



Study Title: Investigating the Potential Application of Video Recordings and Eye-Tracking Data for Ab Initio Flight Training Assessment (ORE# 45876)

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Dear potential participant,

This letter is an invitation to take part in a study being conducted to investigate the potential application of video recordings and eye-tracking data for ab initio flight training using a newly developed assessment tool. The outcomes of this research will help modernise ab initio training programs within the aviation industry.

What is the purpose of the study?

The purpose of this project is to examine if certified flight instructors can accurately measure a student pilot's performance using video recordings from a simulated training. Additionally, this study will investigate if eye-tracking data and/or flight data inputs affect the assessments of the certified flight instructors.

What will the study involve?

If you are interested in participating in this study, you can complete the eligibility questionnaire (link is at the end of this letter) to determine if you are eligible to participate. If you have already achieved your Private Pilot License – Aeroplane (PPL-A), you will not be able to participate in the study. If you are deemed eligible, you will be invited to participate in an in-person session on the University of Waterloo campus. The session will be approximately sixty (60) minutes in length. On the date of the session, if you are feeling unwell, please advise us you will not be attending and we will try to offer an alternative date/time if any are available.

The in-person sessions will be conducted in the Waterloo Institute for Sustainable Aeronautics' (WISA) ALSIM AL250 flight training device located on the University of Waterloo campus. Prior to the session starting, you will be given time to ask any questions regarding the study, the information letter and the consent process and then complete a digital consent form. The study will begin with a demographic study to describe our sample. Then a short pre-flight briefing will occur to provide an overview of what will

occur during the simulated training flight. The session will then move to the ALSIM AL250 where the simulated training flight will occur. You, the student pilot, will wear an eye-tracking device and the session will be recorded using two video cameras mounted in the flight training device. The video cameras will be positioned in a manner to not record any identifiable features, however, voice communications will be recorded as communication is vital when flying an aircraft.

The session will simulate a training flight. The ALSIM AL250 will be configured to simulate a Cessna 172 with a fixed-pitched propeller. The simulated training flight will depart the Region of Waterloo International Airport (CYKF) under visual meteorological conditions (VMC). One of the researchers will perform the duties of the air traffic controllers. The aircraft will be parked on Apron II with the engine off. The engine will be started and a run-up will be completed. The aircraft will then taxi to runway 32 and depart towards the north-west. Once at an altitude of 4500 feet above sea level (ASL), you will perform two steep turns (one to the right and one to the left) and two stalls (one power off stall and one power on stall). The flight will then return to CYKF, join the left downwind for runway 32, land and taxi back to Apron II where the aircraft will be parked and shutdown. A certified flight instructor will be seated in the ALSIM AL250 evaluating your performance using an assessment tool developed by the research team. The events that the certified flight instructor will assess are:

1. Engine Start and Run-Up, Use of Checklist
2. Taxiing
3. Normal Takeoff
4. Steep Turn – Righthand
5. Steep Turn – Lefthand
6. Stall – Power off
7. Stall – Power on
8. Circuit
9. Normal Approach and Landing
10. Taxiing

After you complete each of the above flight exercises, a member of the research team will ask you to self-report your perceived stress, workload and situational awareness for the flight exercise you just completed on a scale of zero (0) to ten (10), with zero (0) indicating no stress/workload/situational awareness and ten (10) indicating extreme stress/workload/situational awareness.

Following the simulated training flight, a debrief will occur between you, the student pilots, and the certified flight instructor. You will be asked to debrief one of the steep turns and one of the stalls using traditional methods (notes your certified instructor has taken, what you and the certified flight instructor recall from the events). You will then debrief the other steep turn and the other stall while having access to the video recording, eye tracking data and flight data outputs generated by the flight training device. Following the debrief, you will complete a survey pertaining to the simulated training session and the debrief. In total, this in-person session will take approximately sixty (60) minutes.

At a later date, the recordings from your session will be reviewed online (via Microsoft Teams) by multiple certified flight instructors where they will be asked to grade your performance using the same assessment tool that was used during the in-person sessions. The certified flight instructors will not be given your name or any identifiable information when reviewing these recordings. If they can recognise you by some means (voice, clothing, etc.) they will be asked to keep this information confidential. Confidentiality is further discussed later in this letter.

Where will the study take place?

The sessions will take place on the University of Waterloo campus, in the Flight Simulation Lab located in the Environment 1 Building, Room 242.

Are there any risks in taking part in this study?

Transient risks associated with taking part in this study may include short term psychological risk due to observation of performance, mild mental/cognitive fatigue from flying the simulator or motion sickness. Observational stress is minimized by the fact that assessment being conducted by the certified flight instructor has no impact on your actual flight training. It is important to mention again that the purpose of this study is to determine if certified flight instructors can accurately assess using recordings from in-person sessions and not to evaluate your individual performance or abilities. All assessments will be recorded in a confidential manner and will not be shared outside the research team. Breaks between trials and/or session discontinuation are at your discretion if you experience fatigue or motion sickness.

