



# *Final Presentation*

## **Embodied Interaction Advanced**

IAD Interaction Design | 5. Semester | HS 2011

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**IAD Interaction Design**

Zurich University of the Arts  
Department of Design

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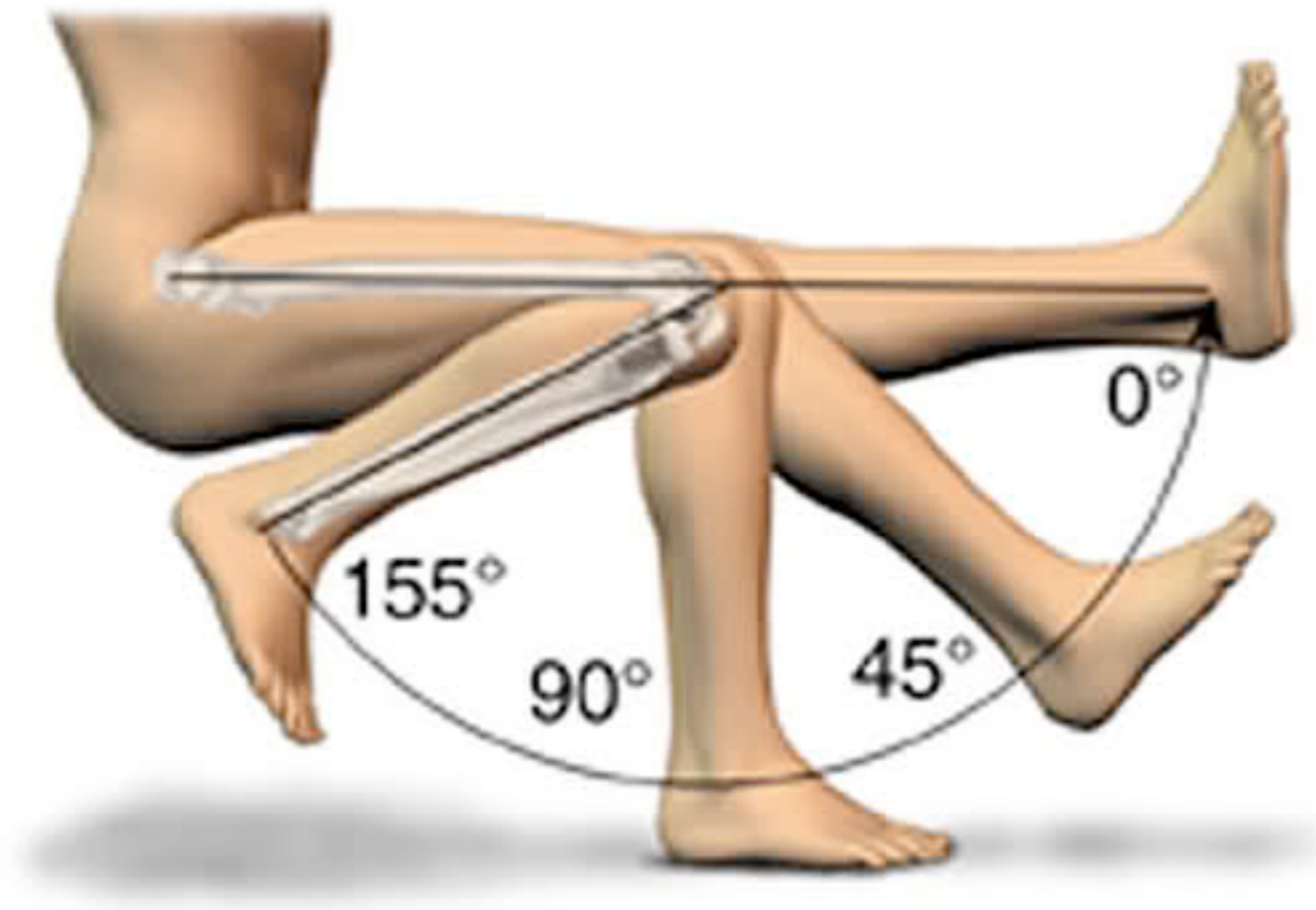
hdk



# **Problemstellung** | Hyperextension

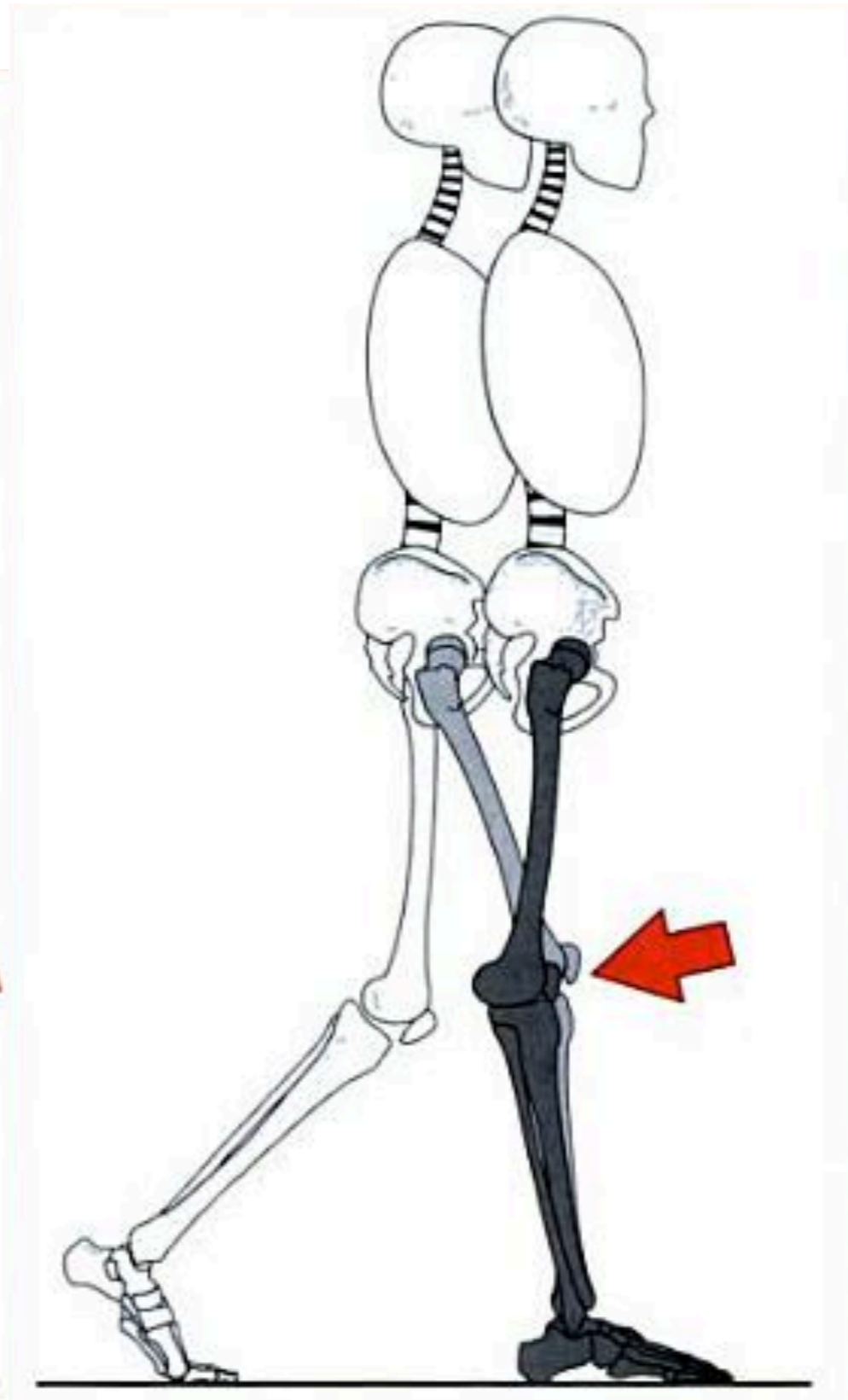
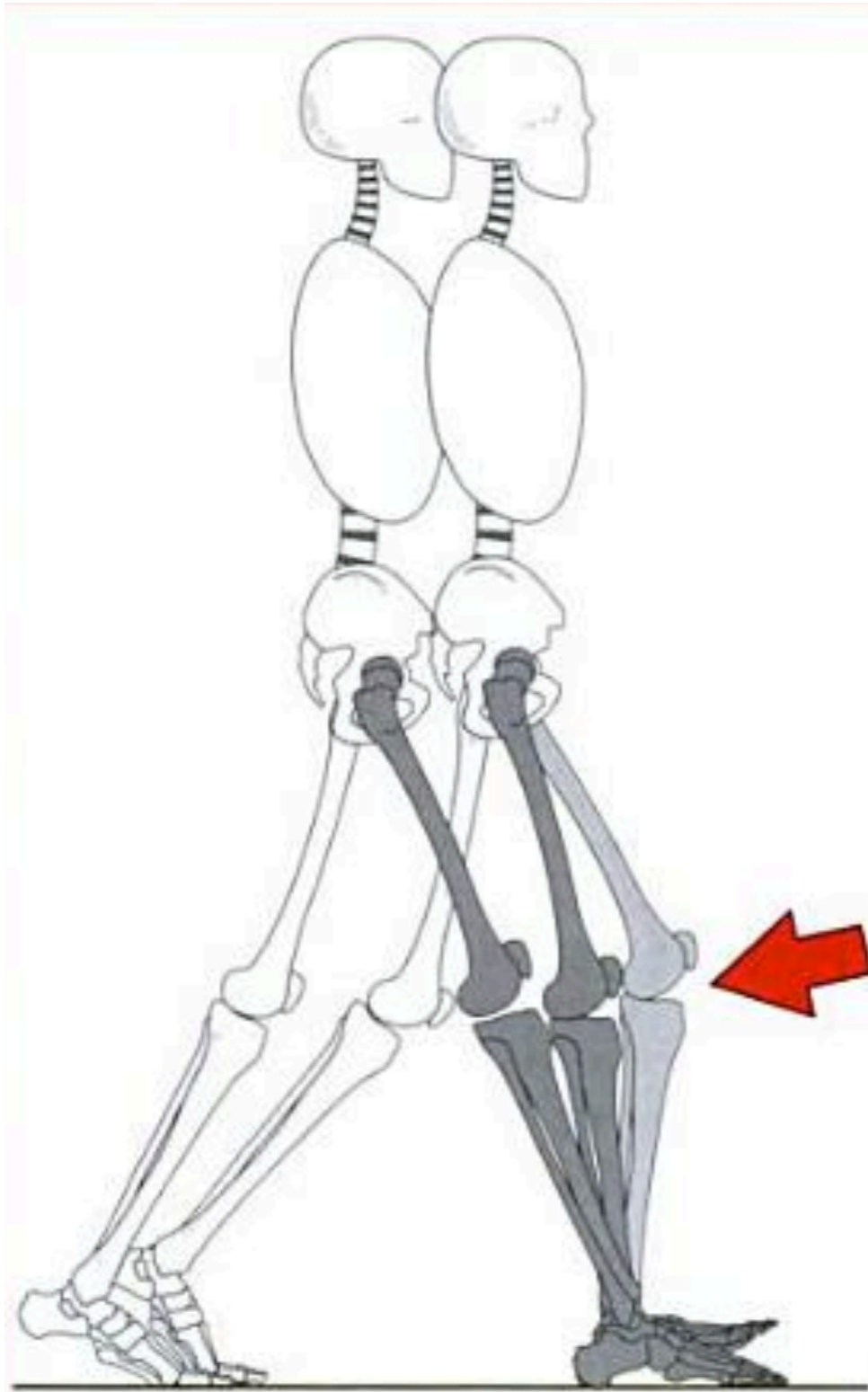


