CONTINENTAL MAPPING

MOVING PEOPLE & GOODS, MAPPING TO SUPPORT CONNECTED & AUTONOMOUS VEHICLES

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Self Driving Car Timeline

Recent History

- **1925**: Hoodlum Radio Control demonstrates a radio-controlled “driverless” car.
- **1956**: The GM Firebird II is equipped with receivers for detector circuits embedded in roadways.
- **1979**: The Stanford Cart uses video processing to navigate a cluttered room without human input.
- **1958**: The Chrysler Imperial is the first car with cruise control.
- **1995**: The VaMP autonomous vehicle drives (almost) completely autonomously for 2,000 km.
- **2004**: The DARPA Grand Challenge is founded to incentivise autonomous vehicle development.
- **2009**: DARPA: The Google Self-Driving Car project begins.
- **2015**: Tesla releases its Autopilot software update.
- **2016**: Google’s Self-Driving Car has its first accident.
- **2017**: GM plans to include autonomous controls in the Bolt and Super Cruise in the Cadillac CT6.
  - **2020**: Slated release of Honda’s near-fully autonomous vehicle.
  - **2021**: Slated release for BMW’s iNEXT.
(An) AV Timeline

- 2015
  - driver assistance common
  - some partial automation available to consumers

- 2020
  - partial / conditional AVs widely available to consumers

- 2025
  - autonomous shared mobility fleets are common

- 2030
  - high automation required in all new vehicles

- 2035
  - human operation is the exception in places

- 2040
  - transition to driverless largely complete
  - fleet turnover continues…

- 2100

- Any estimate is debatable
- We are only at the beginning of a long transition period
Where are we at?

Gov. John Kasich signs executive order allowing autonomous vehicle testing on Ohio roads

Updated May 10, 2018; Posted May 9, 2018

Self-driving shuttles to hit the streets of Columbus, OH
USDOT AV Proving Grounds

- Peer network
- Advise government
- Validate industry
- Awarded January 2017

...no funding
AUTOMATED VEHICLES IN WISCONSIN

TESTING FACILITIES
1. ROAD AMERICA
   Elkhart Lake, WI
2. MILWAUKEE AREA FACILITIES
   City of Milwaukee and UW-Milwaukee
3. MGA RESEARCH GROUP
   Burlington, WI
4. MADISON AREA FACILITIES
   City of Madison, Epic, Mandl Communications, and UW-Madison
5. CHIPPEWA VALLEY REGIONAL AIRPORT
   Eau Claire, WI

PROPOSED AV CORRIDORS
- **MadMSP Corridor**
  WisDOT, MnDOT
- **Sheboygan to Milwaukee Corridor**
  WisDOT
- **Burlington to Milwaukee Corridor**
  WisDOT
- **MRCM Corridor**
  WisDOT, iDOT, IL Tollway

Comprehensiv e Spectrum of Testing/Research Environments
- Computer Simulation
- Virtual Reality Simulation
- Controlled Campuses Epic, RA
- Closed Course MGA
- RC Car and Golf Cart Modeling
- City of Pittsburgh and the Thomas D. Larson Pennsylvania Transportation Institute
- Texas AV Proving Grounds Partnership
- U.S. Army Aberdeen Test Center
- American Center for Mobility (ACM) at Willow Run
- Contra Costa Transportation Authority (CCTA) & GoMentum Station
- San Diego Association of Governments
- Iowa City Area Development Group
- University of Wisconsin-Madison
- Central Florida Automated Vehicle Partners
- North Carolina Turnpike Authority
CAV Types

Platooning

Freight Yards

Full AV

Driver Assist

One driver, multiple trucks

Lead vehicle linked to the platoon via wireless communications

Coupling and de-coupling to allow other road users to cross between platoon vehicles

Incorporates vehicle detection, anti-collision and lateral control technologies for safety

*Number of trucks in each platoon may vary according to trial results.

Source: PSA and Ministry of Transport
BASE MAPPING
POINT CLOUD

Spatially Accurate Data
- 2CM accuracy
- Output of 700,000 points per second
- 360° field of view
- Collected at Posted Speeds

360° IMAGERY

Complete visual catalogue
- Six integrated Cameras taking 360° imagery
- High resolution 5MP images
- 90% full sphere Imagery
- Capture everything visible in ROW

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ANNOTATION

- REMOVE EPHEMERAL OBJECTS
- ANNOTATE LOCALIZATION FEATURES
- TRAFFIC SIGNAL/SIGN CLASSIFICATION
ACCURACY

Current standards used 10-20 cm

Base map generation
- Image
- Lidar
- Conflation

Vehicle sensors
- Ultrasonic
- Image
- Radar
- Lidar
- Cloud

We believe 2-5 cm will win
Simulator

Traffic Network Tool | Right-click to create nodes and connect edges. Select nodes and edges to change attributes.
GIS DATA

Integrating & Conflating GIS Data Helps build a solid picture

- Utilities
- Telco
- County
- State
- 911 Data
BIG DATA & AUTOMATION

Examples of images of the same type - Speed limit (20km/h)
“the vehicles — or the systems controlling them — will sync up with a large network that is constantly feeding data about the local environment and roadways. They will remain aware at all times about congestion or traffic on a current route, accidents and potential dangers, arrival and departure times updated in real time and so much more.”

- Datafloq
DATA QUALITY
Bad data can be a matter of life or death

- Rigorous QA/QC
- Algorithmic data checks
- Data Completeness
- Data Speeds
- Proper Acquisition
- Controlled & Simulator testing

Autonomous car data vs. human data
In 2020, the average autonomous car may process 4,000 gigabytes of data per day, while the average internet user will process 1.5 gigabytes. That means...

1 autonomous car = 2,666 internet users

Source: Intel

Mashable
QUESTIONS?
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