**Automobile Forensics**

- Unpimp my ride

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**Man sentenced to prison**

- October 2003, Lindsay Kyle died in a car accident
- Danny Hopkins, 47, crashed into the back of Lindsay's car, which was stopped at a red light
- The accident was recorded by an Event Data Recorder (EDR) in the car
- Hopkins' EDR revealed that he was traveling 170 km/h 4 seconds before the crash
- Hopkins faces 5-15 years in prison in New York

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**Event Data Recorder**

- "Black box" – What, When, Where
- Located in the airbag control module
  - Monitors crash scenarios and deploys airbags
- Accelerometers – record vehicle accelerations
- Large acceleration/deceleration -> "event"

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**Event Data Recorder - Records**

- Records ~5 seconds of pre-crash data
- Records events and status
  - Vehicle speed
  - Engine speed
  - Acceleration/Braking
  - Seat belts status
  - Delta-v (Crash pulse)
  - And more
- Can be used as evidence in court

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**EDR as evidence**

- In 2001, a driver smashed into a car, killing a young man
- No skid marks, no way to calculate his speed before impact, but the EDR said he was going 157 km/h (55 mph)
- 4 seconds before the crash, he floored the gas pedal and just before impact, he took his foot off the gas but did not brake

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**EDR as evidence**

- Chain-reaction crash on Ontario highway
- Ended in the death of a child
- Witnesses blamed a speeding car
- Driver of the car denied being the perpetrator, demanded data from his EDR
- Showed that he was driving slowly and properly
Event Data Recorder - History

- 1984 – General Motors started research on EDR technology
- 2000 – Data retrieval system (by Vetronix) available to the public
- 2003 – Ford vehicles’ EDRs supported by Vetronix’s software
- 2006 – Toyota and Daimler-Chrysler have EDR technology in some vehicles

Event Data Recorder

- EDR information available even when the air bag does not deploy
- Near-deployment event, recorded data temporarily stored ~60 days of normal use
- Collision severe enough to deploy the air bag, data is permanently stored and cannot be overwritten

Demonstration

The effect of EDRs

- Installing EDRs in fleets, with the knowledge of drivers, has shown to reduce collisions
- A study in 1992 found that EDRs reduced collision rate by 28% and costs by 40% in police fleets
- The drivers knew they were being monitored

No standard

- No universal standard data set or format for the information that can be extracted from EDRs
- Some EDRs have
  - Pre-crash data only
  - Post-crash data only
  - Both data sets
- EDRs can record single or multiple impact events

EDR forensics procedure

- Chain of custody of the EDR data and the EDR unit should be documented
- Required to demonstrate that the data or unit came from the subject vehicle
- Document the entire extraction process
- Demonstrate that nothing has been done to alter the evidence
Summary

- EDRs store data that can be used as evidence in court
- Installing EDRs in vehicles has shown to reduce collisions
- No standard for what information can be extracted from the EDR