# Bewegungsradius eines gesunden Beins





# Problemstellung | Hyperextension





## Betroffene:

- Schlaganfallpatienten
- Personen mit Halb-Lähmungen
- Unfall-Geschädigte
- falsch angewöhnt



## Problemstellung | Lösungsansatz

Hilfe bei der Kontrolle über seine eigenen Bewegungen

### ZIEL:

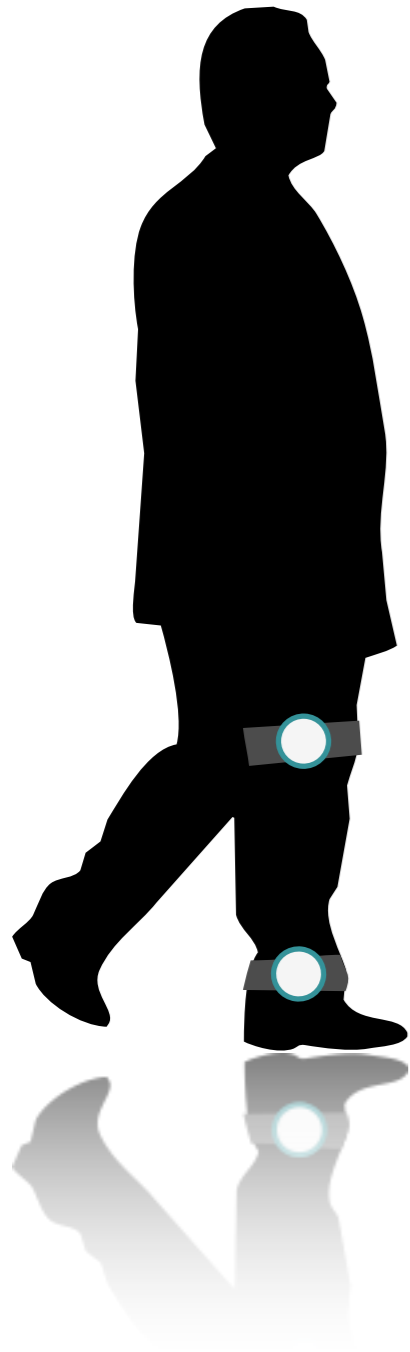
Betroffene auf falsche Bewegungen hinweisen.

### ANSPRUCH:

- echte Hilfestellung (nützlich)
- unauffällig, im Alltag tragbar
- flexibel einsetzbar
- einfach an- und abzuziehen
- individuell zu kalibrieren



