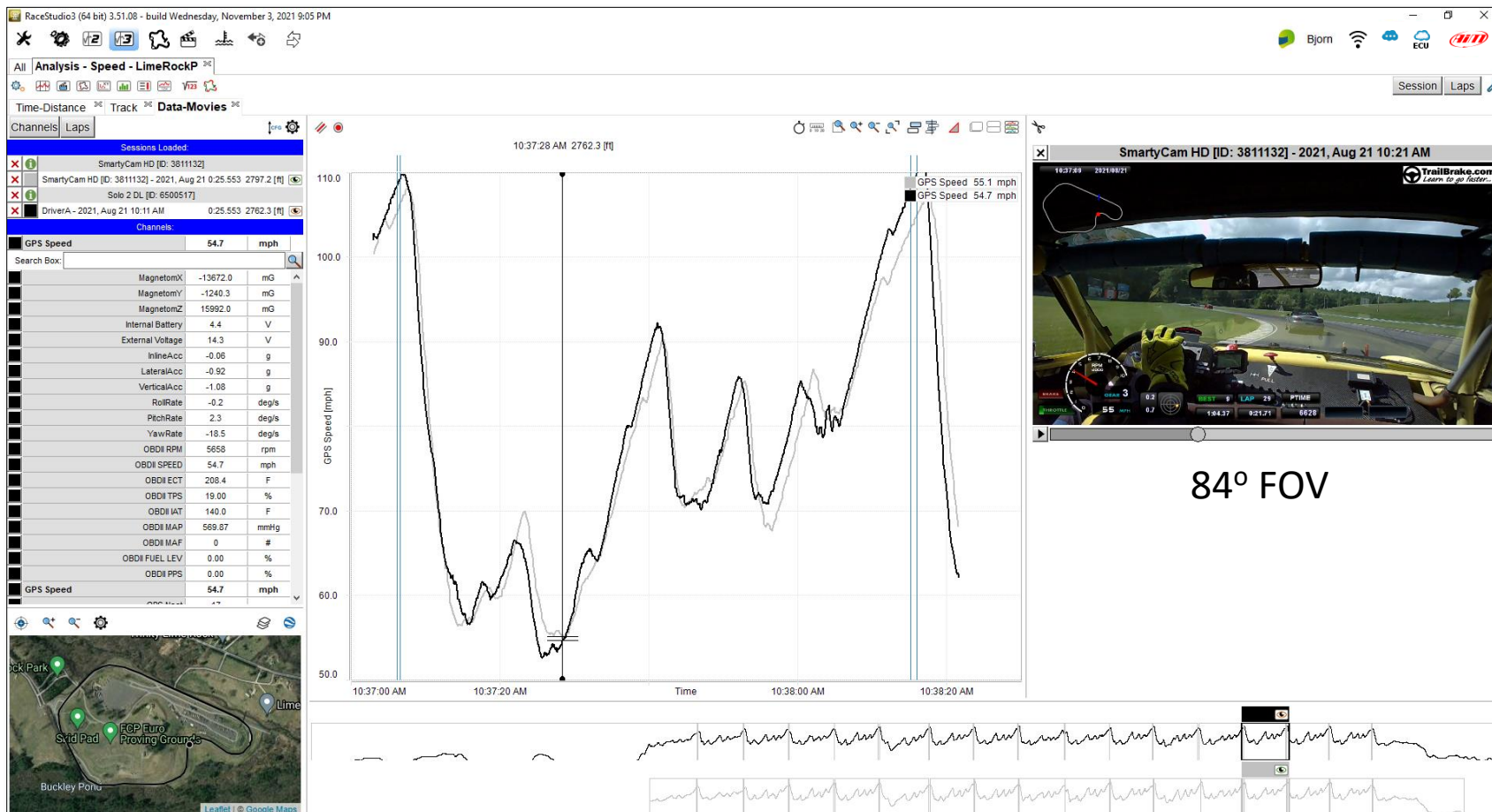


Then Select the Data-Movies Layout Icon



Video/Data Integration

Lead/Follow Instruction



Patroon BMW CCA Data Coaching Program

RS3A Video/Data Integration

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We Have Answers!
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Video/Data Integration

