PARTICIPANT INFORMATION SHEET

Enabling Low-Carbon Structures by Understanding Human Effects of Motion (LOCAST)

Name of Researcher: Dr Jo Reeves
Contact details of Researcher: jer25@bath.ac.uk

Name of Principal investigator: Dr Antony Darby
Contact details of Principal investigator: absapd@bath.ac.uk

This information sheet forms part of the process of informed consent. It should tell you what the research is about and what taking part will involve. Please read this information sheet carefully and ask one of the researchers named above if you have any questions.

1. What is the purpose of the project?

The LOCAST project aims to help create new buildings with less pollution.

This project is a partnership between researchers from Swansea University, the University of Bath, Cardiff University, and the University of Exeter. It is funded by UK Research and Innovation – the UK Government's main research funding body.

We are particularly interested in tall buildings, like skyscrapers. It is possible to create tall buildings that are just as safe as today, but which use less concrete and steel. This would be cheaper and would create a lot less climate emissions because making concrete and steel causes a lot of pollution. It's also possible to construct shorter buildings that are supported with sustainable materials like wood, instead of steel beams (think of Alpine chalets, for example).

The issue is that lightweight tall buildings, and shorter timber buildings, would all sway a bit more than we are used to. Our project looks at how much people can feel this swaying motion when they're inside a building, and whether (and how) the swaying affects them.
The aims of this study are to understand: 1) how much building motion due to wind people can feel; 2) the effect of building motion on comfort, wellbeing, and task performance.

Your participation in this study will take up to 5.5 hours.

2. Why have I been invited to take part?

You have been invited to take part because you are at least 16 years of age, are able to understand English, are able to see words and numbers on a screen, use a computer keyboard and mouse and are able to walk up a few steps to get in and out of our simulator.

3. Do I have to take part?

It is completely up to you to decide if you would like to take part or not. Before you decide, you should read the information in this sheet carefully and ask any questions you may have. If you agree to take part, you will then be asked to sign a consent form. However, if at any time during the session you decide you no longer wish to take part in this project, you are free to withdraw your participation without giving a reason.

