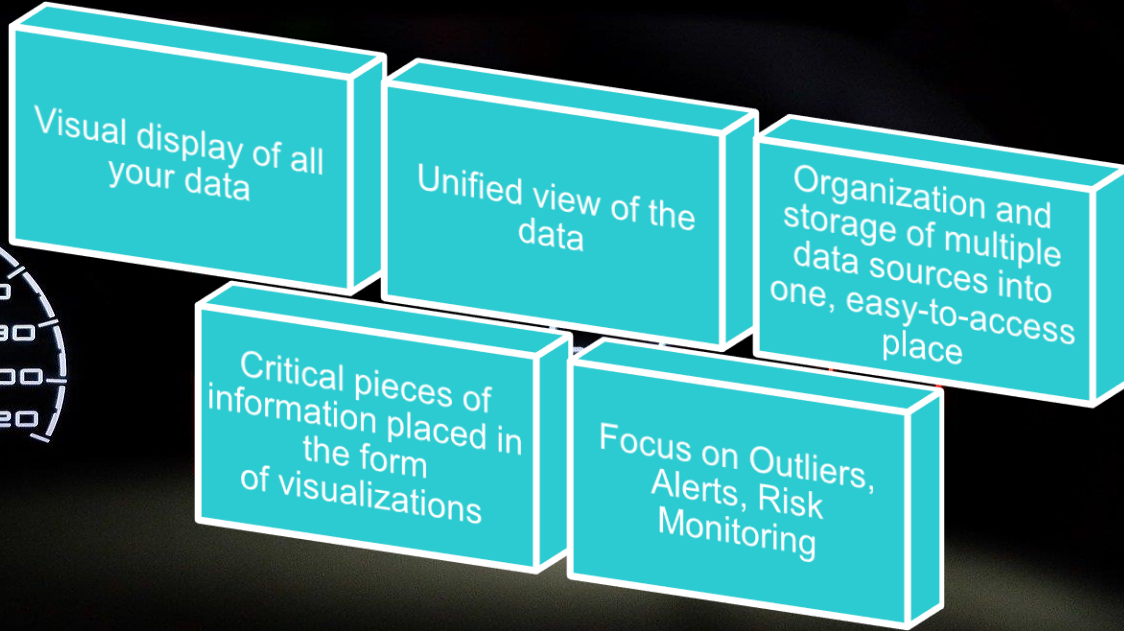




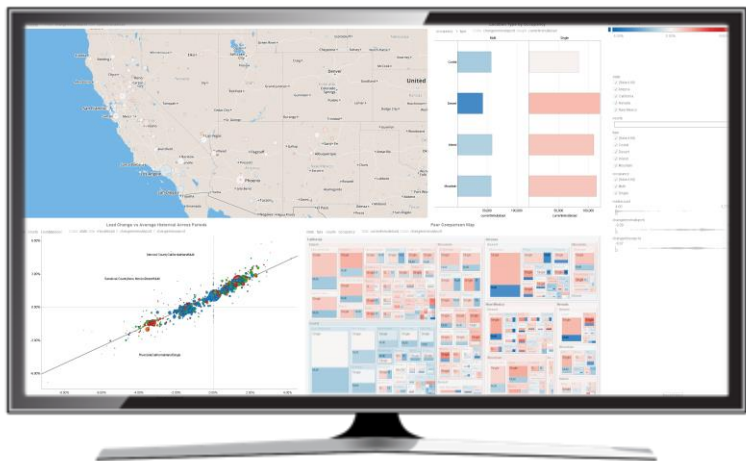
## **DATA ANALYTICS AND DASHBOARDING FOR STUDENT TEAMS**

Naman Pherwani – Student Intern

# DASHBOARDING



## Example Dashboards on Panopticon



### Real-Time Monitoring of Connected Car Telemetry

This screen is visualizing real-time feeds coming in from a fleet of over 10,000 commercial vehicles. Streams containing data on each vehicle's operations, including fuel consumption, time spent idling, actual speed compared to posted, accidents, and route deviations are brought into the system on real-time message buses. The system automatically makes comparisons with historical data and compares each individual vehicle's performance with its peers and flags outliers.



### Visualize Real-Time Telemetry Data from Formula 1 Cars

Panopticon accepts real-time telemetry data from race cars delivered over a message bus, applies a series of statistical functions on-the-fly and visualizes the results. Users can set alerts for critical parameters that may drift out of range during a race, visualize cumulative data for all streams, and perform comparisons with historical reference data for the car being monitored, other cars, other laps, other races, and more.

