



LIKERTSHIFT - AN INPUT DEVICE FOR RECORDING CYCLING SUBJECTIVE EXPERIENCES

Bachelor's Thesis Defense

2025-08-13

CONTENTS

1 Motivation

2 Prototype Design

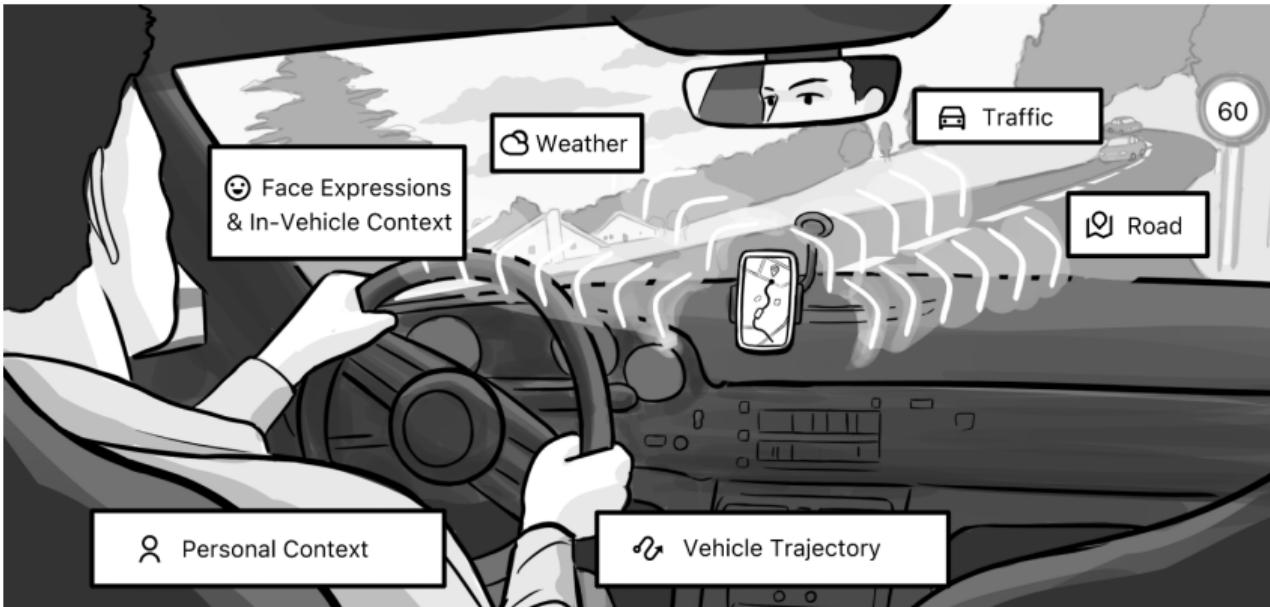
3 Study Design

4 Results

MOTIVATION

Section 1

MOTIVATION



MOTIVATION



Analysis of Overtaking Maneuvers ... (López et al.)
<https://doi.org/10.1145/3472749.3474775>

MOTIVATION



Analysis of Overtaking Maneuvers ... (López et al.)
<https://doi.org/10.1145/3472749.3474775>



Brotate and Tribike ... (Woźniak et al.)
<https://doi.org/10.1145/3472749.3474775>

PROTOTYPE DESIGN

Section 2

DESIGN REQUIREMENTS

DRQ1 **Intuitive**

Using the prototype should be intuitive.

DESIGN REQUIREMENTS

DRQ1 **Intuitive**

Using the prototype should be intuitive.

DRQ2 **Robust**

Minimal user intervention and maintenance.

DESIGN REQUIREMENTS

DRQ1 Intuitive

Using the prototype should be intuitive.

DRQ2 Robust

Minimal user intervention and maintenance.

DRQ3 Safe

Uncompromising to the user's safety.

DESIGN REQUIREMENTS

DRQ1 Intuitive

Using the prototype should be intuitive.