4. What would taking part involve?

The steps involved are shown in **Figure 1.**

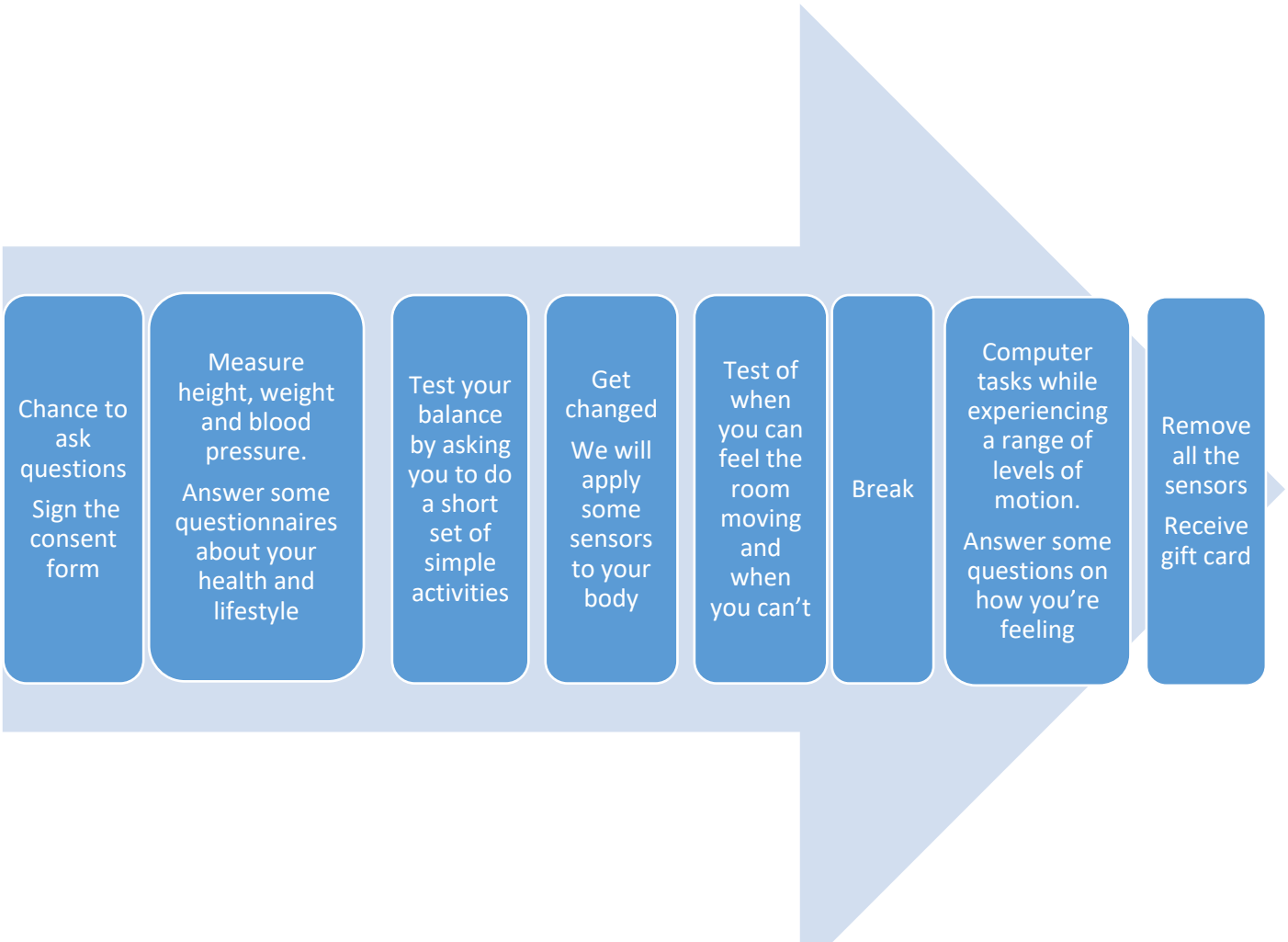

Figure 1. What will happen in the experiment

You will be tested in the VSimulators facility at the University of Bath (**Figure 2**)**.** This is a 3 × 4 × 2.5 m room that looks and feels a bit like an office with the use of virtual reality (**Figure 3**). The room sits on a hydraulic platform, so we can sway it very precisely. We will measure how sitting in this room when it is swaying (and when it is not swaying) affects your body, and how this feels to you.

