

Research Ethics Application

Please fill in the checklist first if you have not done so already. Please complete this form digitally and send it the Ethics Committee.

Date of Submission: 7-6-2017

Project Title: The response of the riders body to rotational & translational motions of two wheelers rider

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Contact information of external partners (if applicable): None

Summary

Many scientific papers deal with bike stability (weave and wobble modes) but very seldom take into account the passive response of rider's body. This research is aiming to identify the biomechanical properties of the rider's body from laboratory tests. To measure the impedance and resonance of the rider's body special testing equipment has been developed; it is an instrumented bicycle mock up mounted on the top of a motion platform. The bicycle mock up is equipped with a combination of strain gauges at every interface (handlebars, footpegs, seatpost) . Two imu's are also in place one under the seat and one attached to the riders chest. The response of the rider's body subject to pseudo random multisinus perturbations will be capture and afterwards analysed and represented in the frequency domain by means of frequency response functions: the frequency response functions will describe the motion of the rider's trunk and upper torso relative to the platform, and also the mechanical impedance of the rider body parts. This will be described by non-parametric system identification methods. The force frequency response functions can be further used from other researchers to identify the parameters of lumped mass biomechanical models, suited to integration with the multi-body model of the bicycle.

Selection of participants

For this experiment 6 subjects (4 male and 2 female) from three different age groups will be selected. First age group 19-30 years old, second age group 30-45 years old and third age group 45-65 years old. For all age groups a mean weight of 75 (± 10) kg and a mean height of 177.5 (± 3.8) cm will be preferred. All subjects will give their informed consent before the start of the experiment. None of the subjects should have a history of low- back pain, other musculo-skeletal impairments, vestibular disorders or severe visual disorders. Invitation of the participants will be accomplished mainly via email.

Safety measures

Three safety measures are in place to ensure the participants safety. First of all, a safety stripe is used to attached the participants feet to the foot pegs . Secondly, the participant is requested to wear military safety harness which is attached to the sealing. Thirdly, an emergency switch is also in place allowing the participant and the user to shut down the platform in case of an emergency. All of safety measures assure that the rider will not fall during the experiments and also in case the mock up fails.

Risk assessment

Perturbations signals are designed within the comfort zone of the human body according to ISO standards (whole-body vibrations). There is no risk involved to the human health if all of the safety aspects are in place.

Research

R.1. What is the research question? Please indicate what scientific contributions you expect from the research.

What is the impedance and resonance of the rider body when subjected to these oscillations?

R.2. What will the research conducted be a part of?

- ☐ Bachelor's thesis
- ☐ Master's thesis
- ☒ PhD thesis
- ☐ Research skills training

Other, namely: Enter what the research is part of here.

R.3. What type of research is involved?

- ☐ Questionnaire
- ☐ Observation
- ☒ Experiment

Other, namely: Enter the type of research here.

R.4. Where will the research be conducted?

- ☐ Online
- ☒ At the university
- ☐ Off-campus / non-university setting: Enter which setting here.

Other, namely: Enter where the research will be conducted here.

R.5. On what type of variable is the research based?

Give a general indication, such a questionnaire scores, performance on tasks, etc.

Impedance and movement of riders body

R.6. If the research is experimental, what is the nature of the experimental manipulation?

Laboratory/controlled experiments

R.7. Why is the research socially important? What benefits may result from the study?

Bikes and motorcycle have oscillatory modes (capsize,wobble etc). This modes can lead to an accident. Analysing the mechanical impedance of the rider body will saw if the rider is able to handle this oscillatory modes . More specific, which frequencies of these modes are mostly dangerous for the rider. The impact to the society will become by either designing new safety system or optimizing existing bicycle and moto designs.

R.8. Are any external partners involved in the experiment? If so, please name them and describe the way they are involved in the experiment.

none

Participants

Pa.1. What is the number of participants needed? Please specify a minimum and maximum.

Minimum: 18

Maximum: 30

Pa.2.a. Does the study involve participants who are particularly vulnerable or unable to give informed consent? (e.g., children, people with learning difficulties, patients, people receiving counselling, people living in care or nursing homes, people recruited through self-help groups)

no

Pa.2.b. If yes and unable to give informed consent, has permission been received from caretakers/parents?

Enter if permission from the caretakers/parents can be received here.

Pa.3. Will the participants (or legal guardian) give written permission for the research with an 'Informed Consent' form that states the nature of the research, its duration, the risk, and any difficulties involved? If no, please explain.

No, the oscillations that the rider will experience are designed based on ISO standards. The oscillations are in the comfort zone of the rider. There is no health risk involved.

Pa.4. Are the participants, outside the context of the research, in a dependent or subordinate position to the investigator (such as own children or students)? If yes, please explain.

no

Pa.5. How much time in total (maximum) will a participant have to spend on the activities of the study?

20 min per participant

Pa.6. Will the participants have to take part in multiple sessions? Please specify how many and how long each session will take.

6 motions will be performed 45 sec between every motion will be given to the rider to relax

Pa.7. What will the participants be asked to do?

Sit on the bicycle mock up. In the first scenario their body will be freely. In the second they will ask to co-contract their muscles.

Pa.8. Will participants be instructed to act differently than normal or be subject to certain actions which are not normal? (e.g. subject to stress inducing methods)

no

Pa.9. What are the possible (reasonably foreseeable) risks for the participants? Please list the possible harms if any.

Maybe, dizziness but as mention the oscillation the the rider is experienced are in the comfort zone.

Pa.10. Will extra precautions be taken to protect the participants? If yes, please explain.

As a safety measure the feet of the rider are striped to the footpegs to maintain the lower body parts constrained to the mock up. A military safety harness is also used to hang the riders body to the sealing. These safety measures assure that the rider will not fall during the experiments and also in cause the bicycle mock up fails. A safety switch is also present to shut down the hexapod immediately if necessary.

Pa.11. Are there any positive consequences for a participant by taking part in the research? If yes, please explain.

no

Pa.12. Will the participants (or their parents/primary caretakers) be fully informed about the nature of the study? If no, please explain why and state if they will receive all information after participating.

No, it is similar to riding their bike.

Pa.13. Will it be made clear to the participants that they can withdraw their cooperation at any time?

Yes, they can withdraw at any time

Pa.14. Where can participants go with their questions about the research and how are they notified of this?

They can send me an email: g.dialynas@tudelft.nl

Pa.15. Will the participants receive a reward?

☐ Travel expenses

☐ Compensation per hour

☒ Nothing

Other, namely: Enter the reward here.

Pa.16. How will participants be recruited?

Invitation via email or poster

Privacy

Pr.1. Are the research data made anonymous? If no, please explain.

No

Pr.2. Will directly identifiable data (such as name, address, telephone number, and so on) be kept longer than 6 months? If yes, will the participants give written permission to store their information for longer than 6 months?

no

Pr.3. Who will have access to the data which will be collected?

Researchers at TU DELFT

Pr.4. Will the participants have access to their own data? If no, please explain.

If they want= yes

Pr.5. Will covert methods be used? (e.g. participants are filmed without them knowing)

No

Pr.6. Will any human tissue and/or biological samples be collected? (e.g. urine)

no

Documents

Please attach the following documents to the application:

- Text used for ads (to find participants);
- Text used for debriefings;
- Form of informed consent for participants;
- Form of consent for other agencies when the research is conducted at a location (such as a hospital or school).