

# Smart environments at Volvo Trucks

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## 1. INTRODUCTION

Working at Volvo involves high workload which involves among other factors stress, physical strain, high noise levels and high variety of heat. All of these aspects could affect workers health. A big challenge for Volvo is for the workers to actually use the safety-clothing at hand, as these are too warm and the workers would rather put themselves at risk when using welders instead of using protective gear. To prevent users from getting too warm when welding a set of adaptive clothing could be helpful. By making the clothing a part of a smart environment the temperature could be adjusted according to the user in a specific situation and thereafter learn patterns of when and where the user usually gets “overheated”.

## 2. AIM AND RESEARCH QUESTIONS

The aim of this project is to create a smart environment that adapts the worker's temperature depending on situation.

- When exposed to heat or getting too warm, how can cooling be applied on the user?
- What are the relevant aspects of the environment?
- How do we know when temperature adjustment is necessary and noninvasive?

## 3. METHODS

During the project the design method used will be linear, due to the lack of time. A concept will be produced, and if enough time, a prototype will be made.

The occupational therapy students(OT students) will be involved during the design process, offering valuable input in the concept. Since the OT students have some contact with Volvo some input will be given from the workers.

### 2.1 Use Scenario

A worker is grabbing the welder, which triggers the cooling equipment both by the grabbing of the welder and by the position of the worker. When the worker is welding the body temperature is rising and this also triggers the equipment and is cooling the person down. Now the worker is getting too cold so the person is adjusting the temperature which the equipment is acknowledging in its learning for this specific worker. When the worker moves on to another task the equipment adjusts the temperature according to the outer body temperature, the task and what it knows about the workers different patterns.

## 2.2 Anticipated Design Solution that will be Demonstrated January 10-11

- A prototype the simulate the function of the equipment.
- A visual demonstration of the system and how it is learning behaviours and adjusting the temperature.
- Posters with information about the product.

## 2.2 Requirements

- The user should have the possibility to adjust the amount of cooling
- The system should learn how the user is performing its task, creating autonomous cooling
- The wristband should be comfortable and noninvasive
- The wristband should not obstruct the worker performing his or hers tasks

## 2.2 Material

Itemised lists:

- *Thermoelectric generator*. Needed for prototype to induce cooling to the users wrist
- *Temperature sensor*. Indication of skin temperature of user
- *Regulator* To regulate the input voltage of the the thermoelectric generator.
- *Location sensor*: To invoke specific methods at different locations.
- *Softlab*: To be able to create a wearable containing the thermoelectric generator and its sensors.
- *Tutoring*: We desperately need help assembling the electronic components.

## 4. TIME PLAN

**Table 1:**Project divided into weekly segments

Vecka	47	48	49	50	51	52	1	2
Project plan								
BASE GROUP MEETING	II	III	IV		V			
Webpage								
WEBPAGE DEADLINE								
DEMO preparation								
DEMO presentation								
Prototype								
Pilot study								
Meeting with OT	I	II	III	IV	V			
OT Presentation								
EXAM								

## **5. ETHICAL CONSIDERATIONS**

Since the device will record some data from the user some considerations is necessary. The recorded data should not be accessible by anyone, apart from the system itself. The system is not supposed to monitor how the workers are performing their task. The problem lies within convincing the users that their data is not being used to monitor them.

## **6. EXPECTED RESULTS AND/OR DISCUSSION**

The expected result is a wearable which helps the worker cool down during its physical tasks. The concept is a device which adapts to a specific user(not enough time to implement during the course).

## **7. REFERENCES**

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- G. Jeffrey Snyder(2008),*Small Thermoelectric Generators*  
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