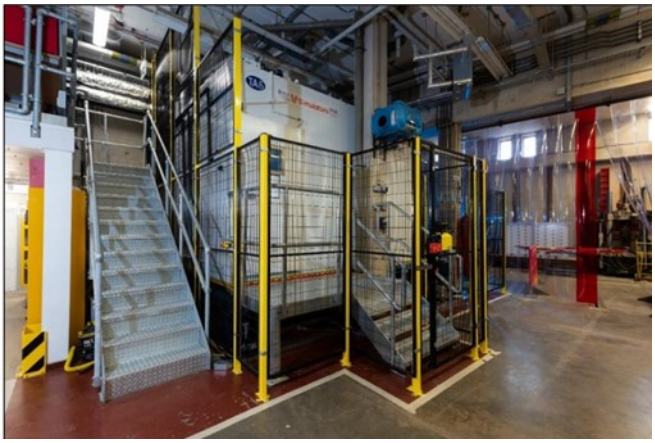

Figure 2. The VSimulators facility at the University of Bath

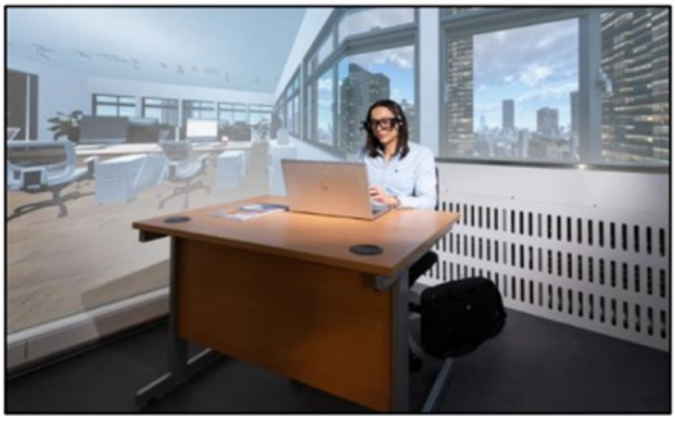

Figure 3. Virtual reality inside the VSimulator facility

You will be in the room on your own or with a researcher. You will be able to talk to us outside the room via an intercom at any time and we will be able to see you. There will be at least one person watching.

Stage 1

About you
We will measure your height, weight, and blood pressure.

We want to test a range of people with different backgrounds. We will therefore ask you for your postcode so that we can search a government website which generates a number from 1-10 based on several factors such as poverty, health, crime and other challenges. We will only record this number from 1-10 and not your postcode itself.

We will ask you a few additional questions about your health and lifestyle, including how long you typically spend at a desk during a workday, how prone you are to motion sickness and what sort of motions are most effective at causing any sickness.

Balance testing

We would like to test how well you can maintain balance in everyday situations. We will therefore ask you to do a short set of simple activities like standing up from a chair, reaching forward, and standing on one foot. The test is safe and takes 10-15 minutes.

Testing set-up
We will then attach several sensors to your body (**Figure 4**):

- Sensors on straps to be attached around your trunk and on a headband, so that we can track your posture.
- Glasses with small wands on them for the virtual reality scene to work
- Small sensors, which are attached with sticky adhesives, that let us measure what your muscles are doing and another that measures your pulse.
- Small sensors on one hand to detect tiny changes in the moisture level of your skin. This helps us understand your body's emotional responses in the experiment.
- Small adhesive sensors to be placed above and below one eye and on the forehead (**Figure 5**) that let us detect when your eyes close and open. We will measure this because we can learn about attention and fatigue by measuring how often you blink and how long you blink for.

All the sensors are non-invasive.

Sensors to record what your muscles are doing will be attached to your chest, back, shoulders and shins. The sensors might feel strange at first, but most people get used to them very quickly. Just let us know if you feel any serious discomfort. These sensors measure the amount of activity in your muscles. To ensure that we get a good recording, we may use a gentle exfoliant on your skin before we attach the sensors. If you have hair on your skin in this region we may ask if we can shave a small patch. The sensors will be attached using an adhesive pad and micropore tape. To allow us

to put these sensors in the right place, we ask if you can wear a loose-fitting t-shirt and shorts.
We will attach the sensors in a private room. As we will attach sensors to your chest, we will need to ask you to remove your t-shirt while we do this. Females can wear a bra. If you feel uncomfortable you can wear a backless hospital gown that can be taped down. Your t-shirt can go back on during the testing itself.
To help us interpret the signal from the sensor on your shoulder, we will ask you to shrug your shoulder upwards and push against manual resistance from one of the researchers.

There will be a thin mat sensor on top of the office chair to detect if you shift your weight during the testing.

We ask that you wear flat shoes for the testing to reduce the risk of you tripping on the steps into the simulator. We will also need you to keep any belongings you have with you (e.g. coat and bag) on the mezzanine or in the lockers provided, not in the VSimulator itself.

