

Participant Information Sheet

Before deciding to take part in this study (2024 2253-2757), please read the following information about the experiment.

Background of this experiment

This project aims to explore the influence of driver drowsiness states (drowsy and alert) and different driving modes (i.e., manual driving, assisted driving with hands-on the steering wheel, and assisted driving with hands-off the steering wheel) on drivers' attention and behaviours. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information.

You are chosen because you are volunteered for participating in this experiment. The basic criteria are night-shift workers or non-night-shift workers, ageing 25–65 years old, having a valid UK driving license, having more than 3 years experiences of driving and regular weekly driving, having normal or corrected-to-normal vision, having no history of motion sickness or epilepsy, being available for a 2-hour session, and no sleep disorders.

The University of Leeds Static Driving Simulator

The University of Leeds Static Driving Simulator is a controlled and safe environment for studying driver behaviour. It consists of a high-resolution monitor and/or head mounted display virtual reality headset along with a complete driving setup (driving pedals, steering wheel). A Tobii 2 glasses system allows us to record head and eye movements. You will be observed by a researcher during the entire experiment - this is to ensure that everything is working correctly and safely; we are not judging your driving behaviour. The total duration of the experiment will be **approximately 120 minutes**. This includes pre-experimental training, briefing, safety checks, the experiment itself, and self-report measurements.



Please note that a small number of people may initially feel ‘odd’ or ‘unsteady’, and for a small percentage of people, these feelings do not subside, and they may feel a little unwell. This usually manifests itself in the form of a feeling of motion sickness. **If you do feel unwell or nauseous, please do not be embarrassed to withdraw from the study. Simply inform the researcher that you are not feeling well, and we will stop the experiment immediately.** The researcher will take you back to the briefing area. You will still be compensated for your time.

For non-night-shift workers only: if you are a non-night-shift worker, we will provide **£30** for your full participation. Expect for the above compensation, it is hoped that this work will enhance our understanding of the safety of assisted driving.

For night-shift workers only: if you are a night-shift worker, we will provide **£40** for your full participation considering your additional effort of visiting the lab after your night shift work. Additionally, due to the possibility of increased fatigue and its potential impact on your safety, we strongly recommend that you avoid driving home afterwards. To support this, we will provide **£10** as transport fees. After the experiment, the researcher will inquire about your level of fatigue. **If you feel too fatigued to travel on your own, please inform the researcher. In that case, you will first be given time and space to rest, and we will then assist you in arranging an Uber to take you home.** Expect for the above compensations, it is hoped that this work will enhance our understanding of the safety of assisted driving.

The experiment process

This study consists of four parts: sign consent form, eye tracking calibration, practice, formal driving, and compensation sessions.

- Sign consent form: The experimenter introduces the participant what is the task and sign the consent form. (simply drive in a urban road, and ensure a safe driving until the end of the simulation)

- Calibration: Then the experimenter will calibrate your eye movements using a non-intrusive eye-tracking device, a process that takes approximately 2 minutes.
- Practice: You will have 5 minutes to complete three practice tests. Each test corresponds to a different driving mode. Three modes are as follows:
 - Manual Driving Mode: In the manual driving session, you will have full control of the movement of the car, drive as normal as possible, please follow the speed limit (30 mph) as much as possible.
 - Assisted Driving (Hands-On Mode): You can engage the system by pressing the green button on the left of the steering wheel, whenever it is available description on how it will become available (if you activate the system, you will see the text shown on the screen “Automation Mode On” for 3 seconds). Whenever the system is engaged, the automated system of the vehicle will be responsible for maintaining the speed of the vehicle and its position in the centre of the lane. You are required to monitor the road with **at least one hand on the steering wheel and foot off the pedals** (“if you deactivate the system, you will see the text shown on the screen “Automation Mode Off” for 3 seconds). The assisted driving system does not handle hazardous situations, so you may deactivate automation and take control when necessary.
 - Assisted Driving (Hands-Off Mode): This Assisted driving system is designed similarly to the previous mode, allowing you to deactivate and take control if needed. The only difference is you are required to monitor the road with **hands off the steering wheel and foot off the pedals**.
- Formal driving: after completing practice tests, you will need to finish a KSS questionnaire to report your drowsy state. Then follows three formal driving tests. The modes in the formal driving tests are the same as you practiced. At the end of each driving test, you will be asked to finish a KSS questionnaire to report your drowsy state and a NASA-TLX questionnaire to report your workload level. Each driving tests lasts for 20 minutes. You will be given a 5 minutes break between every drive.
- Compensation:

Ethics, safety, and confidentiality

It is important to understand that we are not evaluating your individual performance or assessing your abilities. We are solely interested in the behaviour of a group of drivers to draw collective conclusions. Please note that this study is subject to the strict ethical guidelines and the requirements of The General Data Protection Regulations (GDPR). We would like to point out in particular:

- **Types of collected data and reasons**

Five types of data will be collected from you, including demographic data (i.e., age, driving experience, and gender), driving performance data, eye movement data, questionnaire data, and video data (i.e., recording the experiment process). These data will be used to explore the influence of driving modes on drivers hazard perception, driving modes, and subjective ratings.

- **Use, dissemination, and storage of research data**

Your eye movement data, driving behaviours data, and questionnaires data will be processed and analysed by our researchers, along with that of other participants. The raw data and processed data will be stored and backed up according to the University Information Protection Policy (IPP). The data will be anonymised and stored on the University cloud services. For non-anonymised video data, these data will stay strictly on the University cloud services, with access restricted strictly to those who need it, and if these data are moved outside of these secure locations, e.g., to openly share parts of the video data or as illustrations in publications, those parts of the video data will be anonymised and the participant's face will be covered.

An individual ID will be assigned to you if you signed up the experiment. This ID will depend on the order you registered for the study (For example, the first driver's ID will be D01). This ID will be used as a marker at all stages after registration (storing data in the relevant data set etc.). Except for the ID, your age and driving experiences might also be included in data analysis. Your name, email address, and other personal information will stay strictly on the University cloud services. Please see more information about the Research Participant Privacy Notice by the following link: <https://dataprotection.leeds.ac.uk/research-participant-privacy-notice/>

- **Decisions for taking part**

Taking part in this research is entirely voluntary. If you decide to take part and then change your mind, you can withdraw at any time during the experiment without giving a reason. No compensation for withdrawal. However, once your participation in the experiment is completed, it is no longer possible to withdraw, since, at that point, the recorded data will be anonymised, and we will not be able to know which data was recorded during your participation.

Contact for further information

The China Scholarship Council will fund this research. If you would like more information or have any questions or concerns about the study, please contact:

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or

Professor Oliver Carsten (o.m.j.carsten@its.leeds.ac.uk), at the Institute for Transport Studies, University of Leeds

Thank you for taking the time to read this information sheet.