**Interaktion**  
| Service



## Patient

### Anspruch:

- an/ab ziehen
- justieren

### Benötigtes Feedback

- haptisch

## Therapeut

### Anspruch:

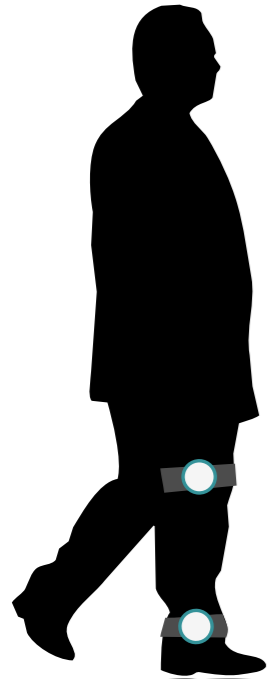
- justieren
- überprüfen
- auswerten

### Benötigtes Feedback

- visuell

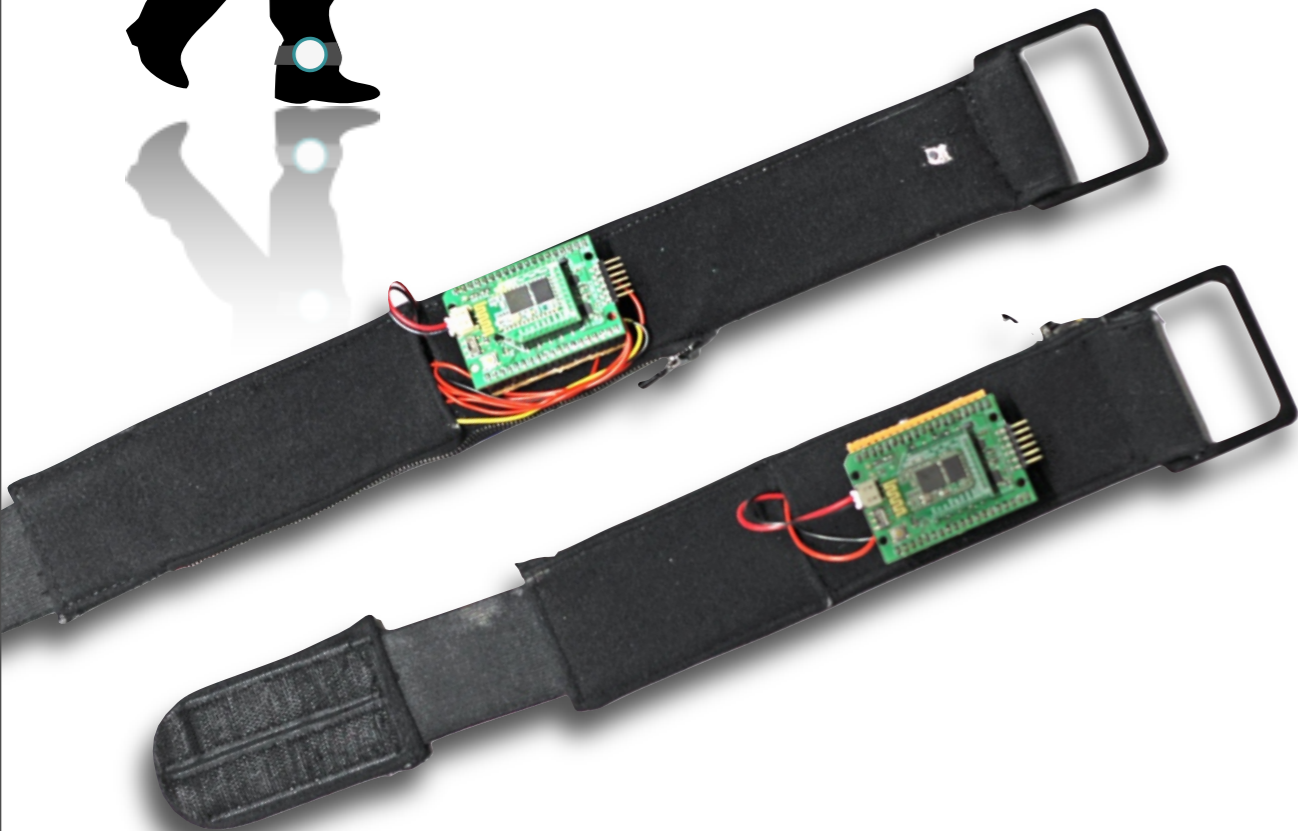






# Patient

mobiles & haptisches Interface



# Therapeut

visuelles Interface


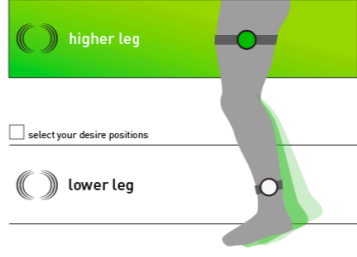





Control window for therapist  
Step by step to a better walk

Test View Feedback Setup IAD Interaction Design Z 10:30

Info: Lorem ipsum dings bumm bla bla, da stahst was mer chan uf dere site xe einfach damits jede verstaht

Info: Lorem ipsum dings bumm bla bla, da stahst was mit jetzt mits jede verstaht

Modus	Feedback Position
<p>Feedback at the time of:</p> <input type="checkbox"/> <b>Hyperextension</b>  Statement: Attention you have overstretched!	<p>Vibration at the position of:</p> <input checked="" type="checkbox"/> select your desire positions  higher leg <input type="checkbox"/> select your desire positions  lower leg
<p>Feedback at the time of:</p> <input type="checkbox"/> <b>Extension – Hyperextension</b>  Statement: On this point no more stretching!	
<p>Feedback at the time of:</p> <input checked="" type="checkbox"/> <b>Flexion</b>  Statement: Attention you have overstretched!	
<p>Reaction Interval</p> <p>select a number to define the reaction-interval of your gain-gadget.</p> <input type="checkbox"/> ▲ 1 wrong steps to start the feedback <input type="checkbox"/> ▼ 3 right steps stop the feedback	

