# GNG 2101

# Deliverable B


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# Table of Contents

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**Introduction** **2**

**Client statements/observations** **2**

Table 1. Customer needs (prioritized) 2

**Problem Statement** **3**

**Metrics** **3**

Table 2. Metrics and related units 3

**Benchmarking** **4**

Table 3.1: Eye Trackers 4

Table 3.2: Buttons/Switches 4

Table 3.3: Adjustable Arms 4

Table 3.4: Camera Covers 5

**Target Specifications** **6**

**Conclusion** **7**

Client Meeting Reflection 7

## Introduction

The following document will discuss the results of the group's first meeting with the client. These results are extracted from client statements and observations notes, which are then translated into customer needs. Once it is prioritized, we can form a problem statement that clearly defines the problem, the project scope and the form of a solution. A list of metrics is then made from the identifying needs, which will be used alongside some benchmarking of existing similar products. These benchmarks will help develop the target specifications for our solution.

## Client statements/observations

- The client would prefer if the product were wireless.
- Switches should have an adjustable arm.
- Switches do not need to detach from the wheelchair.
- Switch activation is done with the side/back of the head.
- Preference for hard plastic and oval-shaped switch.
- Does not need to be water resistant.
- Switches should be reasonably durable.
- Clicky switches are preferred.
- The interference did not stop when the angle of the camera was changed.
- The interference only stops when the lights are completely covered.

Table 1. Customer needs (prioritized)

| Number | Interpreted needs | Importance (1-5, 5 being the most important) |
|---|---|---|
| 1 | The product is durable | 3 |
| 2 | The product emits an auditory cue | 3 |
| 3 | The connection between the switch and the cover is wireless | 4 |
| 4 | The switch is big enough for easy use | 5 |
| 5 | The cover fully blocks the lights | 5 |
| 6 | The cover is fast to activate | 2 |

| | | |
|---|---|---|
| 7 | The water-resistant | 1 |
| 8 | The button is oval-shaped | 1 |
| 9 | The button has some padding | 1 |
| 10 | Button position is adjustable | 4 |
| 11 | Button mount is rigid | 4 |
| 12 | Low energy consumption | 5 |
| 13 | Button can be activated under low force | 2 |

## Problem Statement

There is a need for a device to allow a 12/13 year old boy with disabilities to easily control the eye tracking camera lights using his head. The device is a remote operated eye-gaze camera cover, controlled through a button mounted on head-level.

## Metrics

Table 2. Metrics and related units

| Number | Related Needs | Metric | Unit |
|---|---|---|---|
| 1 | 6 | Activation Time | seconds |
| 2 | 4 | Switch Size (diameter) | cm |
| 3 | 5 | Cover Area | cm^2 |
| 4 | 1 | Drop height | m |
| 5 | 1 | Life cycle | # of cycles |
| 6 | 2 | Audible Feedback | Yes/No |
| 7 | 11 | Stiffness (of mount) | N/m |
| 8 | 12 | Power Consumption | mW |
| 9 | 10 | Volume Coverage of Button Mount | cm^3 |

| | | | |
|---|---|---|---|
| 10 | 3 | Wireless Connection | Yes/No |
| 11 | 8 | Shape of button | Shape |

## Benchmarking

Table 3.1: Eye Trackers

| **Specs / Existing Products** | Tobii I-12 |
|---|---|
| Dimensions | 30,7 x 27,4 x 10,5 cm |
| Battery Capacity | 62.65 W*h |

Table 3.2: Buttons/Switches

| **Specs / Existing Products** | Buddy Button Switch | Switch It Up! Switch | Gumball Switches |
|---|---|---|---|
| Cost | $65 | $29.36 | $53.95 |
| Size (diameter) | 6.35 cm | 6.99 cm | 6.35 cm |
| Activation weight | 99.22 g | 255.15 g | 25 g |
| Audible feedback | yes | yes | yes |
| Bluetooth/wireless | no | no | no |
| Material | plastic | plastic | plastic |

