

IDEA League Summer School 2021
<Chalmers University of Technology Summer School>

Report Date 2021 YY 10 MM 04 DD

Your Name	Yixuan Zheng		
Affiliation at Tokyo Tech	School of <u>Engineering</u> Dept. of <u>System and Control Engineering</u>		
Student ID#	21D10198	Current academic program year	D1
Program theme	Analysis and modelling road user behavior for road crash prevention		
Program period	2021 YY 09 MM 13 DD to 2021 YY 09 MM 18 DD		
Posting to the web	This report may be posted on Tokyo Tech website. Would you prefer to have your name included or excluded from the report if it is uploaded? Include		

Report contents

① **The reason you joined the program**

The reason I joined this program is that currently my research has come into the stage that inspiration is in urgent need, especially some new ideas based on human behavior, which triggered my interest. Also, I would like to communicate with people from diverse countries as well, to see how their research goes, what kind of daily life they're living with.

② **Pre-program preparations**

- Collect information

I got interested once I received the email sent from Tokyo Tech ASPIRE Team, under the kind application instruction of the officer in ASPIRE Team, fortunately I was able to participate in this program on behalf of Tokyo Tech.

- Contact and request from program organizer

One month before the program, the organizer of the program has sent us a Box link, on which initial information about the program, such as content, approximate schedule had already been posted. We were informed that we would conduct two exercises that requiring programming skills and programming environment presetting.



IDEA League Summer School at Chalmers University of Technology

Analysis and modelling road user behavior for road crash prevention

Brief course description

Road crashes are a global concern: The World Health Organization estimates that 1.35 million road fatalities occur worldwide every year and road crashes are currently the leading cause of death for people aged 5-29 years¹. In Europe, although road fatalities have significantly decreased during the period 2007-2016², a less evident reduction has been shown since 2013, and a complete stagnation for cyclists' fatalities during 2010-2018³. The current situation calls for more research investigating road-user behavior, to support the design of active safety systems and automated driving and for the creation of driver's training and coaching procedures. With the aim to enhance knowledge on the topic, this course embraces a multi-disciplinary approach to provide the theoretical foundations and the experimental methodologies to analyze and modelling road-user behavior.

Learning outcomes

- Explain the importance of analyzing and modelling road-user behavior, for improving road safety.
- Illustrate different types of human factors theoretical driver models.
- Compute relevant quantitative and qualitative metrics, to analyze and model road-user behavior.
- Identify the challenges in the analysis of real-traffic data from naturalistic studies.
- Compare the models of road user behaviour and their applications.
- Illustrate the currently available tools for the virtual evaluation of active safety systems.

③ **Program contents, activities**

- Platform (Zoom, Slack, Miro or other tools used in the summer school)

Zoom

- Schedule

IDEA League summer school *Analysis and modelling road user behavior*

Overview of schedule¹

	13 th September	14 th September	15 th September	16 th September	17 th September
8:00-9:00	Welcome reception	Network building activity 1: Introduce yourself and your own work	Lecture 4: Naturalistic data for analysis, modelling, and assessment of road-user behavior	Lecture 5: Modelling road user behaviour	Guest lecture: Parametrization of human driver models with naturalistic drone data
9:00-10:00	Lecture 1: Introduction to road-user behavior and road crash prevention				Lecture 7: Assessment of safety benefits associated to the introduction of active safety systems
10:00-11:00			Lecture 3: Quantitative and qualitative measures of road-user behavior (part 1)		
11:00-12:00	Break	Break	Break	Break	Break
12:00-13:00	Lecture 2: Theoretical framework for modelling driver behavior	Lecture 3: Quantitative and qualitative measures of road-user behavior (part 2)	Exercise 2: Analysis of Naturalistic data	Lecture 6: Sensors for active safety systems	Guest lecture: Models and evaluation for shared control
13:00-14:00					Exercise 1: Quantitative analysis of driving simulator data
14:00-15:00	Guest lecture: Gothenburg projects related to mobility and accessibility		Network building activity 2: Group work session 1		


¹ The times in the schedule refer to the Central European Summer Time (CEST)

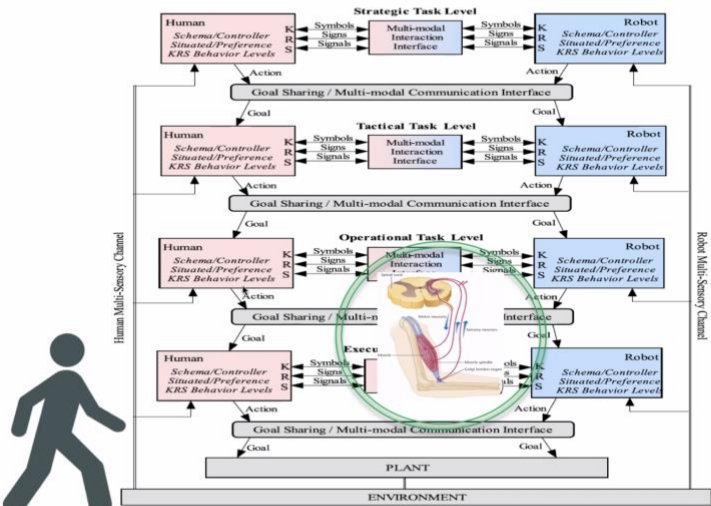
- Activities (Lecture, workshop, presentation)

This program contains several activities, such as lectures, programming exercise, network buildings and presentation. All those activities are balanced allocated among the whole schedules.