Will I be remunerated for my involvement?

You will be remunerated \$15 per session you complete. The amount received is taxable. It is your responsibility to report this amount for income tax purposes.

Are there any benefits in taking part in this study?

Flight time in the simulator is beneficial to pilots but these hours are not included in official qualifying totals. The data collected in this study will help modernise ab initio flight training programs, satisfying the aviation industry's need for well-trained pilots.

Can I change my mind about being in the study?

Participation in this study is voluntary and you may withdraw from this study at any time you wish, without any repercussions. If you choose to withdraw, you have the option of withdrawing screening and study information including withdrawal of data. You can request your data be removed from the study up to thirty (30) days after data collection is complete. It is not possible to withdraw your data once papers and publications have been submitted to publishers.

What information of mine will be kept confidential and how will it be secured?

Video, audio, eye-tracking data, certified flight instructor assessments, flight data outputs from the ALSIM AL250 will be recorded. These will not be available outside of the research environment (e.g., to flight schools, examiners or potential employers). Personal computers located in the locked laboratory will be used to store raw data files and video-recordings. All data will be encrypted and password protected. The eligibility and consent forms will be obtained by an online survey operated by Qualtrics. Surveys conducted throughout the study will also be operated by Qualtrics. All survey data will be stored on a password-protected UW server called Qualtrics XM and will be downloaded onto a password-protected laptop computer. When data are collected from people who are not eligible, they will not be invited to the lab and their data will be removed. Qualtrics has implemented technical, administrative, and physical safeguards to protect the information provided via the Services from loss, misuse, and unauthorized access, disclosure, alteration, or destruction. However, no Internet transmission is ever fully secure or error free. We do not collect or use internet protocol (IP) addresses or other information which could link your participation to your computer or electronic device. Your identity will be kept confidential. Your name will never be used on any document, paper or electronic, except the master coding sheet. Participants will only be identified by the codes they were assigned. Physical documents will be kept in a locked cabinet within a locked office, with controlled key access at the University of Waterloo. Electronic data will be erased after a minimum of seven (7) year following publication. It is possible that as a participant, you may know (or know in the future) other participants including the certified flight instructor. All participants, including yourself, are asked to keep the identity of all other participants confidential. However, we cannot guarantee that all participants will maintain confidentiality.

Future Use of Data

With your permission your data, including audio and video, will be uploaded to a UW repository controlled by the research group and may be used by members of the research team for other aviation projects related to the development of competency-based pilot training and the development of computer models for pilot training studies that have received Research Ethics Board approval. Sharing your data is voluntary. Sharing data helps to avoid duplicating research efforts and allows existing data to be reused to answer new research questions. You can still participate in the study even if you do not want your data to be used for other studies. Once your data are deposited, you will not be re-contacted about reuse of your data in future research projects. It will not be possible to remove data that has been shared. However, by contacting the principal investigator, Dr. Shi Cao at shi.cao@uwaterloo.ca, you can request that your data be removed from the repository so that no further data sharing will occur. The master key code linking you to your data will be destroyed when it is no longer needed for the current study, approximately seven (7) years. At this time, we will no longer be able to remove your data from the repository because we will no longer know which data are yours.

Further, if you agree, de-identified data may, in future, be shared outside of the research group. The data we share will not have your name on it, so people will not know your name or which data are yours. Audio and video which could identify you will not be shared outside the research group. Steps have been taken to make sure the risk of identifying you is minimized. For example, we will also not share any other information that we think might help people identify you or connect you to your data. However, new technologies may evolve that introduce new risks to privacy. In the event your data are used for commercial purposes you will not receive any financial benefit from this. Letting us share your data is voluntary. You can still participate in the study even if you do not want your data to be shared with others outside the research group. Similar to data shared within the research group once your data are deposited, you will not be re-contacted about reuse of your data in future research projects outside the research group. It will not be possible to remove data that has been shared. However, by contacting the principal investigator, Dr. Shi Cao at shi.cao@uwaterloo.ca, you can request that your data be removed from the repository so that no further data sharing will occur. The master key code linking you to your data will be destroyed when it is no longer needed for the current study, approximately seven years. At this time, we will no longer be able to remove your data from the repository because we will no longer know which data are yours.

What if I have concerns about my participation in the study?

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Board (ORE#45876). If you have questions for the Board contact the Office of Research Ethics, at toll-free at 1-833-643-2379 (Canada and USA), 1-519-888-4440, or reb@uwaterloo.ca.

What do I have to do if I am willing to participate?

Please click [here](#) to complete the eligibility questionnaire.

What if I have questions about the study?

Should you have any questions about this study, please feel free to contact Brad Moncion at bmtmoncion@uwaterloo.ca.

Yours sincerely,

Dr. Shi Cao and the research team.