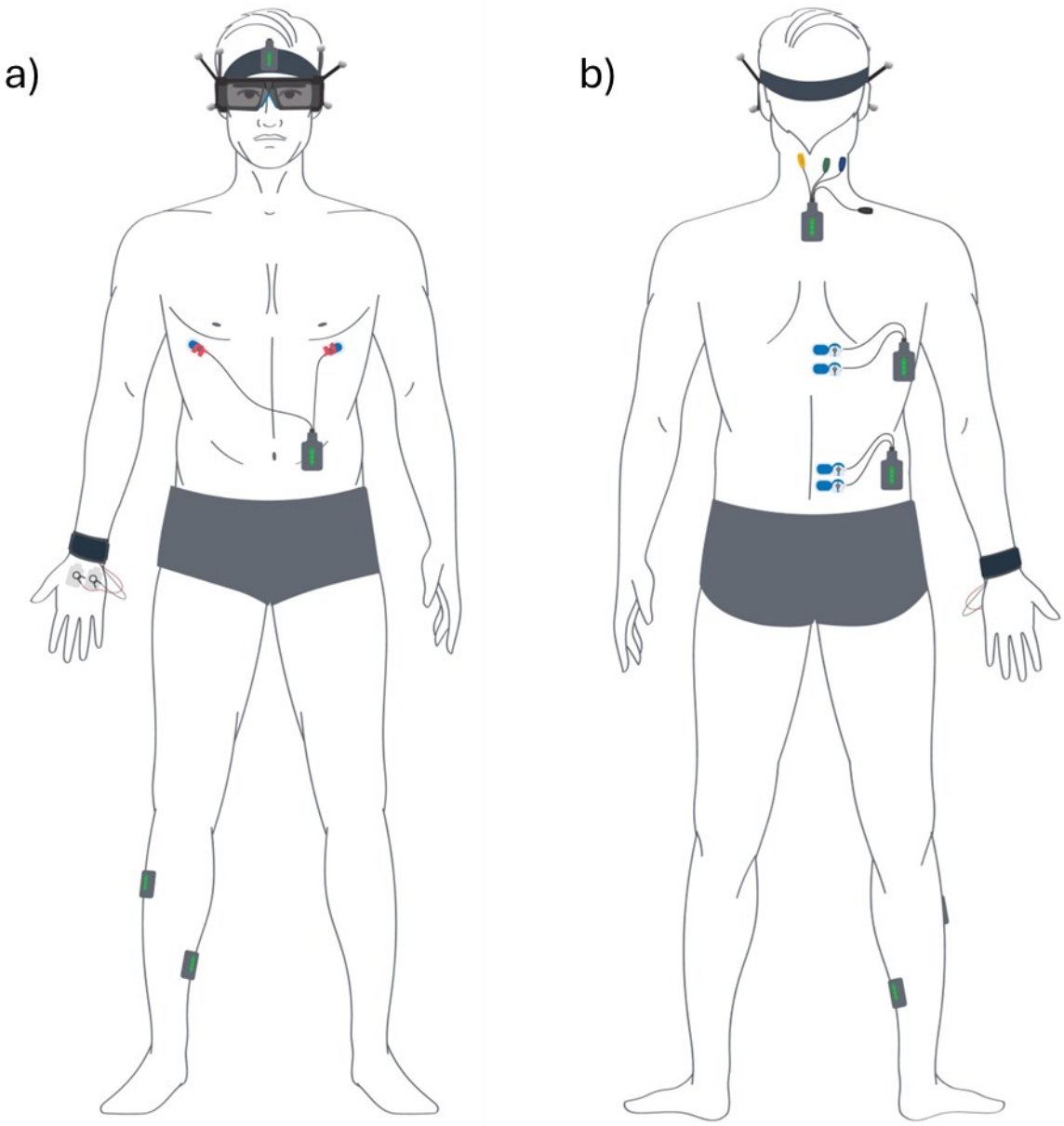

Figure 4. a) Sensor on the headband, glasses, sensors on hand, sensors on the lower leg and sensor that measures your pulse; b) sensor that measures muscle activity on the back, lower leg and neck. Yyou can put your shirt back on once sensors are attached.