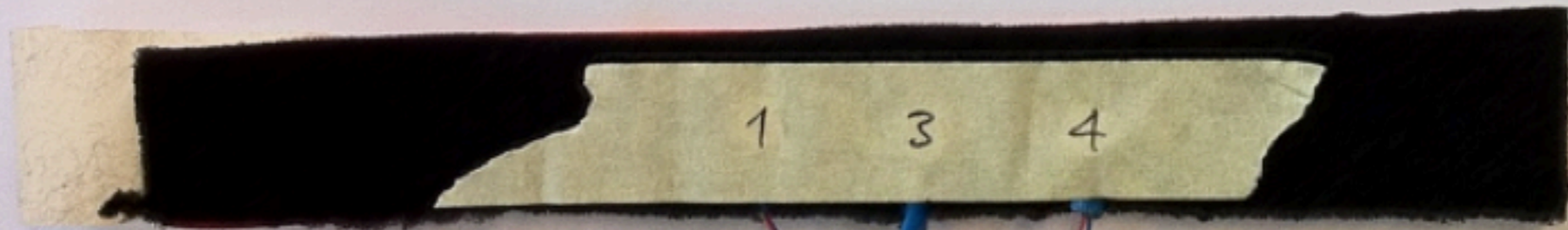


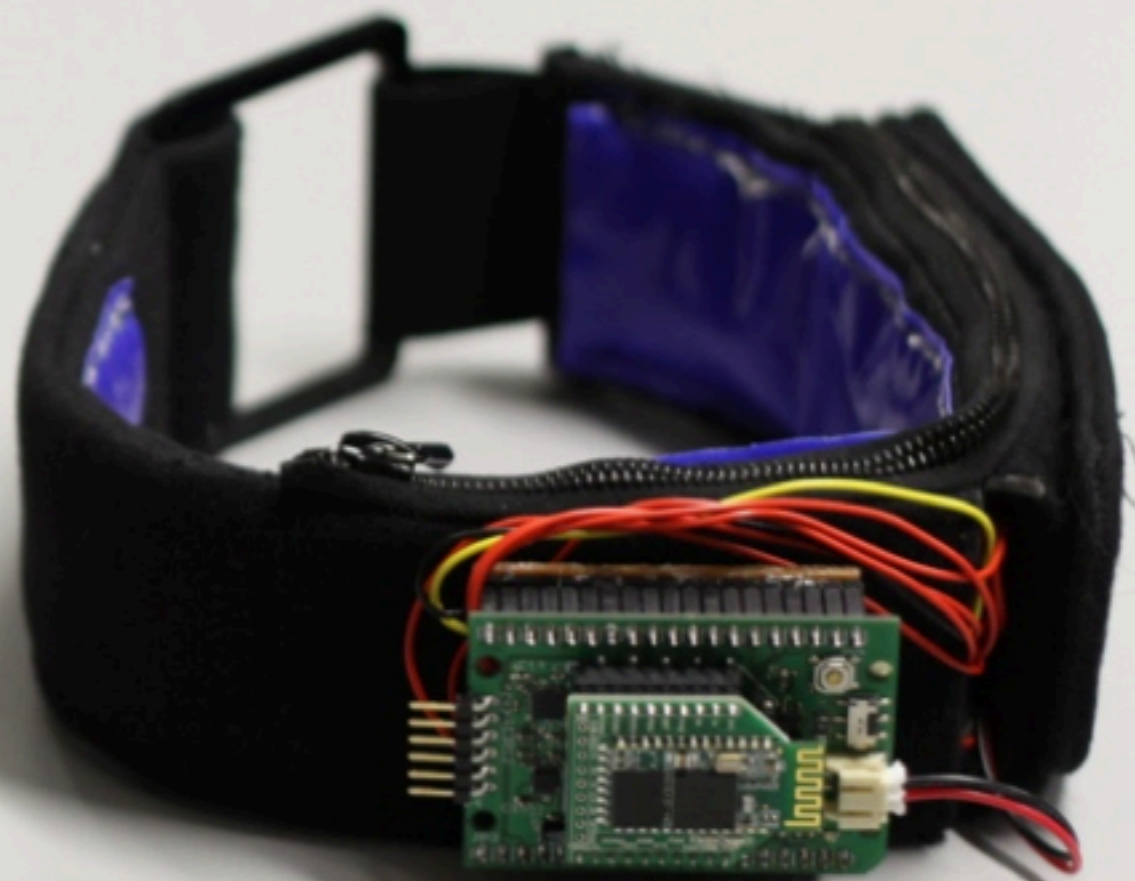
# Prototype | Aufbau

Test one

Impulsverstärker

3 vibres







# Prototype | Aufbau



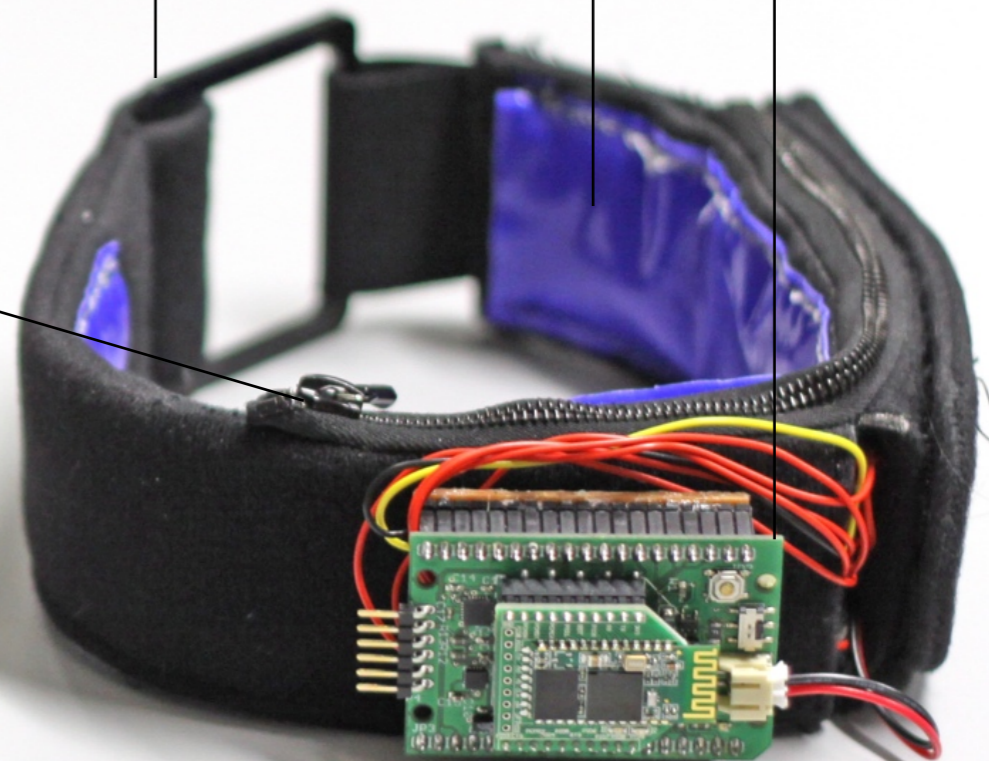
**Unterschenkel**

Reissverschluss  
(praktisches Verstauen der Sensoren  
& Signalgeber)

Schnalle  
(extra Gross)

