PIVOT

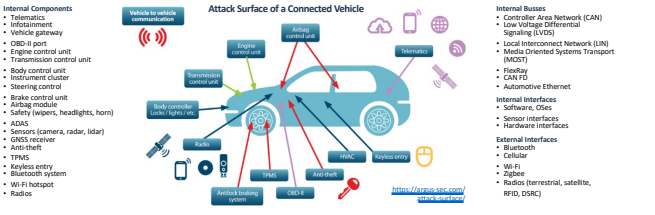
THE UNIVERSITY OF MEMPHIS · Colorado State University · USC Viterbi School of Engineering Information Sciences Institute + GEOTAB Commercial Collaborator





OPEN COMMUNITY PLATFORM FOR SHARING VEHICLE TELEMATICS DATA FOR RESEARCH AND INNOVATION

MOTIVATION & NEED



Need for High Quality, Real-life Automotive Datasets: Needed by researchers advancing the state of the art in automotive and related systems, but such datasets tend to be ad hoc, hard to obtain, and have limited utility, which prevents (or slows) the researchers from growing the discipline

Need for Community Infrastructure: Needed to transform the ad-hoc, small-group endeavors for vehicle data curation into scientific body of work done by larger synergistic community

FIVE PILLARS

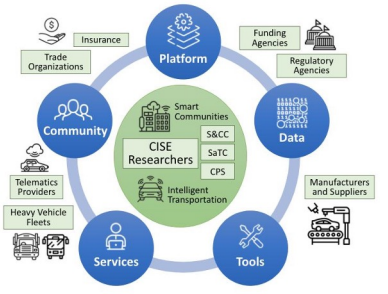
Platform: Robust and reliable hardware and software upon which the system runs

Data: Curation and sharing of data and contextual information

Tools: Common software-based tools to collect, transform, combine, filter, and visualize the data

Services: Researcher-centric services for sharing, securing, and evaluating datasets, plus privacy services

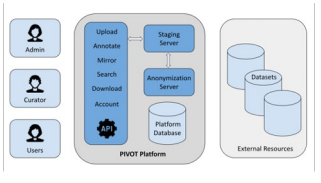
Community: Outreach and engagement to improve the data utility using design feedback mechanisms



PLATFORM

Scalable, interactive platform to provide user services and access to data and tools

- The platform will host a web server, database, and microservices
- Robust security including firewall
- Hosted at Memphis
- Mirrored at partner institutions (e.g., Colorado State) for backup, redundancy, and seamless recovery



DATASETS

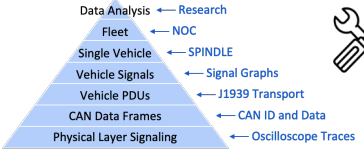
Community Datasets
- Produced by others
- Not widely known
- PIVOT acts as clearinghouse
- E.g., ORNL ROAD, HCRL datasets, Bosch SynCAN, CSU heavy truck datasets

Geotab Telematics Devices and Fleet Data
- **Spindle**: Small "fleet" for collecting high-fidelity telematics data for PIVOT researchers
- **Altitude**: Geotab global telematics network and analytics platform

PIVOT CAN Logger 4
- Collect and store crowdsourced datasets from passenger cars and heavy trucks
- Based on CSU's CAN Logger 3

TOOLS

- CAN log format converters
- Convert raw CAN into protocol data units
- Data decoding
- CAN data log slicing and filtering
- Others TBD based on community needs



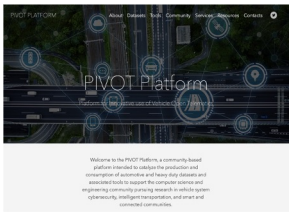
SERVICES

- Access to datasets and tools
  - Links to community datasets and tools
  - Access to and/or mirroring of PIVOT Spindle datasets
  - Access to Geotab datasets and analytical tools
  - Collection, storage, and mirroring of PIVOT crowdsourced CAN logger datasets
- Access to PIVOT tools
- Privacy support services and tools
  - E.g., using anonymization or privacy-enhanced technologies
- Internal Review Board (IRB) support


COMMUNITY OUTREACH & ENGAGEMENT

Community engagement and outreach activities to raise awareness, encourage contributions and use, elicit input and requirements from broader community

- Publications
- Technical review articles
- Webinars
- Website content
- Social media
- Conferences and workshops
- PIVOT community workshops
- CyberAuto & CyberTruck challenges



Community Workshops
- **November 2021**: focus on datasets and applications
  - 70 people from academia, industry, and govt
  - Materials: https://bit.ly/auto-datasets-2021wkshp
  - Report: https://bit.ly/auto-datasets-2021wkshp-report
- **November 2022**: focus on CAN loggers and privacy
  - Materials: https://bit.ly/auto-datasets-2022wkshp
- **April 4-5, 2024**: focus on beyond CAN
  - Materials: https://bit.ly/auto-datasets-2024wkshp

BENEFITS & IMPACT

- Help coordinate existing isolated efforts
- Provide new crowdsourced CAN datasets
- Facilitate exchange of knowledge and resources
- Encourage, nurture, and sustain ongoing conversations
- Stimulate pre-competitive research collaborations
- Provide resources to educate the next generation of automotive cyber engineers
- Engage industry, including OEMs, suppliers, and other important partners
- Engage relevant standards bodies and applicable government organizations

IMPACT: Create robust ecosystem that works to develop and share community resources, including automotive research datasets and tools

➔ **Enable researchers to address important problems, define high-quality research initiatives, and develop new, innovative applications**

WEB: https://www.pivot-auto-.org
EMAIL: info@pivot-auto.org

This material is based upon work supported by the National Science Foundation under Grant Numbers 2213733, 2213735, and 2245323. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.