# Semanux

## Making the Web an Inclusive Experience

**In today's digital society, the Web is everywhere.** We use it to inform ourselves, do shopping, be entertained, and get work done. We browse to popular services like Facebook, YouTube, Google, or Amazon on a daily basis, but also business software like SAP Business ByDesign, IBM iBusiness Applications, or Microsoft Office are operated through Web interfaces. Users interact with those interfaces using mouse, keyboard, or touch by default. But many people – through motor impairment caused by an accident, illness, or aging – cannot conveniently use these input methods. This excludes many individuals from nowadays essential services and modern working environments. But why should we waste the potential of bright people? What if we offer alternative ways of interaction?

## Idea

We believe that the Web should be inclusive, such that all people can make use of it. This helps individuals to participate conveniently in the digital society and let people integrate into the workforce of a company without costly software changes. Our AI-based approach of making the Web an inclusive experience works in three steps:

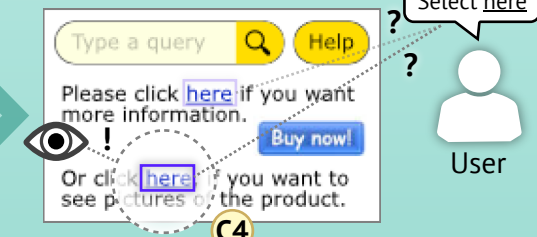### 1. The user wants to use an interface of, e.g., an online shop

Interface

### 2. We understand the interface

Text input — Icon "Search" C2
Link "here"
Button "Help"
C1
Link "here"
Banner "Buy now!"
C3
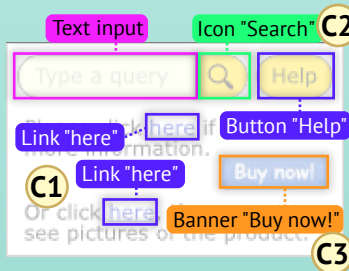
### 3. The user interacts hands-free using their voice and eyes

"Select here"
!
C4
User

## Challenges

**C1** Find interactive elements on Web interfaces that may change dynamically through animations or scripts.

**C2** Understand icons without title or accessibility annotations.

**C3** Decode embedded texts reliable and in real-time.

**C4** Adapt the interaction for input that is available to the user.

## Approach

We develop the Semantic Interface Model (SIM), which considers live HTML code, ARIA annotations, and pixel data from the screen. Machine-learning-based icon and text recognition enrich the data. We train deep models on well-annotated interfaces and utilize it on unannotated interfaces – creating an AI to understand all interfaces and adapt interaction.

## Market Potential

### Targeting Consumers
We deploy our product as a Web browser that adapts the interaction with Web sites for social media, communication, entertainment, and shopping.

### Targeting Businesses
We integrate our technology with business software by IBM, SAP, and Microsoft to support or even enable the inclusion of employees.

Market Size: According to the market leader in eye-tracking technology Tobii AB, at least 50 million people worldwide need assistive technology to communicate. But only 1 – 2 percent of the target population are using an assistive system that makes the digital environment accessible to them.*

*https://www.tobii.com/siteassets/tobii-group/investor-relations/roadshow-sep-17-18-2019.pdf

## Team

**Raphael Menges**
M.Sc. in Computational Visualistics
Machine Learning   C++
Computer Vision

**Ramin Hedeshy**
M.Sc. in Web Science
JavaScript   NodeJS   Python

**Chandan Kumar**
Doctor rer. nat.
Multi-Modal Interaction   Eye Tracking

## Awards

Raphael Menges and Chandan Kumar have developed GazeTheWeb, an award-winning Web browser that is controlled solely via eye gaze. The design, technology, and business potential was decorated at various venues.

**W4**
Winner of the Web for All Accessibility Challenge

**WWW 2017**
Honourable Mention for Technical Approach

**DIGITAL IMAGINATION CHALLENGE**
Scored Third for Digital Impact

Submission of the project to EXIST Transfer of Research in January 2021. **We are looking for an entrepreneur to join!**