# Applied Analytics For Racing



## Why Dashboard with Panopticon?

- Streaming analytics for:
- Faster accurate decisions
- Code-free Development
- Drag and drop interface
- Connect to any data source
- Risk monitoring
- Reducing operating costs
- Improving profitability



## Use Cases

- Lap by Lap, car and driver analysis
- Car health and performance
- Aerodynamic performance
- Chassis : Structural performance
- Engine : temperatures, pressures, timings
- Control metrics and alerts

## Racing Use Case

Combining historical & real-time data for fault detection - setting alerts to predict potential failures (breaks / tyre pressure too low or temperature going too hot) & plan proactive maintenance

Post-race performance analysis - drill down to compare previous races, cars, designs, laps, competition, environmental factors (weather)

Charting and multi-variate analysis, trends and anomalies for data discovery and vehicle development trajectory

Realtime processing and analysis of sensor metrics from wind tunnel testing in real-time for direct correlations, improvements and benchmark analysis

Engine optimisation & health monitoring - very high frequency time-series analysis

Extracting information from multi/semi-structured file systems - race results, regulatory data etc. in PDF & CSV format

# THE TWO MAIN PROBLEMS – BIG DATA AND FAST DATA

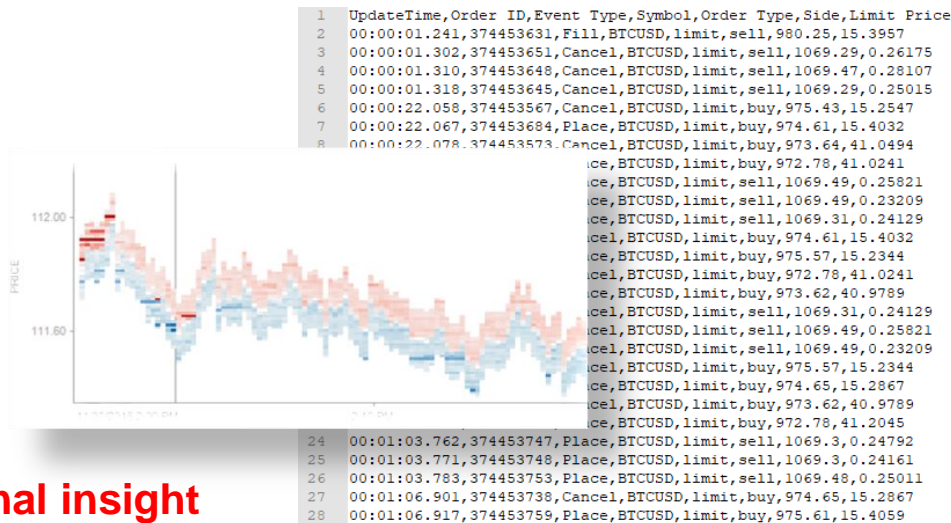
**Input:** Raw Telemetry/Transaction/Sensor messages – impossible to use for visual analytics

- Lack dimensionality
- Too granular
- Too high frequency
- Need aggregate measures

**Must**

- Aggregate
- Calculate
- Rank
- Mini-batch
- Join

**Output:** Live view of data for operational insight





# Our Analytical approach

## Focus on anomalies

Identify, investigate, backtest, optimise – Build better Dashboards for Data Discovery and insights