Grip zur besseren  
Haftung

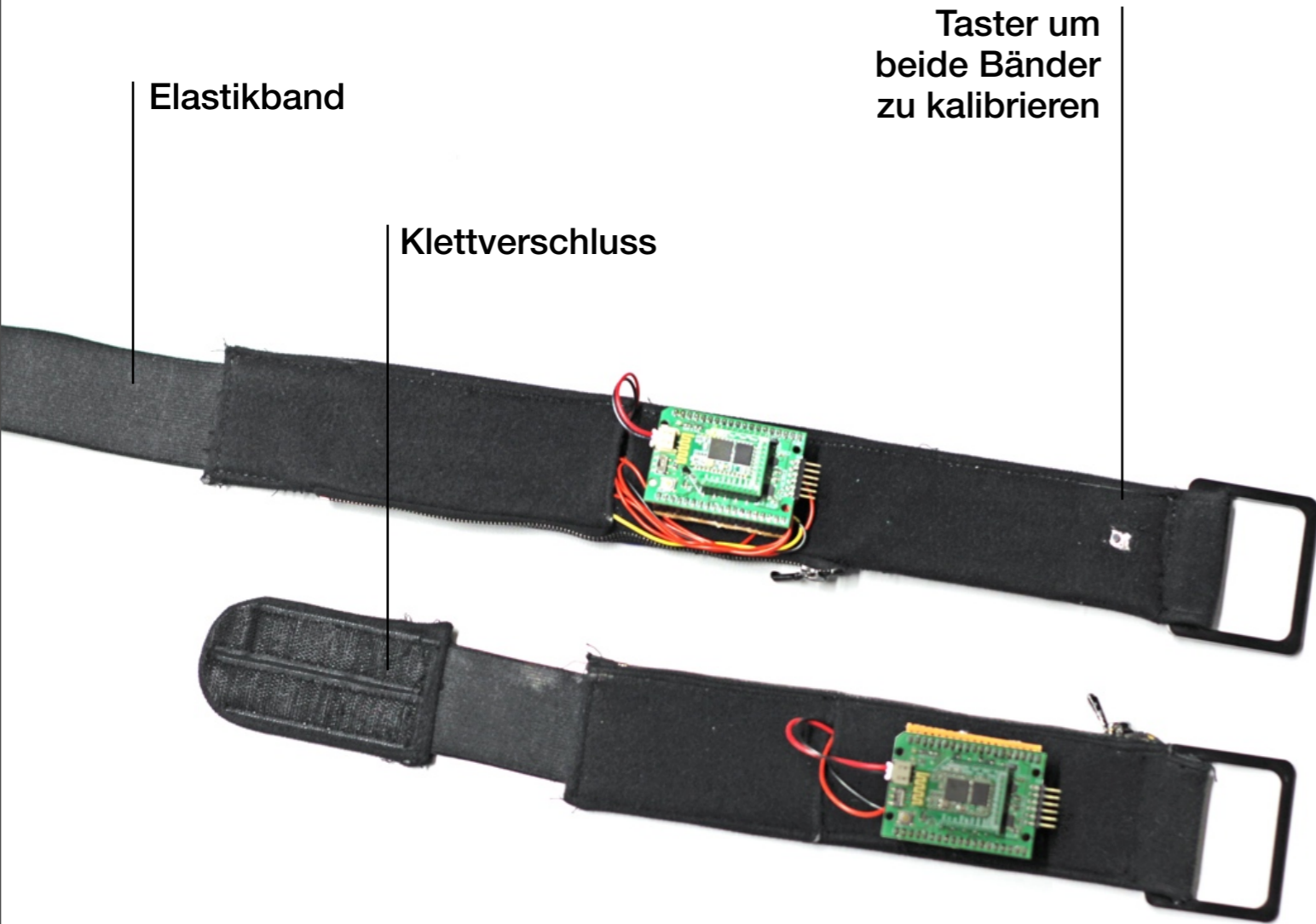
DakaX  
Micro Chip



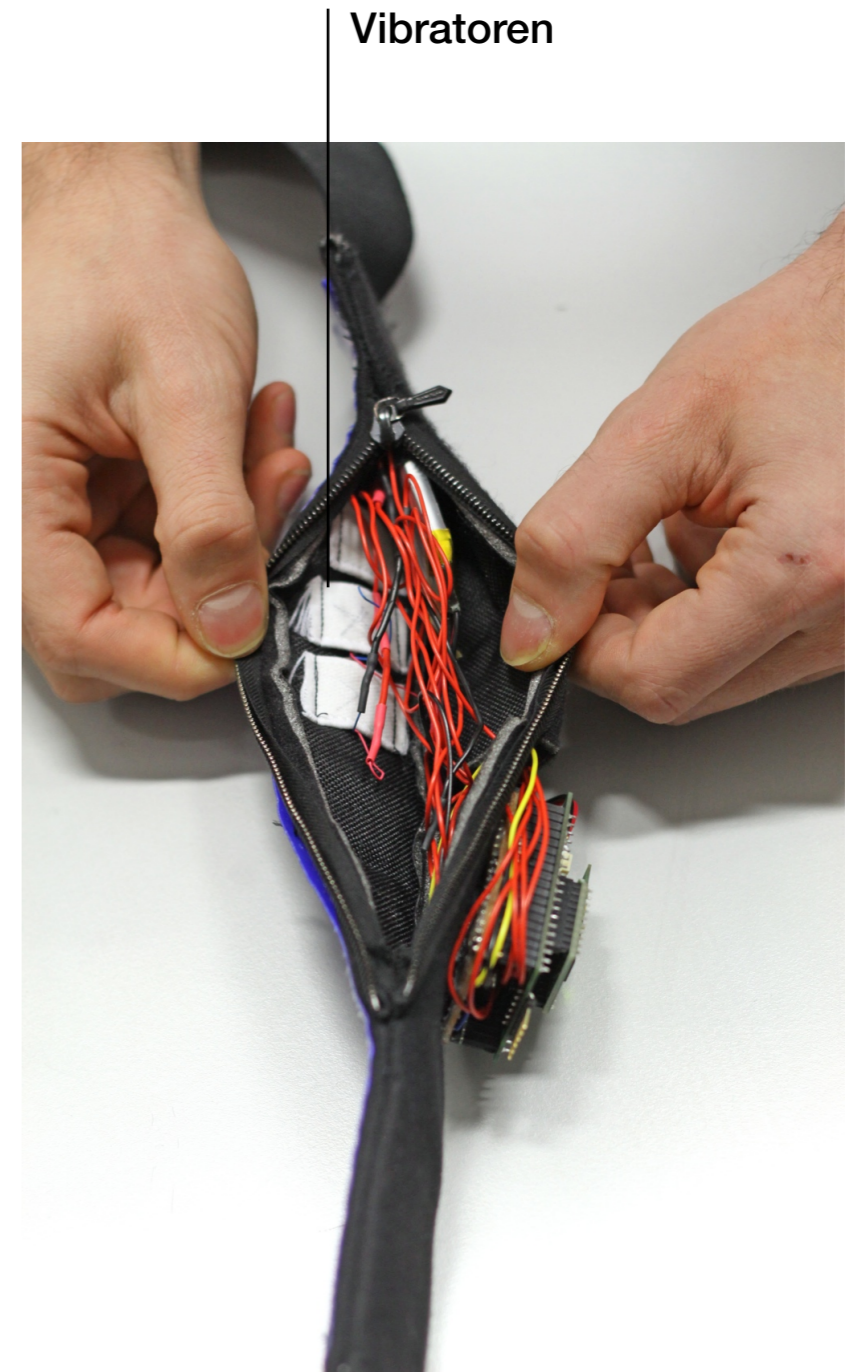
**Oberschenkel**



# Prototype | Aufbau



**Band offen**



**Reissverschluss offen**



# Feedback | Vibration

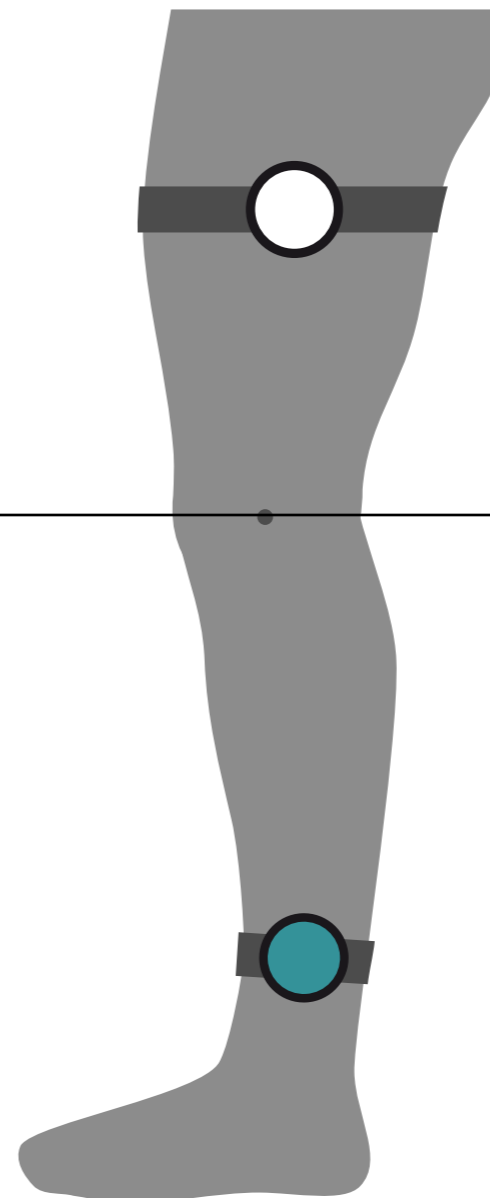


## Unterschiedliche Position:

Individuelle Regulierung der **Stärke** und **Position** des Feedbacks

Vibratoren  
an Oberschenkel

Vibratoren  
an Unterschenkel





## Unterschiedlicher Zeitpunkt:

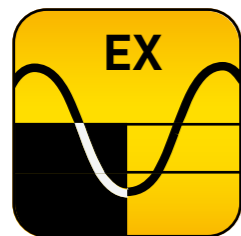
Je nach dem bei welcher Position das Feedback erfolgt, variiert die Aussage.

### Hyperextension



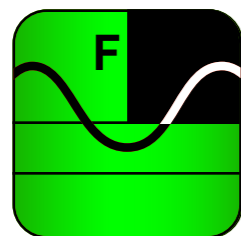
Statement  
**Attention you have overstretched!**