Important Lessons Learned

- **Follow Car** should have **2+ sec/lap minute** Advantage on **Lead Car**
 - To Free Up Mental Bandwidth
 - To Make Up for Anticipating Braking Points & Delaying Throttle On
- **Follow Car** Should Follow Closely
→ But Video Needs to Show Tarmac Behind **Lead Car**
- **Follow Car** Camera Should use **Narrow HFOV lens** to Minimize Distortion and Maximize Relative Size of **Lead Car**

Summary

- Confirmed over two HPDE events that Lead/Follow Instructional Methodology can be Significantly Enhanced Using the World Timing Mode in RS3A
- Confirmed that RS3A Custom Track Split Maps...
 - Simply Generated Using the Google Map as Reference
 - Visually Links the Measures Graph Traces to Easily Identifiable Track Features
- With Viability and Hardware Requirements of RS3A Video/Data Integration Confirmed, Patroon plans to:
 - Expand the Approach at this Year's HPDE Events
 - Work with Other BMW CCA Chapters at Their Events to Expand and Refine the Methodology
- Begin Porting Patroon' RS2A Math Channels and User Profiles to RS3A

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YouTube

www.youtube.com/aimdata

Data/Video Coaching Program
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Host:
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Guest:
Bjorn Zetterlund
Patron Chapter - BMW CCA

Guest:
Matt Romanowski
TrailBrake.com

aimsports.com Tuesday December 7th, 2021 LearnFast™

Configuring & Calibrating RS3 Sensors
Steering, Throttle, Suspension, and Fuel Level

Host:
Roger Caddell
AiM Sports - National Training Manager

aimsports.com Tuesday November 14th, 2021 LearnFast™

Webinar Series
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Data Download Options
In Race Studio 3

March 31st, 2020

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- All New 2020 - 21 Live Webinar Videos
 - Software Updates with Race Studio 3
 - Pre-Calculated Gear Position Function
 - Configuring WiFi Communication
 - Customizing AiM Device Logos
 - Race Studio 3 Basic Configuration - Part 1
 - Race Studio 3 Basic Configuration - Part 2
 - **I Have Downloaded my Data, Now What - Part 1*
 - **I Have Downloaded my Data, Now What - Part 2*
 - GPS Lap Insert
 - Data Views
 - Measure Units
 - Sort Channels
 - Test Properties
 - Per Lap Color
 - Export Tests
 - Channel Reports
 - Setting Time
 - Track Mapping
 - Selection Criteria
 - Sensor Calibration
 - Conditional Alarms
 - Gear Position
 - Firmware Update
 - Solo Configuration
 - Transmit Tracks
 - Gps Manager Overview
 - New GPS Track
 - Webinars
- * *Most Popular and Recommended*

Additional Materials

LearnFast™ E-Training Videos

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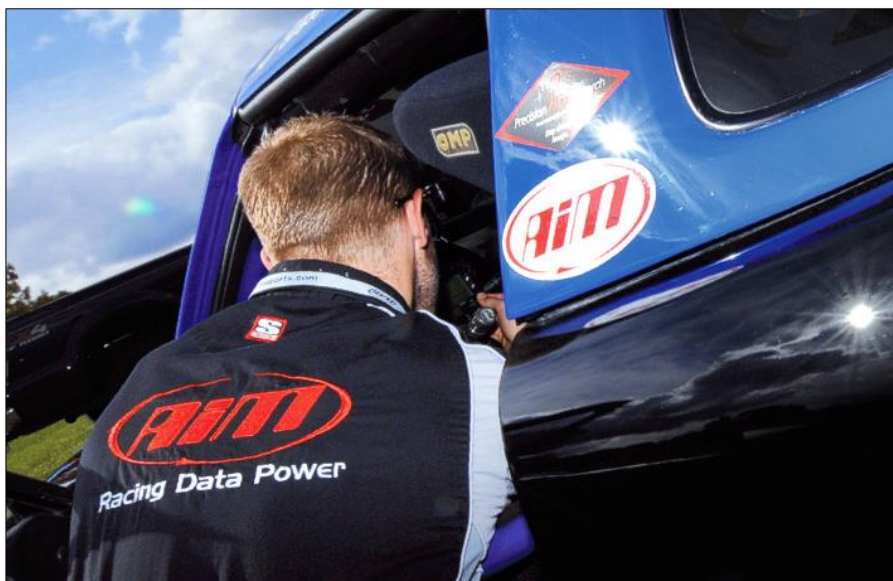
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Formula Drift