Lectures:

The Design Space for human-robot co-op





Abbink et al. (2018) A topology of shared control systems – Transactions on Human-Machine Systems

Exercises:

Task 2

This task is about understanding the relation between crash severity and distracting activities.

Load the data from *Event.mat* with the given function `util.get_data`.

```
print(util.get_data.__doc__)
```

When the data are loaded (which can take about half a minute!), the pandas DataFrame `data`, which includes the information on all events in the 100car dataset is available.

```
data = util.get_data("Event.mat")
data.head()
```

Our presentation:

NETWORK BUILDING ACTIVITY -2

DIMITRIOS NIKOLAOU, NTUA GREECE

JAZIB HASSAN, RWTH AACHEN GERMANY

PRAGYAN DAHAL, POLIMI ITALY

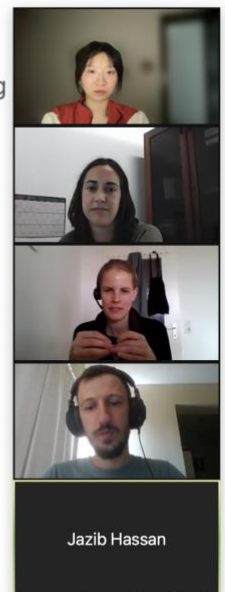
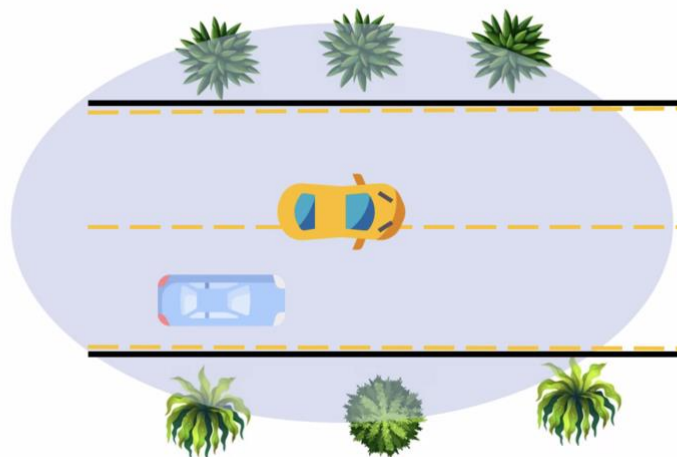
YIXUAN ZHENG, TOKYO INSTITUTE OF TECHNOLOGY, JAPAN

Member of the Helmholtz Association



TASK

Sideswipe/rear-end (ADS striking) conflicts with manually driven vehicles cutting



Member of the Helmholtz Association



- Networking with other participants



- Certificate of program completion, any awards

Connect. Exchange. Innovate.



Certificate of Participation

Yixuan Zheng

has successfully participated in the IDEA League Summer School:
"Analysis and modelling road user behaviour"
13 - 17 September 2021 / Chalmers University of Technology



TU Delft
ETH Zurich
RWTH Aachen
Chalmers
Politecnico di Milano

Dr. J. L. Zachariah-Wolff,
Secretary-General, IDEA League

④ Program participants

There were around 30 participants, most of them came from European countries, 1 third of them are from China, there is only one participant came from Tokyo Tech, that is me.

⑤ Any difficulties you faced during the online program

- The summer school is very intensive, and the content is very compact, every day we need to sit in front the computer for 8 hours with jet lag. For instance, people in Asia might have to start taking the class from 3 pm to 10 pm. This kind of time difference in some extent could disturb people's daily routine, like cannot eat at proper mealtime, don't know how to manage the rescheduled timeline, etc.

- Students' background are quite varies, some of them are Bachelors, some of them are Masters, and Ph.D. students are involved as well. Also, some of them are studying mathematics, some of them are focusing on material fields, only a few students' field is close to the content itself. For students having a background far from the content of the summer school, it is hard for them to understand the lectures and communicate with the others.

- Also resulted by diverse academic background, it is hard to participate in group presentation part to share ideas, since some of them might know the task very well, but some of them barely know the topic.

-Students' nationalities are differed as well, it might be hard to adapt to different English accents.

⑥ Outcomes of your participation in the program

- It is quite extraordinary for the organizes to improve the content of the course each year, more sessions such as exercises and network building presentations has helped us get to understand the content in a comprehensive way, though I'm a layman in auto-driving patterns, but in the end, I was able to know the entrance knowledge of this research filed.

- The designation of the lectures are very reasonable, theoretical contents and practical contents are all mentioned. Personally, I love the session when the lecturer sharing their own papers, which starts from how the experiment was designed, to what kind of images they got, the reason why they chose those factors. A complete scientific research process was clearly presented and illustrated, which is quite illuminative and educative.

- By doing exercises, my programming skills improved a bit as well.

- It is very enjoyable to talk with researchers worldwide, what kind of life they are living, what they are focusing on, in research related aspect, how's their process goes.... It is very important to know peer works in the research journey.

⑦ Any advice for students who wish to participate in a similar type of online program

- The material prepared by the organizers are in very high quality, if you have time, please read them carefully before the program start.

- If you have a thought in your mind, please say it out during the lecture. Though due to the pandemic, it is difficult to talk with the professor face to face, but still, interaction with people is very important, it helps the professor get to know the extent you understand the lecture, also it gives you a feeling of being actually participated, instead of facing the computer only.

- Think actively during the program, think of your own research, how could the content of the lecture can help with your paper, how did the professor conduct their own research, etc.