### Extension – Hyperextension

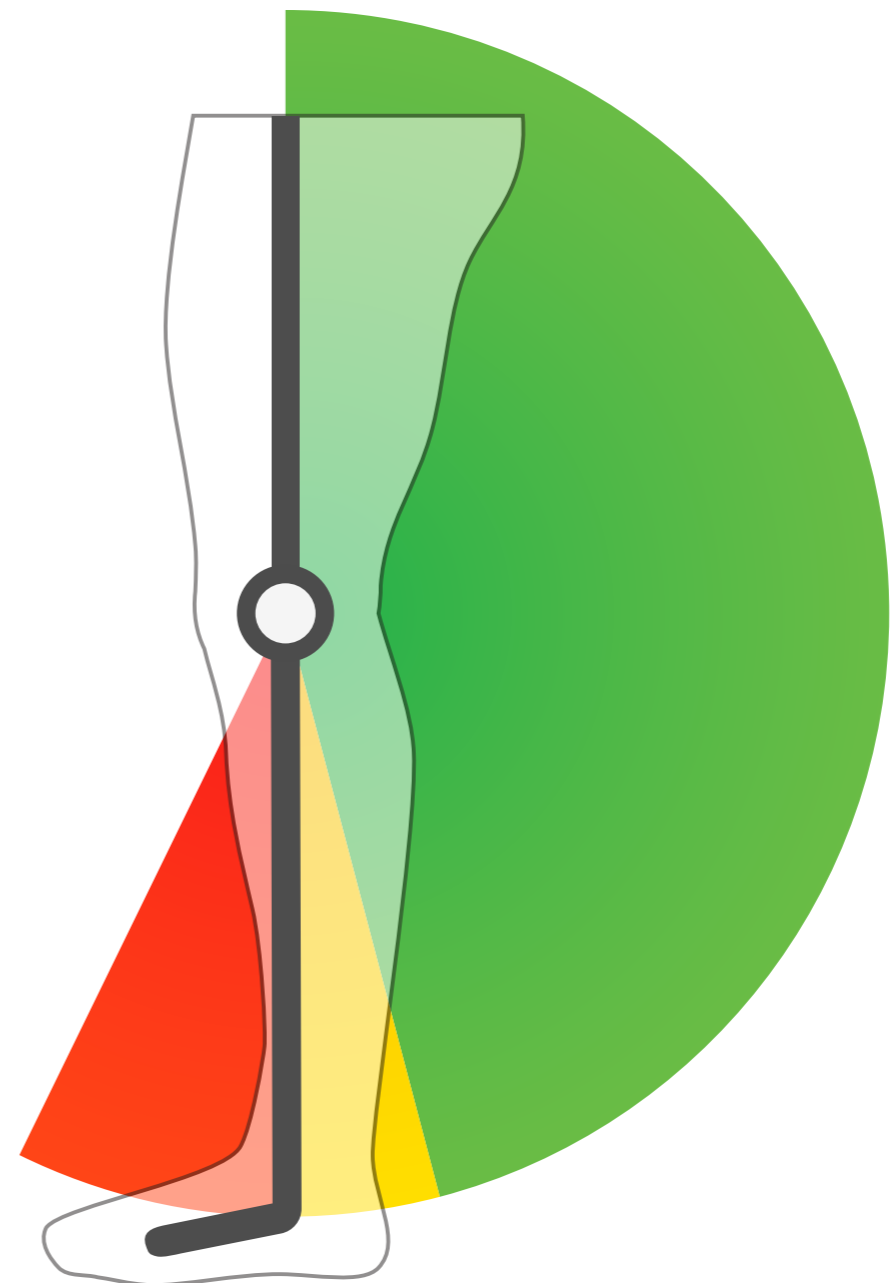


Statement  
**On this point no more stretching!**

### Flexion

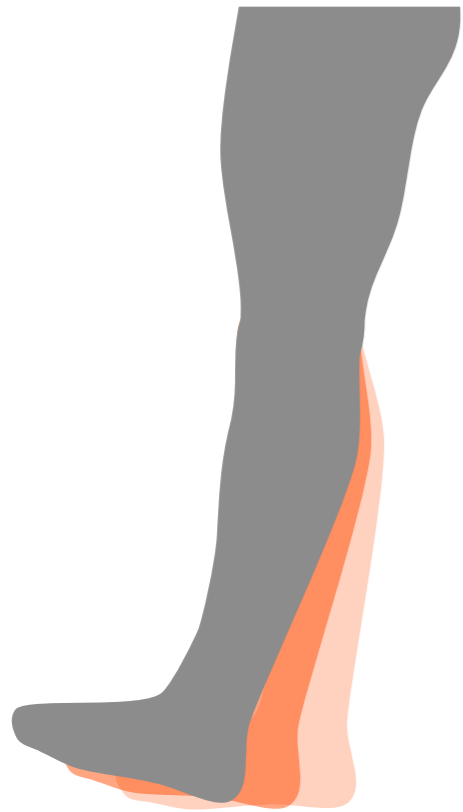


Statement  
**Well done, it was a good footstep!**

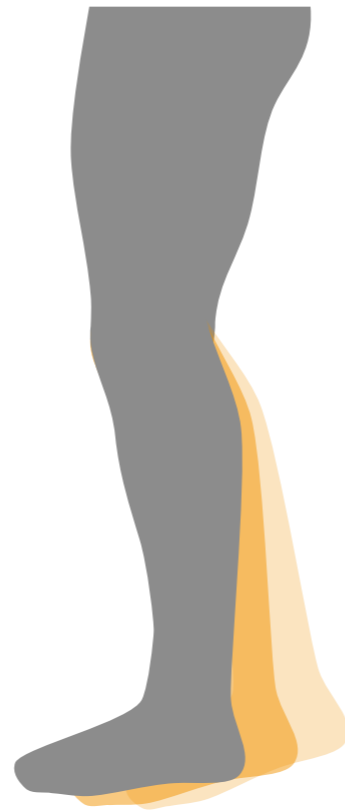




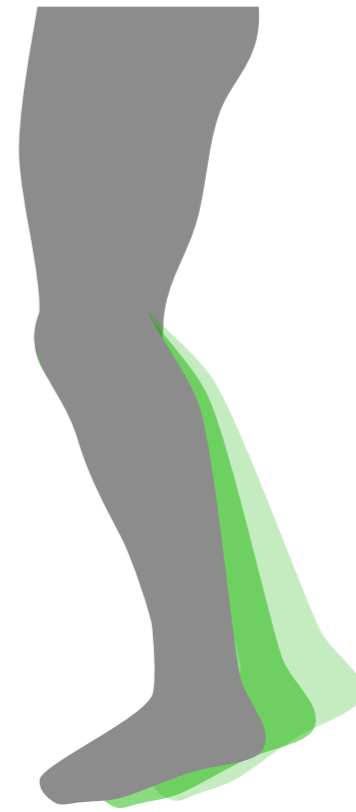
# Feedback | verschiedene Modi



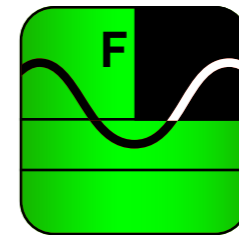
Attention you have overstretched!



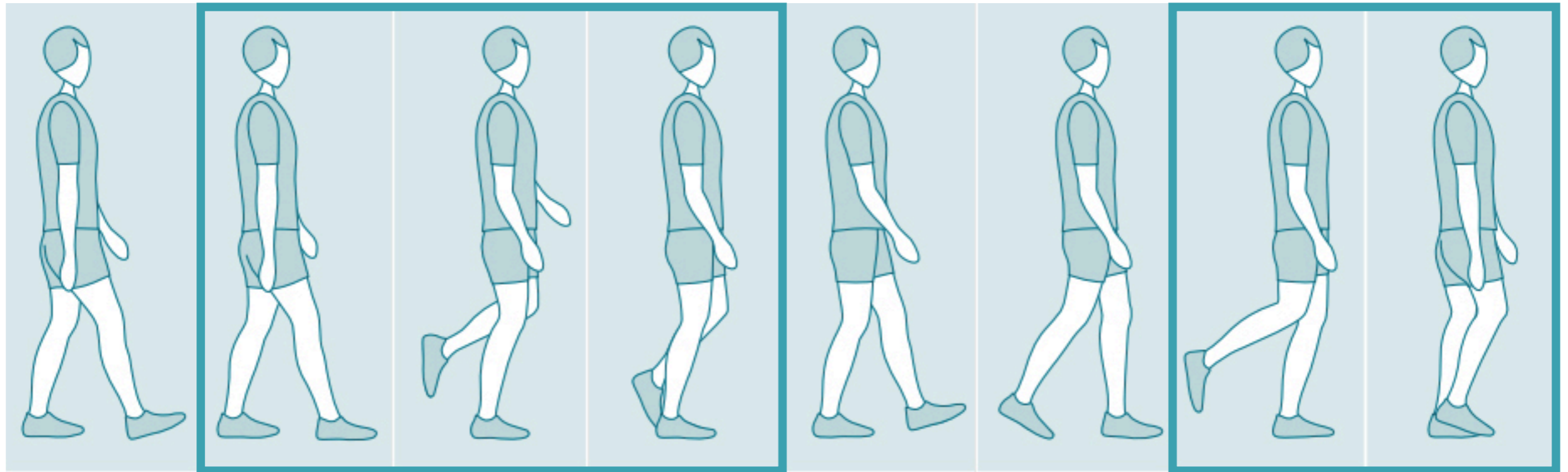
On this point no more stretching!



Well done, it was a good footstep!



