



OUTREACH & EDUCATION

Katie Dey, Vanderbilt University

WORKSHOPS & CAMPS

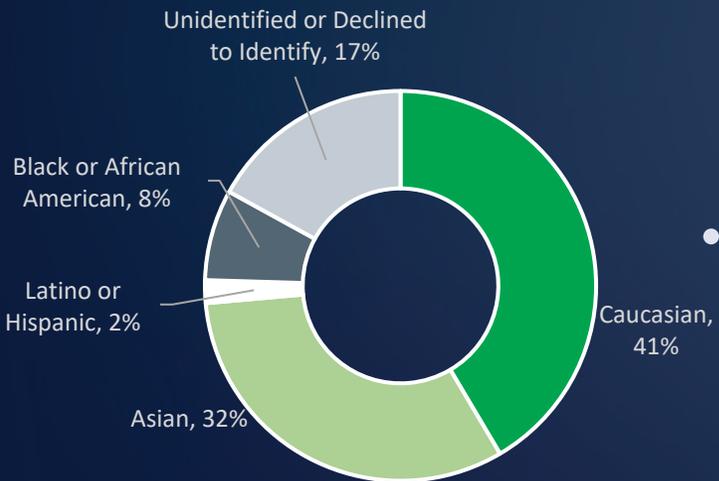
- 2018 Workshop on Societal and Technological Research Challenges for Highly Automated Road Transportation Systems in Germany and the US: Diversities and Synergy Potentials
- 2021 Workshop on Assured CPS Autonomy for 3D Urban Transportation: Drones, Flying Cars and Beyond (postponed from 2020)
- 2022 Workshop on Acceptance of Smart Energy Systems (upcoming, June'22)
- UCB Expanding Your Horizons Bio-Inspired Robots STEM Camp for girls (Spring 2020)



UNDERGRADUATE RESEARCH OPPORTUNITY



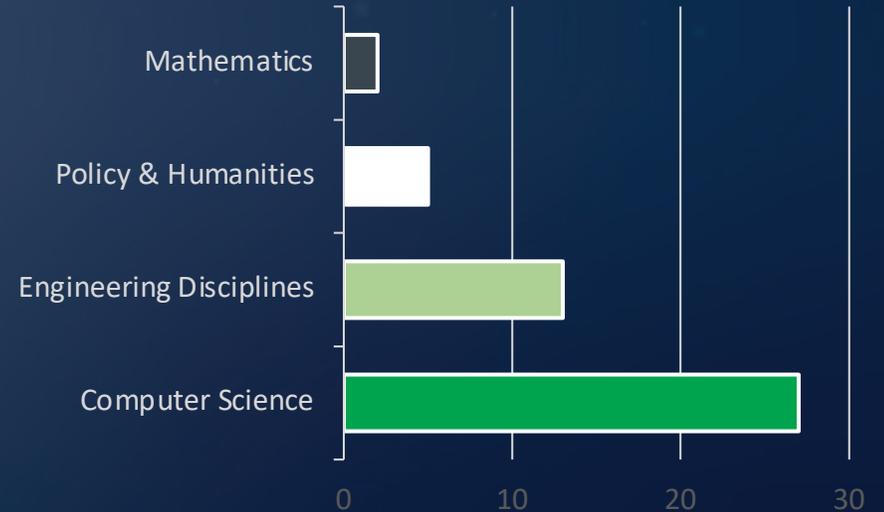
53 Total Students



Participants by Race & Ethnicity



32% Female Participation



Participants by Major

SPRING SEMINAR

<https://cps-vo.org/group/sdss-cps/seminars>

*GOAL: An overview of the relationship between engineering and software design challenges, and **societal and policy dimensions** of emerging technologies involving **Human-Cyber-Physical Systems (H-CPS)**.*



*Connected &
Automated Vehicles*



Transactive Energy



Autonomous Drones

Major Societal Challenges



Summer Research Experience

<https://cps-vo.org/group/sdss-cps/summer-exchange>

Timeline

Spring

- PIs prepare summer research project descriptions
- Students review project descriptions and indicate which topics interest them the most
- Students are matched with project. A mentor is assigned for close supervision.
- PIs/mentors have introductory video call with students.

Summer

- Orientation
- Weekly throughout the summer
 - Lecture series
 - Grad student Lunch-and-Learns
 - Bulletin Board Hour
- Summer Showcase

Fall

Report Writing



Bastian Cornelsen,
University of Oldenburg '19



Brionna Davis,
Vanderbilt '21

Taylor Pothast,
Vanderbilt '21

Grace Jennings,
Vanderbilt '21

Photo credit: Severin Kacianka

FALL REPORT WRITING

Brionna Davis, Grace Jennings and Taylor Pothast
Decentralized Optimization Vehicle Route Planning
Mentors: Ilias Gerostathopoulos, Raphael Stern
Department of Informatics
Technical University Munich, Germany

1. General Problem and Context

The rise of Connected and Autonomous Vehicles, CAVs, introduces new possibilities in vehicles and traffic management. This study considers the application of an adaptive routing framework for a fleet of autonomous vehicles, while considering the impact of each vehicle's selfishness on the network as a whole. There is already dynamic traffic routing services through applications like Google Maps, Waze, and Uber. However, their contribution to traffic flow is unknown because their suggested routes are not enforceable and are dependent on the number of users. As vehicle technology approaches fully autonomous vehicles and companies like Uber and Lyft consider replacing their drivers with CAVs, the understanding of optimized routing of CAVs is crucial for societal acceptance of this new technology.

The goal of this research was to explore the sensitivity of *system optimal* (SO) traffic assignment to dynamic vehicle routing using agent-based planning [1] [2]. SUMO (Simulation of Urban Mobility), is a widely accepted traffic simulator that was used along with TraCI (Traffic Control Interface), to dynamically route the cars, or agents, in the simulation. EPOS (Economic Planning and Optimization Selection), is a decentralized optimization framework that interfaced with the simulation environment to select optimal agent routes that was used with the preexisting adaptive routing framework TRAPP [3] [4].

STUDENT PANEL

Maya Kumar, Vanderbilt University'22
Jennifer Fish, Vanderbilt University'22
Caroline Janssen, Vanderbilt University'19