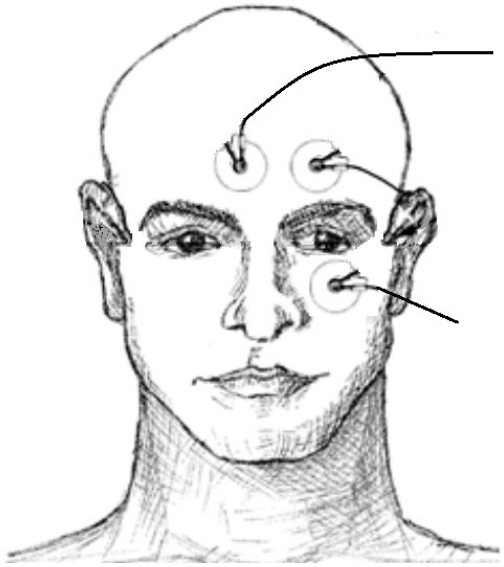

Figure 5. Sensors above and below the eye and on the forehead to detect when you blink

[image adapted from: https://www.biopac.com/wp-content/uploads/s08.pdf]

Building sway

We will be measuring how easily you can feel swaying motion in the room while sat down at a desk in the room. This will last around 2 hours.

For a small group of people, we will ask you to complete Stage 1 for a longer period (up to 3 hours), but without moving on to stage 2 and without the sensors described above.

Break

When Stage 1 is finished there is a 30-minute break, where you are welcome to eat, drink or use the bathroom.

Stage 2

Now we know how much movement you can feel, we will expose you to seven different levels of motion – including zero motion – and see how each of these feels to you, and how well you can perform on some simple tests. Each of the 7 tests will last around 10-12 minutes.

Stage 2 will also take around 2 hours.

After you have completed the computer tasks, we will ask you some short questions about how you feel about the virtual reality environment. For instance, how much do you agree with the statement: “I felt like I was actually there in the environment”.

That is then the end of the whole procedure. We will remove all the sensors and escort you out of the VSimulator chamber.

5. What are the exclusion criteria? (or - are there reasons why I should not take part?)

You should not take part if you have a heart condition (symptomatic coronary artery disease, uncontrolled hypertension, arrhythmias, cardiomyopathy, severe aortic stenosis). You should also not take part if you have photosensitive epilepsy, suffer extreme reactions to motion sickness, have an allergy to adhesives, are taking medication that may cause drowsiness (including antimalarial treatment), have any condition that may be affected by being in a confined space for 5.5 hours, including claustrophobia, or are colourblind.

Unfortunately, you will not be able to take part if you are a wheelchair user and not able to go up and down steps (there are steps into the simulator facility, and it is not possible to install a ramp).

6. What are the possible benefits of taking part?

You will receive a Love2shop gift card of £50 to cover your time for taking part and we will reimburse your travel expenses up to the value of £50.

The information you and the other participants provide in this project will help us make buildings more sustainably and reduce carbon emissions.

7. What are the possible disadvantages and risks of taking part?

While the amount and speed of movement is minor, you are strongly advised to consider any health conditions that might prevent you from taking part, may cause you discomfort or to feel unwell. Due to the motion and virtual reality aspects of this project, those with certain health conditions are prevented from taking part.

The University of Bath reserves the right to restrict access to the VSimulators chamber, for any individual, as they consider appropriate in the circumstances, and in order to protect your safety whilst using the VSimulators. In the unlikely event you become unwell, the researchers are trained to provide first aid assistance and will seek further advice if needed.

We will stick sensors onto your skin using an adhesive pad, tape and straps. If you have an allergy this may result in mild discomfort. To reduce the risk of this you will not be able to participate in the study if you have a known allergy to adhesive.

There will be at least two experimenters present at all times. Both experimenters have access to an emergency stop button that will immediately cut power to the simulator and stop any movement. You will also have access to an emergency stop button should you feel you need to use it.

