What is enGlobe?

enGlobe is a DAAD funded internationalization project under the roof of THI’s Latin America Center AWARE which offers scholarships each year from 2020-2023 to master students from UFPR for research stays of 5 months at THI’s research and testing center CARISSMA. The 08 topics you find below are offers from CARISSMA professors for which you can apply. If you are successful in the application for the research stay in one of the topics, you automatically receive the enGlobe scholarship (no separate application process necessary):
- Single travel allowance: 1,575€
- Monthly scholarship rate: 861€

The research stay itself does not include any remuneration or further financial support.

Who can apply?

Master students from any of the graduate programs of UFPR with a level of English of minimum B2 (please consider the requirements of the offers). The stay should preferably be connected to writing a final master’s thesis.

Exceptions:
- If you would like to plan your stay as “voluntary internship”, i.e. not connected to your master’s thesis, please indicate it accordingly in the application form.
- If none of the below listed topics fits to your thesis topic, you have the option to find a THI supervising professor yourself who supports your topic. You then need as additional application document a letter of support of the THI supervisor confirming he/she accepts you for the stay. Please indicate this accordingly in the application form.

How to apply?

1st phase: Documents are to be submitted until May 04 (23:59, Brasília) in English in one pdf file (max. 15 MB) to aware@thi.de:
- Application form, indicating the topic(s) you apply for
- Motivation letter (1-2 pages) explaining choice of topic(s) and motivation for the stay
- CV (max. 2 pages)
- Filled form “TERMO INDIVIDUAL DE PARTICIPAÇÃO EM PROJETO INTERNACIONAL” from UFPR
- Current transcript of records of master studies; if not available: scan of certificate of bachelor’s degree with transcript of records
- Proof of sufficient English language skills (B2 or C1, see requirements of offers)
- Only in case you do not apply for one of the offers (see exception above): Letter of support of the supervising professor at THI
- Optional: Proof of international experience (studies/internships abroad, participation in international conferences/seminars/courses etc., active membership in international organizations etc.)

2nd phase: After the deadline, your application will be evaluated. If you pass the first phase, your documents will be sent to the prospective professor(s). If they agree, you will be contacted by the beginning of May offering an interview appointment with one representative of the selection committee and the professor(s). With the feedback of the professor, the selection committee will then decide on the scholarship holders by mid-May.

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1 Find the form under https://aware.thi.de/en/studying-and-internships/germany/englobe-research-stay-at-thi
2 Can be submitted in Portuguese if not available in English.
3 A confirmation of UFPR or a simple online test are also accepted. Latest during the selection interview it will be tested whether your English language skills are sufficient for the research purpose.
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**3rd phase:** After being selected for the scholarship, you must apply at THI as exchange student **until June 1**. THI’s International Office will then support you in your preparation and offers an orientation week one week before the start of the semester on October 1st which will also be your first day of your research stay at CARISSMA.

**Contact**

Felix Reinhardt, *enGlobe* coordinator THI
Prof. Egon Walter Wildauer, *enGlobe* coordinator UFPR

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**Research Stay at CARISSMA**

October 1, 2022 – February 28, 2023

The THI research and test center CARISSMA - *Center of Automotive Research on Integrated Safety Systems and Measurement Area* has been designed as leading scientific center for vehicle safety in Germany. The aim of this facility is to conduct applied research in order to enhance traffic safety in Germany and abroad. To this end, CARISSMA works with car manufacturers, scientists and research institutions all over the world. Working on an interdisciplinary basis, the scientists involved seek to tackle the social challenge of “Vision Zero” – achieving the ultimate goal of zero traffic deaths. Currently some 39,000 people are killed per year on Europe’s roads alone.