Drifting Around and Using Data



Host:

Roger Caddell

AiM Sports - National Training Manager

Guest:

Kevin Wells

Formula Drift – Competition Director

Next Webinar: Tuesday Dec 14th, 2021 - 10:00am Pac/1:00pm East

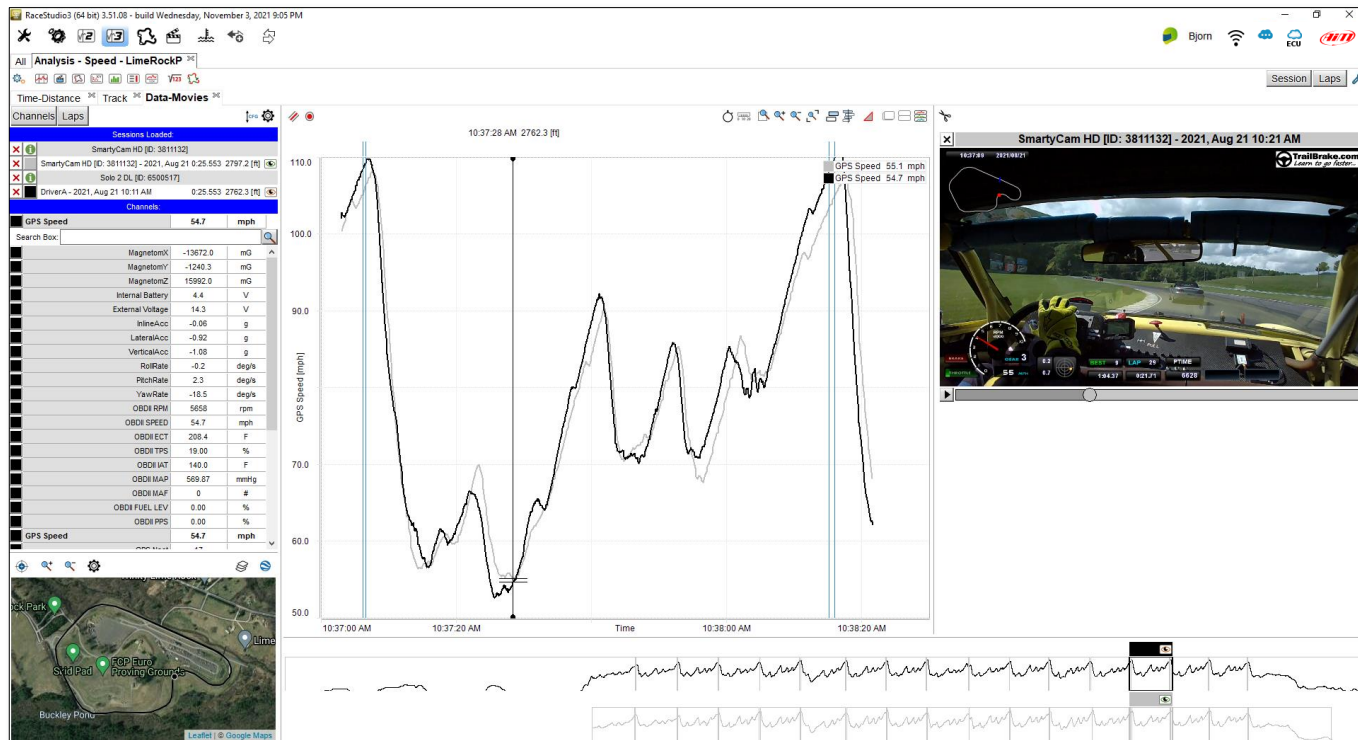
Next Webinar

Formula Drift – Drifting and Using Data



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