Green Light Report

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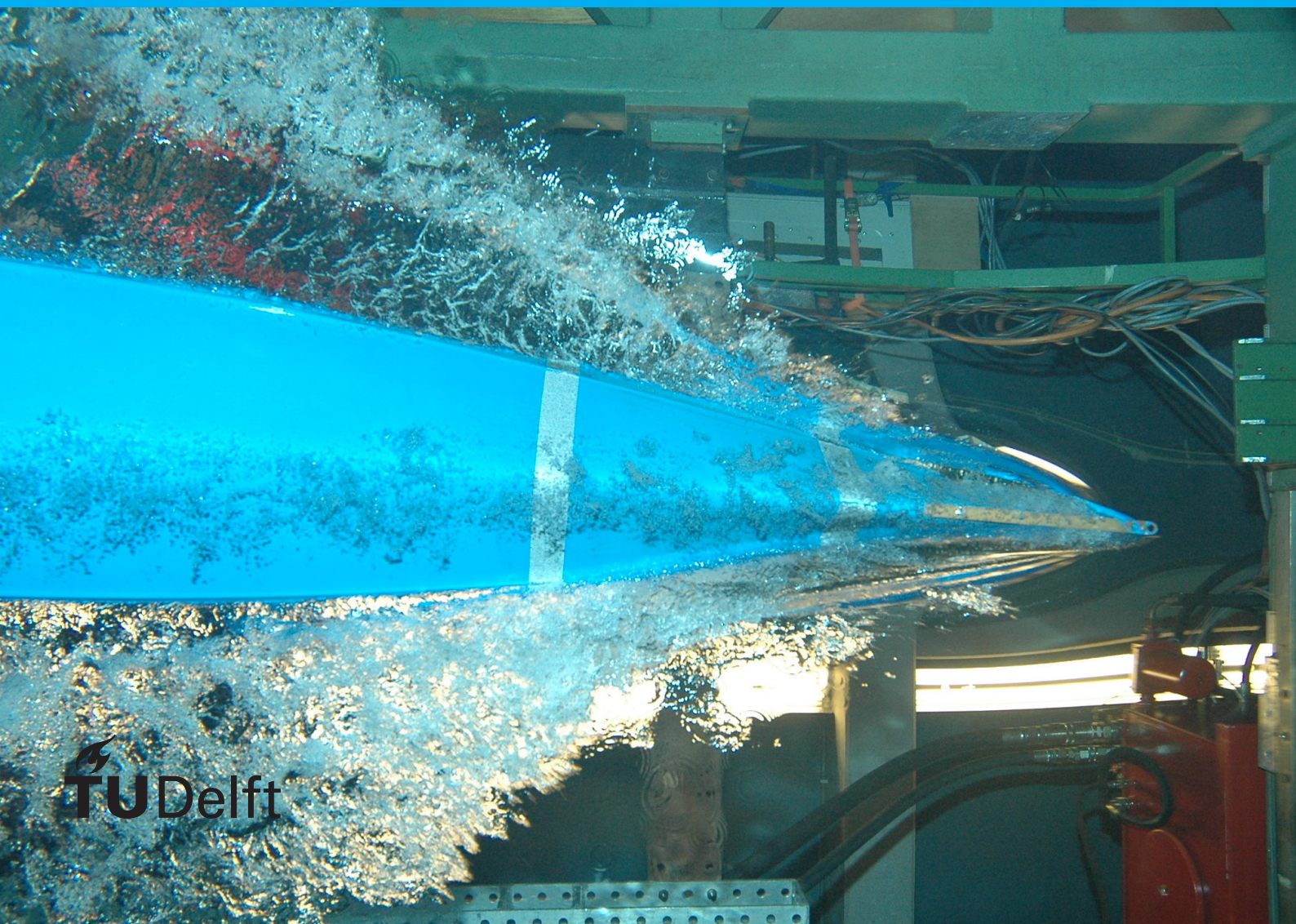

TU Delft

Contents

This report describes the progress and prospects of the stimulation group. It will describe first the targets and deliverables of this project. Then the current level that is achieved, followed by the tasks still needed to achieve the targets and deliverables. Finally a plan is laid out indicating how the tasks will be executed.

The goal of the stimulation group is to deliver a circuit that is capable of not only stimulating the vagus nerve but also to make the circuit power efficient without compromising safety. This circuit will be soldered on a PCB. An additional goal is to give a possible design of an integrated circuit which is used for controlling the circuit. This design will not be implemented, however it will be tested on a field programmable gate array (FPGA).

As of now, there is still plenty of work to be done. The research that is done for this project so far is not sufficient to start designing the circuit and more information is needed to consider different implementations. The project has been split up into different tasks that are needed to be achieved to get the final circuit. The project is divided into a square wave generator, a control unit and a power management circuit. The circuit is current controlled and should deliver a current which is load independent in an acceptable range, since the impedance of the skin is highly non-linear. But as of now there are no concrete designs in place yet to test with. A lot of general information is found with the literature research in regards to stimulation intensities and other stimulation parameters.

The important tasks that follow are designing the circuit, implementing the design on a PCB, integration with the signal processing group and an electrical model of the human skin.

To make sure that the final targets and deliverables are achieved, a plan is listed below.

1. Finding different implementations of the different subcircuits. This stage is important since we want to optimize the circuit for power efficiency and different implementations have different qualities.

2. Design of the impedance model of the skin. Whilst the PCB is being fabricated, an impedance model of the skin will be designed that will be used to eventually test the PCB with the circuit on it.

3. Designing the total circuit and running simulations. It is important that all the different subcircuits work according to their function. Therefore, it is important to first simulate the different subcircuits and test them whether they work as expected. After that, the total circuit needs to be designed by integrating all the different subcircuits. This also has to be tested to see whether this works and if the requirements that were listed in the ”Program of Requirements” are met.

4. Fabricating the PCB. This is an important step in the process in which the physical design will start to take shape.

5. Building the circuit on the PCB and testing whether it works. It is important that this step is done because a physical resemblance of the circuit has to be tested in order to assess if it would work in practice.

6. Assessing if the deliverables are according to the wishes and future improvements

For each step in this plan, careful coordination with the supervisor will be done to make sure that no intermediate steps are rushed