Three institutes are located at the CARISSMA research and test center:

The **CARISSMA Institute of Safety in Future Mobility (C-ISAFE)** is concerned with anticipatory accident detection and accident mitigation. It is concerned with global vehicle safety, which uses all the information available, including to guide unprotected road users safely through road traffic. With its predictive accident detection and mitigation, it makes an important contribution to the EU’s Vision Zero. This includes safety systems ranging from sensors to actuators and their evaluation in the context of automated driving. One focus is on protection in bad weather conditions.

The **CARISSMA Institute of Automated Driving (C-IAD)** focuses on the development, testing and validation of automated driving functions. In the context of road safety, the focus is on accident prevention. Here the institute is closely networked with the Research Center for Artificial Intelligence and Machine Learning (AININ - Artificial Network Ingolstadt) located at the THI. As a cross-sectional topic, the institute is intensively engaged in research on human factors (e.g. trust, acceptance, ethics) as well as user experience/usability evaluation in the field of automated driving.

The **CARISSMA Institute of Electric, Connected and Secure Mobility (C-ECOS)** is thematically broadly based and pursues the focal points of safe electromobility and accident analysis, Car2X communication in connection with intelligent traffic systems and cyber-physical systems as well as the focus on automotive IT security.

The three institutes use synergy effects both among themselves and with other THI facilities, including in the areas of testing and validation and safe automated driving.

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4 More details on the application here: [https://www.thi.de/en/studies/international-students/exchange-students](https://www.thi.de/en/studies/international-students/exchange-students)

5 Practical information for your stay here: [https://www.thi.de/en/international/studies/international-students/practical-information-for-internationals#c6028](https://www.thi.de/en/international/studies/international-students/practical-information-for-internationals#c6028)

6 Find out more about CARISSMA here: [https://www.thi.de/en/research/carissma-1](https://www.thi.de/en/research/carissma-1)
Topics of C-ISAFE

1. Implementation of Automated Valet Parking System for Automated Vehicle Platform ANTON
Supervising professor CARISSMA: Prof. Dr. Ondřej Vaculín

THI develops an open platform ANTON for research, development and testing of different function of connected and automated vehicles. The platform is built on Renault Twizy and Autoware, ROS-based open-source software for autonomous driving technology, together with Carla simulator. It is equipped with sensors, such as lidar, radar, cameras, ultrasound and GNSS/IMU, powerful onboard computer and c2x communication unit.

The objective of the proposed enGlobe project is to develop and verify a concept of an automated valet parking system, implement it to Autoware and the vehicle platform. The research should focus on the methods for positioning and planning of safe trajectories in the parking house.

In the first stage the candidate will get familiar with the open-source environment Autoware and Carla simulator. Further, the concept will be developed and implemented in Autoware. Some additional functions will be implemented. In the next stage it will be verified by simulation for different test scenarios. Finally, the concept will be implemented to a real vehicle ANTON and tested with selected test scenarios.

Special Requirements
Target-oriented, driven workstyle with analytic problem-solving skills, basic knowledge of PYTHON, experience with ROS of advantage

2. Augmentation of assessment methods from passive vehicle safety with machine learning methods
Supervising professor CARISSMA: Prof. Dr. Vaculín Ondřej / Plaschkies, Franz

We are developing approaches to augment assessment methods – namely finite element simulations – with machine learning. Therefore, we concentrate on occupant safety and the variety of human body anthropometrics. It is the objective, to create robust metamodels while keeping the number of required finite element simulations low. Depending on the student’s background, the tasks are either more focusing on the finite element model or the metamodel.

Special Requirements
First experience in either finite element simulation, passive safety or machine learning

3. Analysis of Drone-Base Interface Communication Disturbances for Sensor Data and Control Signals Transmission
Supervising professor CARISSMA: Prof. Dr. Alessandro Zimmer

The student will analyze the signal interference in drone paths used for road monitoring, determining the technological limits for this application. To do this, the student will develop an
appropriate data collection protocol, acquire the data using a Drone from the lab and analyze the corresponding signals, determining possible software solutions (through a new computational model, for example) and/or hardware solutions to work around the detected problems.

