ITMO UNIVERSITY

Study Plan

Applicant: Hao Liu

This study plan includes the following contents:

- Background of the study
- The applicant's preparations for the study in China
- The anticipated target of the study in ITMO University
- The schedule of the study
- Introduction to the follow-up work after returning to China

Background of the study

ITMO University is one of the most famous engineering schools in Russia and is the pride of Russia. It has a high reputation in computer science and technology, especially software design. It is the only university in the former Soviet Union that has optics, optoelectronics, precision machinery and computer technology as the core teaching, and has made significant contributions to Russian space and aerospace technology. It is a technical college with a wide range of professional settings and special training for engineers. And in many fields of scientific and technological engineering in a leading position throughout the year. The university is the leader among Russian technical universities and the pride of Russia. Hangzhou Diansheng Machinery Joint College is the first high-level Sino-foreign cooperatively-run school that has introduced foreign high-quality educational resources after the province's comprehensive implementation of the strategy of strengthening the province through higher education. The construction of digital economy provides an important practical platform.

With the great development of environment awareness technology and decision control theory, the degree of automation of smart cars is getting higher and higher, and already has a certain degree of automatic driving ability, but it takes a long time to achieve fully automatic driving. At this stage of the smart car, people and cars will jointly complete the driving task, referred to as human-vehicle co-driving. Human-vehicle co-driving is a new challenge and an important research topic in smart car technology. The establishment of the driver's state representation and the intervention of the machine under dangerous conditions are of great significance to driving safety. In the process of driving, driver fatigue driving and inattention can easily lead to traffic accidents. Detecting the state of the driver through computer vision methods and combining the information of the surrounding roads to warn the driver and local path planning can greatly improve the driver's safety. The control rights of the vehicle are allocated, and the co-driving coefficient allocation model is studied. The vehicle state error and the driver's steering torque are used as the input variables of

fuzzy control, and the co-driving coefficient is used as the output variable to reduce the conflict between the auxiliary control system and the drivers.

The applicant's preparations for the study in China

In order to fully grasp the opportunity of this visit, Hao Liu fully understands the courses that may be involved and gradually establishes the corresponding knowledge system. In terms of language ability, Hao Liu has passed the CET-6 and is actively doing Russian self-study. In terms of software applications, Hao Liu can proficiently operate software like Matlab and Carsim, and can get a reasonable inference by analyzing the operation results. In addition, Hao Liu also has a certain programming ability and has a good matrix operation thinking, which laid the foundation for the control algorithm required by human-vehicle co-driving.

The anticipated target of the study in ITMO University

- Improve language skills and teamwork skills. Further study theoretical knowledge and establish a more comprehensive knowledge system.
- Improve the knowledge ability of human-vehicle co-driving. Carry out deeper research on the man-machine co-drive control system and its switching mode based on the driver model and the inverse dynamics of manipulation, including the sensor system, driving intent recognition model, human-machine co-driving model, sovereign switching control system and execution system.
- Cultivate a way of thinking that discovers problems, raises problems and solves problems, learns to progress in cooperation, make up for deficiencies in communication, practice theory in experiments, and gain real knowledge in thinking.
- Feel the exoticism of Russia and the academic atmosphere of the ITMO University understand the world's high-level level and plan for future research directions.

The schedule of the study

First month

- Solve the problems encountered in life, quickly adapt to the new environment of clothing, food, housing and transportation in order to better work.
- Understand the characteristics of the school curriculum and participate in classroom learning. Combine with the courses that have already learned to achieve analog learning.
- Be familiar with the language in the communication with teachers and students.

Second month

- Select interested research groups and communicate with the team members, enter the laboratory, participate in experiments and discussions. Actively cooperate with team members in the experiment, record data in time, process and analyze the data,

and achieve timely feedback. If problems are encountered during the experiment, solving the problems through discussion will not only help common progress, but also increase the trust of the team members.

Third month

- Improve the research report of the subject from the following aspects:

  1. Introduce source of the research topic, relevant background and theoretical basis.
  2. Explain purpose and significance of research, potential value of research results.
  3. Elaborate research methods and steps, mainly guiding ideology and research principles on which they are based.
  4. Expose experimental design ideas, experimental steps, and control of irrelevant factors.
  5. Record the experimental data, list the results before and after the experiment, and make a comparison. When comparing, do different experience, make a preliminary analysis of the experimental results and write the preliminary conclusions of the experiment.
  6. Make a rational analysis of the preliminary conclusions. Check whether the desired expected experimental results are obtained.
  7. Reflect on the entire research process and sum up experience and shortcomings.
  8. Invite team members and mentors to make amendments to the research report and improve the quality of the report.

Introduction to the follow-up work after returning to China

It is believed that Hao Liu's study in ITMO University will contribute to the progress of vehicle safety in China to reduce the number of traffic accident victims. He will continue developing the human-vehicle co-driving model according to the Chinese traffic situation and improve the model in future.

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