## Gangphasen beim normalen Gehen:



**Hyperextension:**  
Gefahr zu Hyperextension besteht

**Flexion:**  
Beginn der Schwungphase

Feedback Signal:

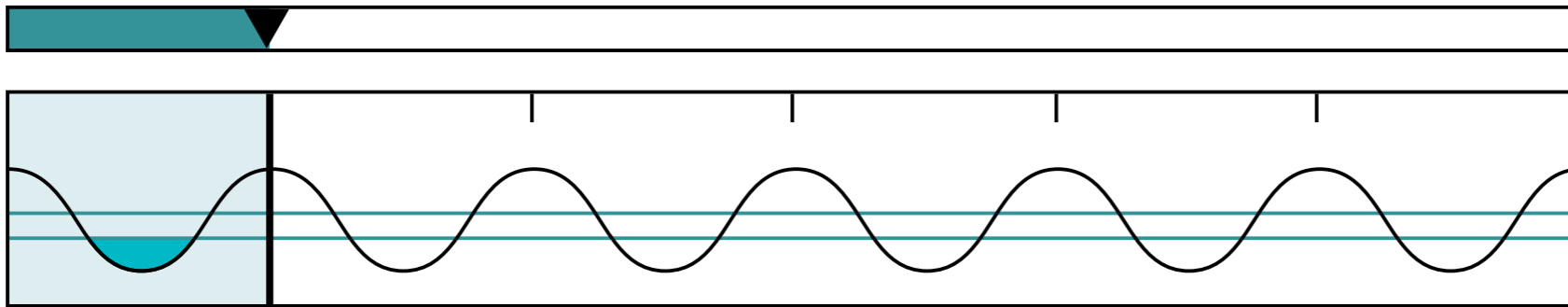


Feedback Signal:

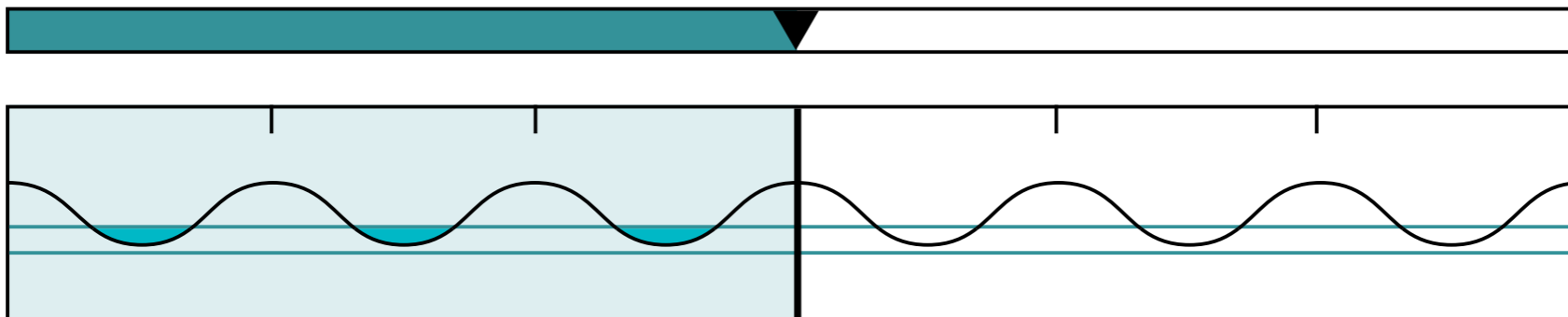


## Filterinterval

**1** WRONGS STEPS TO  
**START** THE FEEDBACK

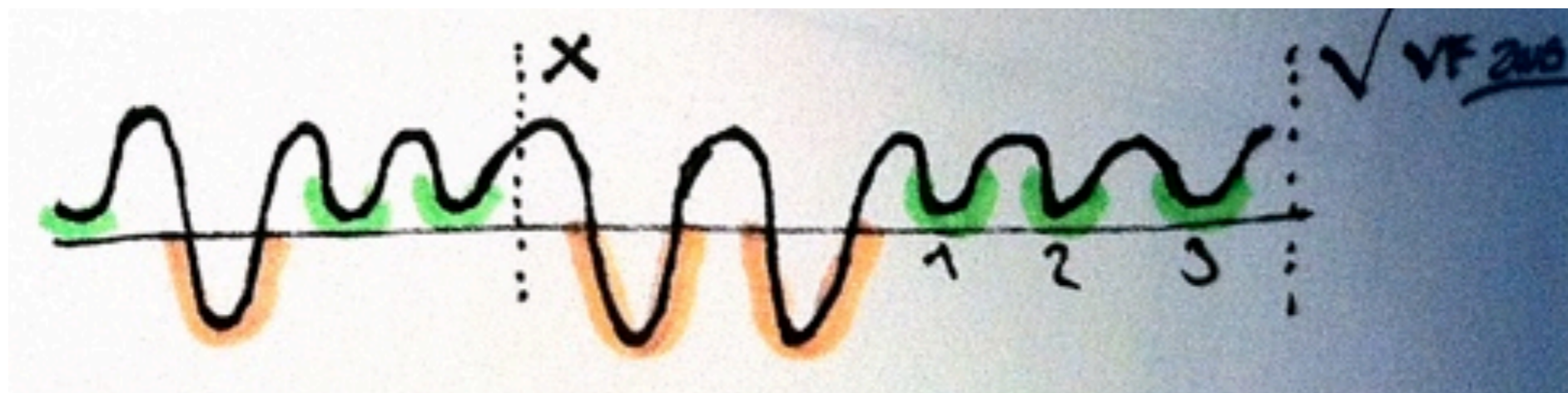
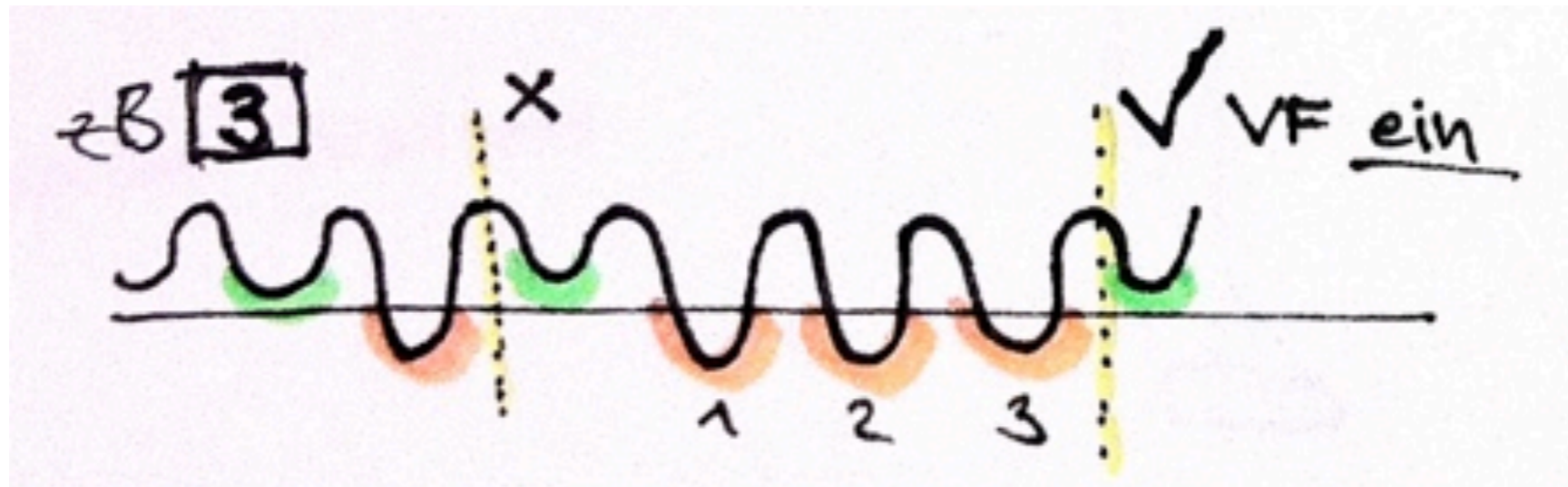