DRQ2 Robust

Minimal user intervention and maintenance.

DRQ3 Safe

Uncompromising to the user's safety.

DRQ4 Affordable

Total cost < €25.00.

DESIGN REQUIREMENTS

DRQ1 **Intuitive**

Using the prototype should be intuitive.

DRQ2 **Robust**

Minimal user intervention and maintenance.

DRQ3 **Safe**

Uncompromising to the user's safety.

DRQ4 **Affordable**

Total cost < €25.00.

DRQ5 **Easy to Reproduce**

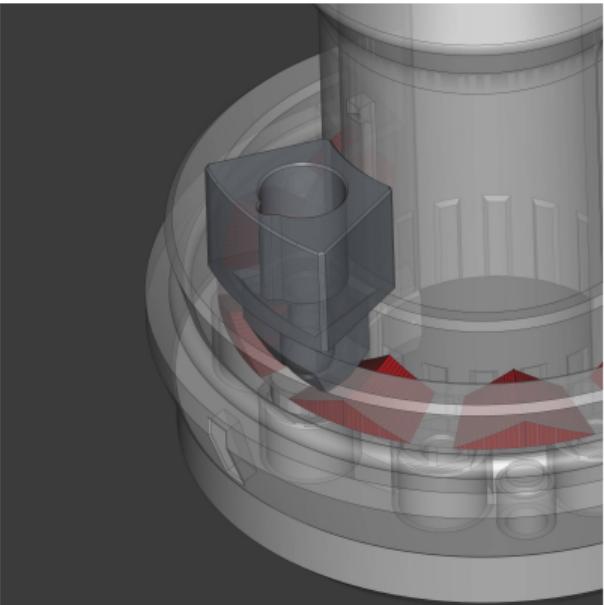
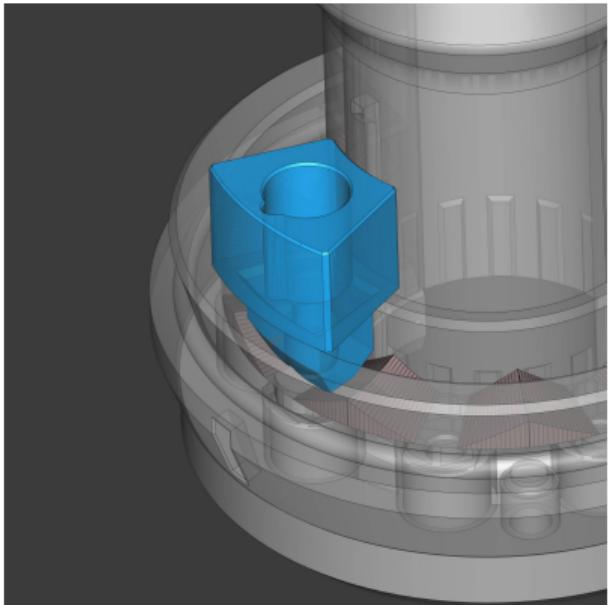
Manufactured and assembled with standard components and tools.