Special Requirements
Candidates with creativity and a high level of self-initiative will be preferred. The candidate will have to join online and presential meetings, including eventually business meetings with companies, presenting, and defending his ideas to the group. The ability to write scientific reports is also appreciated.

4. Analyzing the Behavior of Retro-reflectance Signals on Road and Street Signs

Supervising professor CARISSMA: Prof. Dr. Alessandro Zimmer

Devices used to measure the retro-reflectance of road signs are expensive and complex to use. This project aims to analyze sensor alternatives (ToF cameras, Lidar, others) to collect the signal, modeling the eventual relationship between the signal obtained and the one provided by the original device. To do this the student will collect data in a controlled environment (CARISSMA) and in real environments (streets and roads) using the selected sensors selected, to be installed in a THI vehicle, and model the correspondent signal, generating an error or transfer function between the original signal and the one provided by the selected sensors. AI techniques, including neural networks can be used for this task.

Special Requirements
Candidates with creativity and a high level of self-initiative will be preferred. The candidate will have to join online and presential meetings, including eventually business meetings with companies, presenting, and defending his ideas to the group. The ability to write scientific reports is also appreciated.

5. Fusion and Optimization of Neural Models for Recognizing and Reading Plates/Signs in Real-Time

Supervising professor CARISSMA: Prof. Dr. Alessandro Zimmer

Analysis of the fusion of deep learning neural network architectures with the eventual proposition of a new model, capable of detecting and reading traffic signs or license plate images in real time. If necessary, collect a database for testing and validation of the new proposed model using a THI vehicle equipped with cameras and a computer for data collection and processing.

Special Requirements
Candidates with creativity and a high level of self-initiative will be preferred. The candidate will have to join online and presential meetings, including eventually business meetings with companies, presenting, and defending his ideas to the group. The ability to write scientific reports is also appreciated.


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Supervising professor CARISSMA: Prof. Dr. Werner Huber/ Maikol Funk Drechsler

The testing virtualization in the automotive area requires the development of precise and real-time capable models of the whole vehicle. The measurement of parameters necessary to describe the dynamic behavior of the mechanical system of the vehicle require an extensive and expansive procedure. In this way, this project proposes a rapid method that will enable the measurement from these parameters by dynamic maneuvers on the test track. During the stay in Ingolstadt the student will have the opportunity to learn working together with the CARISSMA – Institute of Automated Driving in the following tasks: 1) Definition of a AI-based or regression methods to extract the parameters of the model from the dynamic maneuvers 2) Using simulation software as IPG CarMaker the student will define the maneuvers necessary to obtain the parameters of the vehicle model. 3) Collect the respective data from a real car, performing the defined maneuvers and obtaining the vehicle model.

Special Requirements
Programming skills and knowledge of dynamic vehicle models are required

Topics of C-ECOS

7. QoS for Channel Overloaded by VAMs and the Safety Impact on a dense VRU environment

Supervising professor CARISSMA: Prof. Dr. Christian Facchi / Silas Correia Lobo

Analysis of the impact on the traffic safety for Vulnerable Road Users (VRU) caused by the channel overload on different scenarios, where a high VRU concentration is observed. The first development step is based on simulation, i.e. Artery. On this phase, the impact generated by VAMs on the channel will be evaluated. The scenario will be extended combining CPMs and VAMs.

Special Requirements
Strong interest in interdisciplinary research

8. AI for Automotive Security Testing

Supervising professor CARISSMA: Prof. Dr.-Ing. Hans-Joachim Hof

“Design and implementation of attacks on vehicles for an AI-based vehicle penetration testing framework”. The PhD/master student designs several attacks on vehicles. He/she implements these attacks and integrates them into the AutoSec framework (developed at THI). He/she extends the AI of the AutoSec framework used to automatically hack into cars.

Special Requirements
English language skills of C1; Should have a background in security or AI (especially ontologies), should be willing to work with embedded systems

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