Table 3.3: Adjustable Arms

| **Specs / Existing Products** | Noga NogaFlex Holder - Model: NF1022 | HFS Pro |
|---|---|---|
| Cost | $86.63 | 23.99 |
| Weight (g) | 226.8 | 453.99 |
| Dimensions (cm) | 10.16 x 15.24 x 10.16 | Fixed arm height: 17.526; Extension arm length: 19.05; |

| | | |
|---|---|---|
| | | Magnetic Base dimension: 5.842 L x 5.02 W x 5.53 H |
| Adjustability | Ball joints | Rotary joints |

Table 3.4: Camera Covers

| **Specs /Existing Products** | Moko sliding webcam cover | Cardboard rectangle | HUYUN webcam shutter | Silent pocket privacy stickers |
|---|---|---|---|---|
| Cost | $ 11.99 (pack of 3) | Free | 6.99 | 13.99 (pack of 25) |
| Dimensions | 1.78 x 0.76 x 0.08 cm | Variable Dimensions | 3.56 x 3.3 x 1.02 cm | Variable Dimensions |
| Type (automatic, manual) | Manual, slider | Manual | Manual, flip cover | Manual, tape-on |
| Remote controlled | no | no | no | no |
| Battery | N/A | N/A | N/A | N/A |
| Type of mount | Adhesive tape | Duct tape | Snaps on the edge of the laptop/webcam | Sticker |
| Opacity | Full (black) | Full (hard cardboard) | Full (black) | Full (Black) |
| Material | plastic | paper | plastic | paper |

## Target Specifications

| | Metric | Units | Marginal Value | Ideal Value |
|---|---|---|---|---|
| **1** | Activation Time | seconds | <20 | <5 |
| **2** | Switch Size (Diameter) | cm | 3-12 | 4-6 |
| **3** | Cover Area | cm^2 | 31-22x6-1 | 27-23x4-2 |
| **4** | Drop Height | m | >0.3 | >1 |
| **5** | Life Cycle | Number of clicks | 30 000 | 50 000 |
| **6** | Sound Coming off button | dB | 30-60 | 30-40 |
| **7** | Stiffness (of mount) | N/m | >2 | >4 |
| **8** | Power Consumption | mW | 700(*) | 280(*) |
| **9** | Volume coverage of mount | cm^3 | >25 | >50 |
| **10** | Wireless connection | Yes/No | no | yes |
| **11** | Shape of button | Shape | Any shape | Oval/circle |

(*) This calculation is based on an acceptable drain of Tobii I-12 battery. (As if the device was powered by the Tobii battery) We chose < 10% battery consumption as marginal and < 4% as Ideal. The Tobii has a 62.64 Wh battery capacity, and the average battery life of the Tobii is 9 hours, thus the average power consumption is 62.64Wh/9h=6.96W. [1] This means that the marginal and ideal power consumption are 0.1*6.96W~=700mW and 0.04*6.96W~=280mW respectively.

# Conclusion

Client Meeting Reflection

Based on the little information we had going into the client meeting we were not expecting to receive the amount of details the first client meeting needed. From the paragraph provided to us we were not quite sure of the types of questions to have prepared.

Before the meeting, we expected the users' problem with the eye-gaze camera to have something to do with privacy. As we started the meeting we became aware that the client had physical impairments in which his arm and leg coordination is reduced. The problem the user was facing had to do with the interactions of the system he uses to speak and the system he uses to write on his other electronics. The cameras the user uses interferes with the camera from the other system in which a camera cover is needed. This change altered our perspective on the requirements needed for our product. Not only was the purpose of the product different, we also became aware of the restrictions our client has when it comes to using a switch. As we gained more information, we adapted our approach and asked questions that would strengthen our understanding of the problem and the user's needs.

Our focus is now more on the accessibility of the switch for the cover and making sure that it fits into the daily life of the client with ease. We also now know the exact camera model that we will be covering as well as the type of chair the button will be attached to.

Future questions that we would need clarifications/ask the client:

- Dimensions of the button that the user is using
- Specific dimensions of the area the camera light