LIKERTSHIFT PROTOTYPE



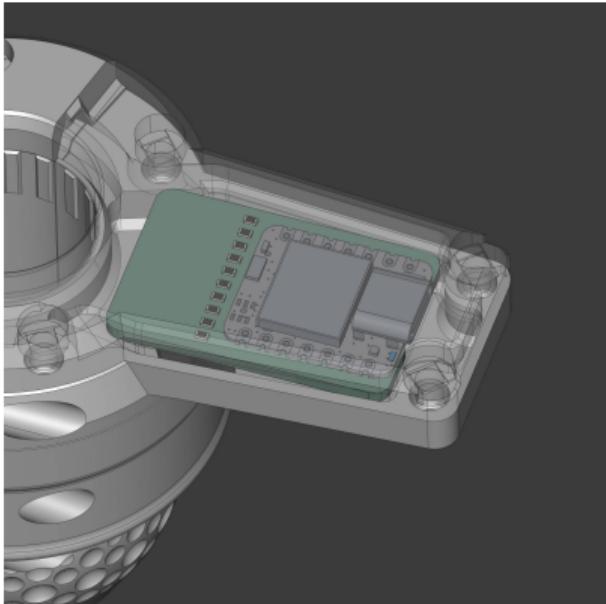
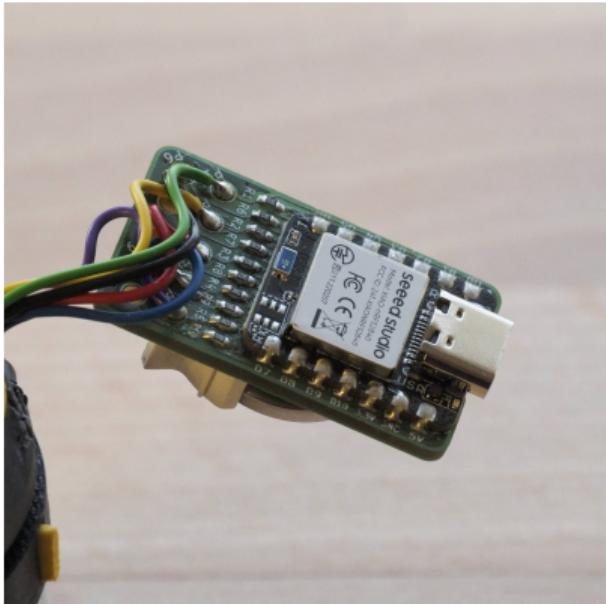
HOW DOES IT WORK?

MECHANICS



HOW DOES IT WORK?

ELECTRONICS



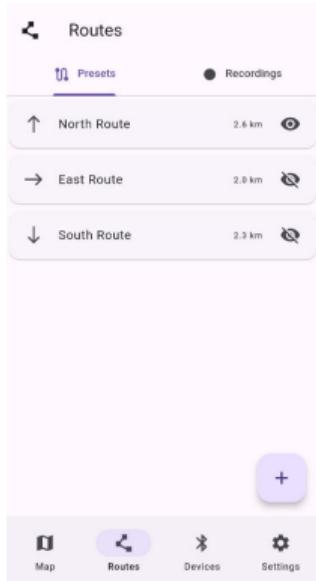
HOW DOES IT WORK?

SOFTWARE



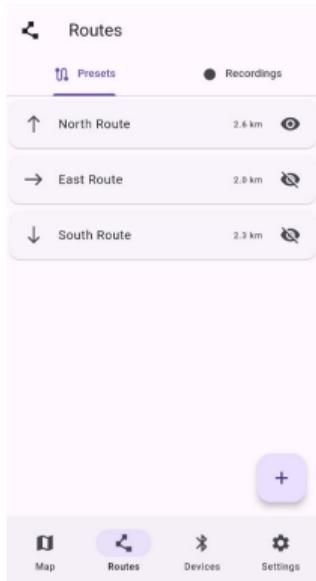
HOW DOES IT WORK?

SOFTWARE



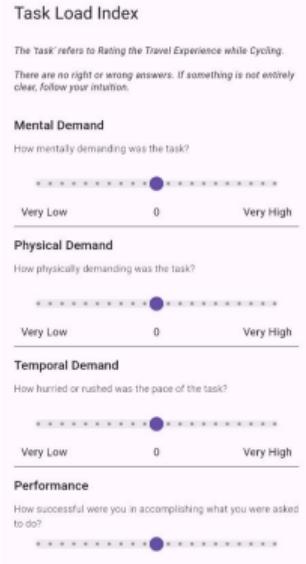
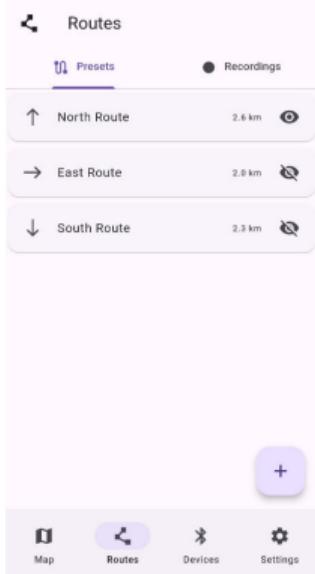
HOW DOES IT WORK?