**3** RIGHT STEPS TO  
**END** THE FEEDBACK





# Filterinterval (zB 3)





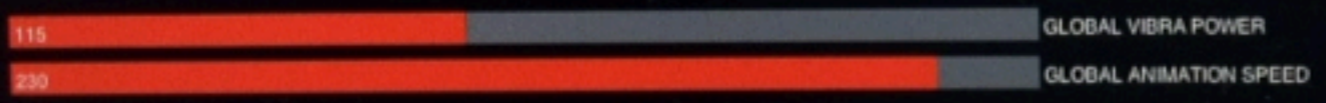
# Feedback

| Visuell

```
pattern4( Vibrolib inVibro )
println("pattern4 start");
int step = 20;
int positions = int(255 / step) + 1;
int[] animationArray = new int[(positions*2)+2];
int power = 3;
int i=0;
for( i < positions*2; i += 2)
{
  animationArray[i] = power;
  animationArray[i+1] = 500;
  power += step;
}
animationArray[i] = 0;
animationArray[i+1] = 500;
patternAnimationCommand(animationArray, inVibro);
pattern6( Vibrolib inVibro )
println("pattern6 start");
int step = 20;
int positions = int(255 / step) + 1;
int[] animationArray = new int[(positions*4)+2];
int power = 3;
int i=0;
for( i < positions*2; i += 2)
{
  animationArray[i] = power;
  animationArray[i+1] = 500;
  power += step;
}
for( i < positions*4; i += 2)
{
  animationArray[i] = power;
  animationArray[i+1] = 500;
  power += step;
}
animationArray[i] = 0;
animationArray[i+1] = 500;
```

### Vibra Machine

PUSH KEY   1   1	Vibrator 1 on/off	<input checked="" type="checkbox"/>	163.00	POWER VIBRO NR. 1	33%	<input checked="" type="checkbox"/>	ON/OFF
PUSH KEY   2   2	Vibrator 2 on/off	<input type="checkbox"/>	0.00	POWER VIBRO NR. 2	0%	<input type="checkbox"/>	ON/OFF
PUSH KEY   3   3	Vibrator 3 on/off	<input type="checkbox"/>	0.00	POWER VIBRO NR. 3	33%	<input checked="" type="checkbox"/>	ON/OFF
PUSH KEY   4   4	Vibrator 4 on/off	<input checked="" type="checkbox"/>	163.00	POWER VIBRO NR. 4	33%	<input checked="" type="checkbox"/>	ON/OFF
PUSH KEY   5   5	Vibrator 5 on/off	<input type="checkbox"/>	0.00	POWER VIBRO NR. 5	0%	<input type="checkbox"/>	ON/OFF
PUSH KEY   6   6	Vibrator 6 on/off	<input type="checkbox"/>	0.00	POWER VIBRO NR. 6	0%	<input type="checkbox"/>	ON/OFF
PUSH KEY   O	Animation Aufbau on/off	<input checked="" type="checkbox"/>	163.00				
PUSH KEY   W	Animation Knight Rider on/off	<input checked="" type="checkbox"/>	163.00				
PUSH KEY   E	Animation Pattern on/off	<input checked="" type="checkbox"/>	163.00				
PUSH KEY   N	- Delay Speed decrease	<input type="checkbox"/>	0.00				
PUSH KEY   M	+ Delay Speed increase	<input type="checkbox"/>	0.00				
PUSH KEY   V	- Vibra Power decrease	<input type="checkbox"/>	0.00				
PUSH KEY   B	+ Vibra Power increase	<input type="checkbox"/>	0.00				
PUSH KEY   X	All Vibras off	<input type="checkbox"/>	0.00				



GLOBAL POWER CHECK     POWER LIVE UPDATE     SPEED LIVE UPDATE

### Feedback Mode

Feedback at the time of:

**Hyperextension**



Statement  
Attention you have  
overstretched!

Feedback at the time of:

**Extension –  
Hyperextension**



Statement  
On this point no  
more stretching!

Feedback at the time of:

**Flexion**



Statement  
Well done, it was a  
good footstep!

### Feedback Position

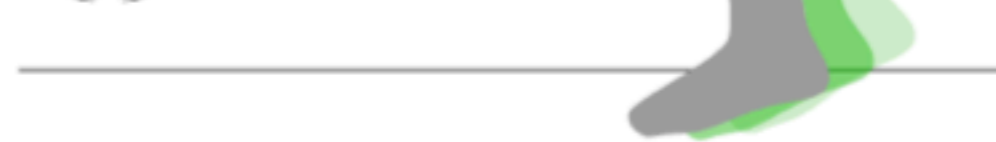
Vibration at the position of:

select your desired positions



select your desired positions

**lower leg**



### Reaction Interval

Select a number to define the reaction-interval of your gain-gadget.

▲ 1 \_\_\_\_\_  
 ▼ 1 wrong steps to **start** the feedback

▲ 3 \_\_\_\_\_  
 ▼ 3 right steps **stop** the feedback





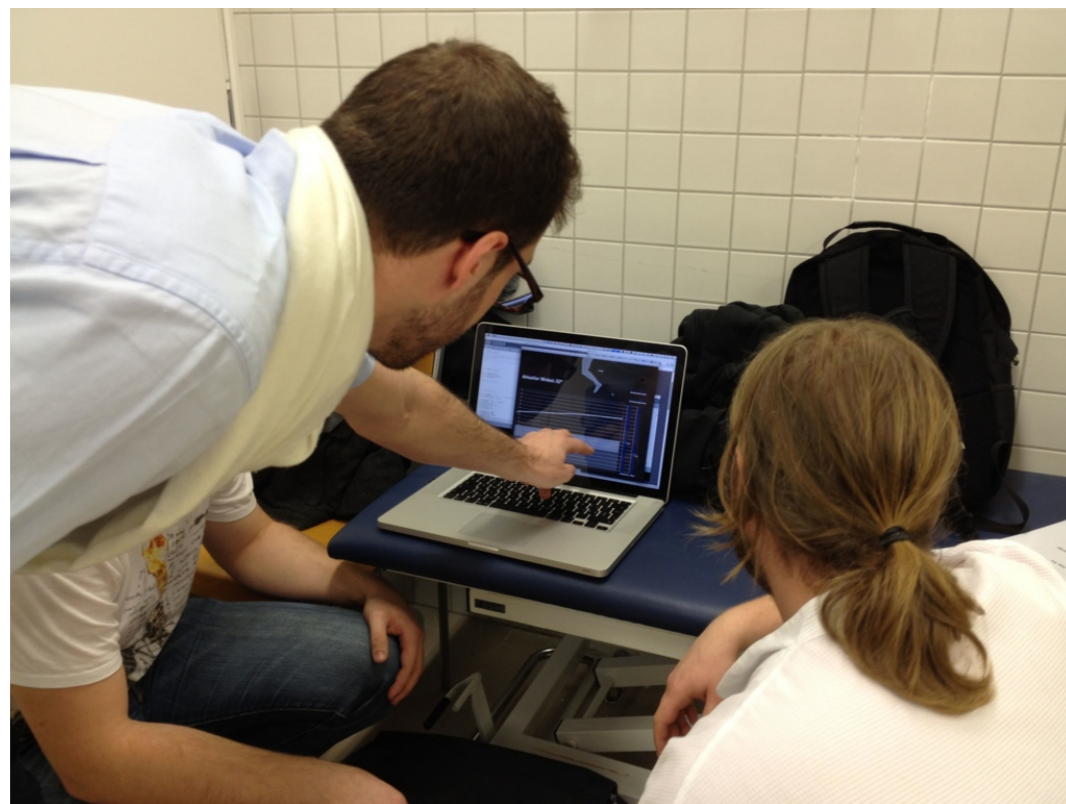


**Exkursion**

| Spital Balgrist



# Prototype Präsentation | Spital Balgrist, Zürich





**Demonstration**

| **live**



**we need you!**

**Wer möchte es  
gerne testen?**





**Konklusion**  
| **Ausblick**



## Weiterführende Einsatzmöglichkeiten:

- Orthetik, Prothetik
- Bewegungsanalysen
- Präoperative-postoperative Vergleiche
- Sport

## Aussicht:

- Prototypen an realen Patienten testen
- Messungen verbessern (Kompass-Funktion nutzen)



# Feedback | Fragen?

**Students:**

Sabrina Brunner, Stefan Wanner, Cedric Steiner, Michael Nef

**Teachers:**

Karmen Franinovic, Max Rheiner

**Assistant:**

Florian Wille, Samuel Bauer and Dinis Meier