### Dynamic reporting

Real-time Statistics + historical context

### Connectivity

Consume multivariate/multi source payloads to build rich data pipelines

### Convergence

Simulation + real-world pre - post race-day analytics

Leverage historical data for backtesting





# DEMO

rec_id	obc_timeStamp	gps_utcTime	gps_latitude	gps_longitude	jm_netJoule	jm_voltage	jm_current	lfm_temperature	Lap	lfm_instantFlow	GPS Distance (m)	GPS Speed (m/s)
1232	19:01.3	15.18.59	38Â°09.602240N	122Â°27.187925W	979	13071	2085	13.7	1	14.3226	0.001484187	0.833333333
1233	19:01.4	15.19.00	38Â°09.603008N	122Â°27.188216W	979	13071	2085	13.7	1	9.2146	0.001484187	1.138888889
1234	19:01.5	15.19.00	38Â°09.603008N	122Â°27.188216W	994	13071	2278	13.7	1	9.2146	0.001484187	1.138888889
1235	19:01.6	15.19.00	38Â°09.603008N	122Â°27.188216W	994	13071	2278	13.7	1	7.5118	0.001484187	1.138888889
1236	19:02.4	15.19.00	38Â°09.603008N	122Â°27.188216W	1008	13074	2211	13.7	1	12.019	0.003780162	1.138888889
1237	19:02.5	15.19.01	38Â°09.604202N	122Â°27.188640W	1021	13079	2120	13.7	1	7.1112	0.003780162	1.944444444
1238	19:02.6	15.19.01	38Â°09.604202N	122Â°27.188640W	1021	13079	2120	13.7	1	12.8202	0.003780162	1.944444444
1239	19:02.7	15.19.01	38Â°09.604202N	122Â°27.188640W	1021	13079	2120	13.7	1	11.7185	0.003780162	1.944444444
1240	19:02.8	15.19.01	38Â°09.604202N	122Â°27.188640W	1021	13079	2120	13.7	1	11.6184	0.003780162	1.944444444
1241	19:02.9	15.19.01	38Â°09.604202N	122Â°27.188640W	1021	13079	2120	13.7	1	12.8202	0.003780162	1.944444444
1242	19:03.0	15.19.01	38Â°09.604202N	122Â°27.188640W	1035	13084	1871	13.7	1	12.5198	0.003780162	1.944444444
1243	19:03.1	15.19.01	38Â°09.604202N	122Â°27.188640W	1035	13084	1871	13.7	1	8.2129	0.003780162	1.944444444
1244	19:03.2	15.19.01	38Â°09.604202N	122Â°27.188640W	1035	13084	1871	13.7	1	9.7154	0.003780162	1.944444444
1245	19:03.3	15.19.01	38Â°09.604202N	122Â°27.188640W	1035	13084	1871	13.7	1	13.6215	0.006943918	1.944444444
1246	19:03.4	15.19.02	38Â°09.605844N	122Â°27.189239W	1035	13084	1871	13.7	1	11.1176	0.006943918	2.666666667
1247	19:03.5	15.19.02	38Â°09.605844N	122Â°27.189239W	1049	13081	2058	13.7	1	10.7169	0.006943918	2.666666667
1248	19:03.6	15.19.02	38Â°09.605844N	122Â°27.189239W	1049	13081	2058	13.7	1	11.3178	0.006943918	2.666666667
1249	19:03.7	15.19.02	38Â°09.605844N	122Â°27.189239W	1049	13081	2058	13.7	1	12.2194	0.006943918	2.666666667
1250	19:03.8	15.19.02	38Â°09.605844N	122Â°27.189239W	1049	13081	2058	13.7	1	9.9157	0.006943918	2.666666667
1251	19:03.9	15.19.02	38Â°09.605844N	122Â°27.189239W	1049	13081	2058	13.7	1	8.3131	0.006943918	2.666666667
1252	19:04.0	15.19.02	38Â°09.605844N	122Â°27.189239W	1062	13086	1871	13.7	1	7.2114	0.006943918	2.666666667
1253	19:04.1	15.19.02	38Â°09.605844N	122Â°27.189239W	1062	13086	1871	13.7	1	14.6231	0.006943918	2.666666667
1254	19:04.2	15.19.02	38Â°09.605844N	122Â°27.189239W	1062	13086	1871	13.7	1	14.0222	0.006943918	2.666666667
1255	19:04.3	15.19.02	38Â°09.605844N	122Â°27.189239W	1062	13086	1871	13.7	1	10.0158	0.010614634	2.666666667
1256	19:04.4	15.19.03	38Â°09.607741N	122Â°27.189969W	1062	13086	1871	13.7	1	12.2193	0.010614634	3.055555556
1257	19:04.5	15.19.03	38Â°09.607741N	122Â°27.189969W	1075	13084	2079	13.7	1	12.9205	0.010614634	3.055555556
1258	19:04.6	15.19.03	38Â°09.607741N	122Â°27.189969W	1075	13084	2079	13.7	1	12.7201	0.010614634	3.055555556
1259	19:04.7	15.19.03	38Â°09.607741N	122Â°27.189969W	1075	13084	2079	13.7	1	7.9125	0.010614634	3.055555556

**THE END**