SOFTWARE



HOW DOES IT WORK?

SOFTWARE



STUDY DESIGN

Section 3

STUDY DESIGN

What methods are we comparing?

STUDY DESIGN

What methods are we comparing?

⇒ Audio Recording, Manual Mapping, LikertShift

STUDY DESIGN

What methods are we comparing?

⇒ Audio Recording, Manual Mapping, LikertShift

What are we measuring?

STUDY DESIGN

What methods are we comparing?

⇒ Audio Recording, Manual Mapping, LikertShift

What are we measuring?

⇒ Travel Satisfaction, based on the road

STUDY DESIGN

What methods are we comparing?

⇒ Audio Recording, Manual Mapping, LikertShift

What are we measuring?

⇒ Travel Satisfaction, based on the road

Route Selection

Name	Total Length	Road Type					Number of Crossings
		Road	Bike Path	Mixed Path	Pedestrian Way	Other	
North	2589 m	191 m	480 m	1135 m	359 m	424 m	13
East	2007 m	853 m	465 m	173 m	181 m	335 m	9
South	2289 m	1152 m	677 m	116 m	47 m	297 m	9

STUDY DESIGN

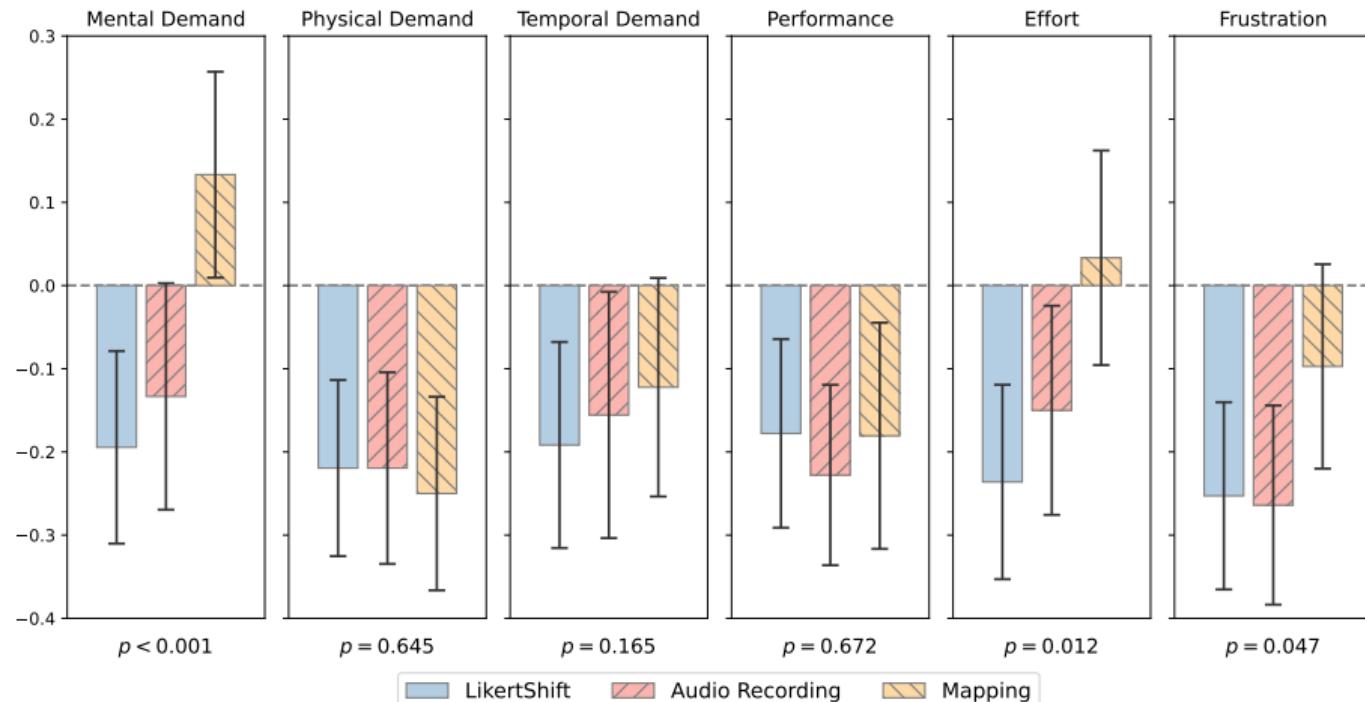
ROUTES



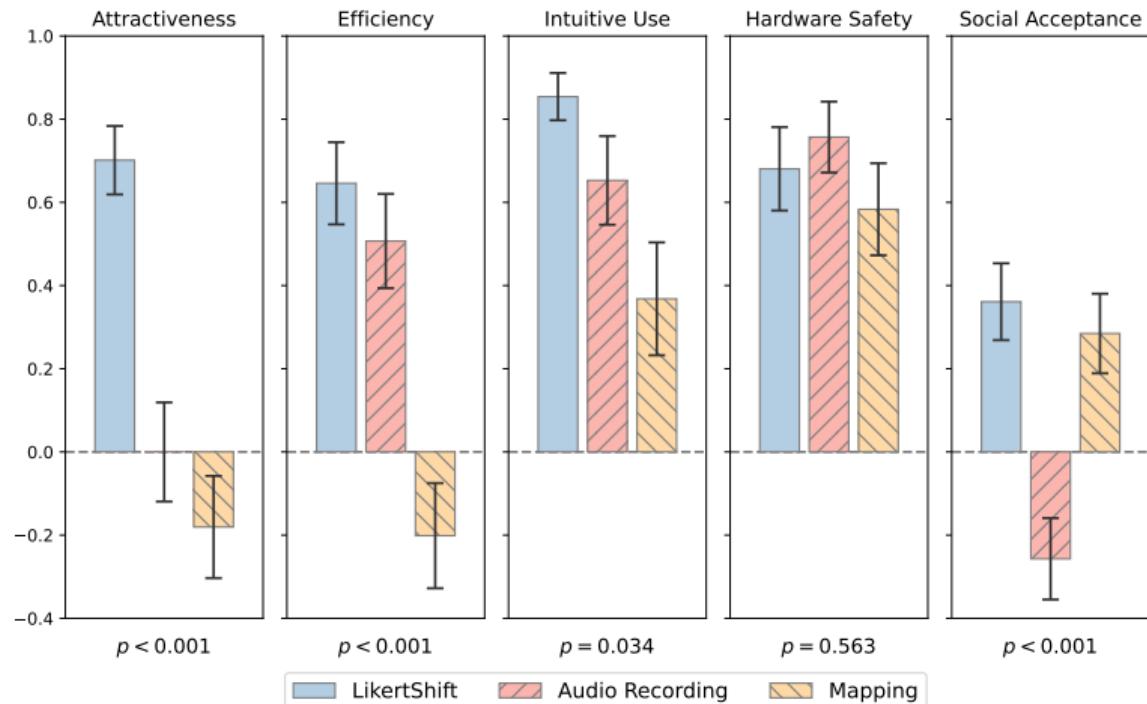
RESULTS

Section 4

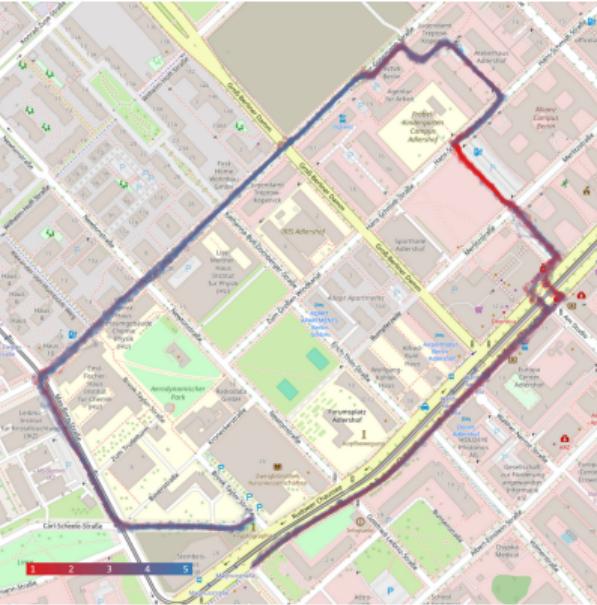
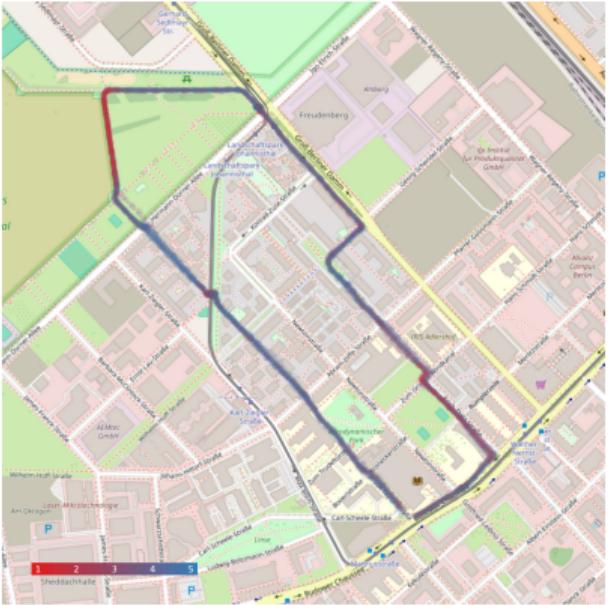
TLX RESULTS



UEQ+ RESULTS



RECORDED ROUTE DATA



RECORDED ROUTE DATA

LikertShift	Road Type						
	Road	Bike Path	Mixed Path	Pedestrian Way	Wood Path	Field	Lawn
MEAN	3.7661	3.4624	3.7708	3.0176	1.8114	1.9804	2.8664
VARIANCE	0.9327	0.9140	0.8548	0.8873	0.9661	1.2512	1.3830
STDDEV	0.9658	0.9560	0.9246	0.9420	0.9829	1.1186	1.1760
Audio Recording	Road Type						
	Road	Bike Path	Mixed Path	Pedestrian Way	Wood Path	Field	Lawn
MEAN	3.6622	3.4978	3.7915	2.9559	2.5513	1.6895	2.4405
VARIANCE	0.8519	0.7970	0.8172	1.4158	0.5622	1.2402	0.9290
STDDEV	0.9230	0.8927	0.9040	1.1899	0.7498	1.1137	0.9638
Mapping	Road Type						
	Road	Bike Path	Mixed Path	Pedestrian Way	Wood Path	Field	Lawn
MEAN	3.7476	3.4952	3.7230	3.3553	2.3586	1.0000	3.0291
VARIANCE	0.9192	1.0542	1.0379	1.2773	1.5566	0.0000	1.0891
STDDEV	0.9587	1.0267	1.0188	1.1302	1.2476	0.0000	1.0436

FUTURE WORK

Hybrid Methods - Combination of LikertShift and Mapping Methods

FUTURE WORK

Hybrid Methods - Combination of LikertShift and Mapping Methods

Improved Feedback - Sounds / Vibrations

FUTURE WORK

Hybrid Methods - Combination of LikertShift and Mapping Methods

Improved Feedback - Sounds / Vibrations

Software Improvements - for standalone / long-time Usage Scenarios

THANK YOU FOR LISTENING!



All project sources are available at:

<https://github.com/30350n/likertshift>