If anything feels uncomfortable, please let us know at any time. We will stop the study at any time that you request for any reason.

8. Who will have access to the information that I provide?

The research team at the University of Bath and our colleagues at Swansea University, Cardiff University and the University of Exeter will have access to your data.
For administrative purposes the team from the University of Bath and University of Exeter will have access to your contact information. We will delete your contact information after you have taken part unless you wish to subscribe to a mailing list to hear about project updates and a summary of the project findings. The rest of the team will only have access to your non-identifiable research data.
The findings of the study will be shared with our industry partners to help them in designing buildings. You will not be able to be identified from the findings.

Please note to help us streamline the booking and communication process we select third-party applications, such as Calendly and Mailchimp. These platforms operate under their own data privacy policies and may collect certain personal information. If at any point you receive promotional communications from these services, or if you prefer not to remain connected with them, you are welcome to unsubscribe directly through their respective platforms. Further information on how we will handle other personal data shared during the study will be provided when you attend your session.

9. What will happen to the data collected and results of the project?

We will treat all information that you provide as confidential and store it securely at the University of Bath in a locked room or on a password-protected file on the University's secure server (X Drive). Storage of data will be done in accordance with current UK data protection legislation. Recorded data and consent forms will be stored securely and confidentially in the University archives for a minimum of 10 years. Data will be shared with our collaborators using Microsoft SharePoint.

Your name or any other identifying information will not be disclosed in any presentation or publication of the research.

After the project has finished, we can provide you with a summary of the project results if you would like via our project mailing list. This summary will not include any identifiable information and will only show the overall findings of the project.

Once this project is completed, other researchers at the University of Bath, Swansea University, Cardiff University and the University of Exeter may conduct related research projects which would benefit from using the data that you provide. Further use of your data will only occur with your consent and only as part of projects which are given a favourable opinion by an ethics committee of one of these institutions. Data will continue to be stored in accordance with current UK data protection legislation. Your name or any other identifying information will not be disclosed in any presentation or publication of the research.

We will ask for bank details for reimbursement of travel expenses, which will be treated as confidential. These will be kept securely on the University of Exeter's OneDrive and deleted once payment has been received.

10. Who has reviewed the project?

This project has been given a favourable ethics opinion by the University of Bath, Biomedical Science Research Ethics Committee [reference: 10152-14810].

11. How can I withdraw from the project?

If you wish to withdraw your participation before completing the data collection you can tell one of the researchers in person. You can withdraw from the project at any time on the day without needing to give a reason and without any penalty. You can ask for your data to be withdrawn up to two weeks after taking part by contacting the researchers named below or LOCAST@exeter.ac.uk. You will not be able to withdraw your data more than two weeks after the session as your anonymised data may have already been used in analysis. Your individual results will not be identifiable in any presentation or publication.

12. University of Bath privacy notice

The University of Bath privacy notice can be found here: https://www.bath.ac.uk/corporate-information/university-of-bath-privacy-notice-for-research-participants/.

13. What happens if there is a problem?

If you have a concern about any aspect of the project, you should ask to speak to the researchers who will do their best to answer any questions. If they are unable to resolve your concern or you wish to make a complaint regarding the project, please contact the Research Governance and Compliance Team at research-ethics@bath.ac.uk.

14. Who should I contact for more information?

Thank you for your interest in this project. Please do not hesitate to contact the researchers Dr Jo Reeves and Dr Antony Darby if you would like more information.

Name of Researcher: Dr Jo Reeves
Contact details of Researcher: jer25@bath.ac.uk

Name of Principal investigator: Dr Antony Darby
Contact details of Principal investigator: absapd@bath.ac.uk

Project administrator: LOCAST@exeter.ac.uk

To complete the screening questionnaire and book a date to attend please see our website: https://locastproject.org/take-part/