Evaluation of An Augmented Reality Approach to Better Understanding Diverse End User website Usage Challenges

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HUMANISE

Outline

- Motivation
- Funkify
- Method
- Results
- Future work

Motivation

- Users have many challenges
    - Sight - colour blindness, tunnel vision, blurred vision, no sight
    - Hearing impairment
    - Cognitive challenges - adhd, neurodiverse, dyslexic, dyscalculia, short term memory impairment
    - Motor skills - tremor, precision
- These make using web sites designed WITHOUT consideration difficult or even impossible
- Developers are usually very different to these users, don’t have skills or experience in designing for these users
- How do developers (i) understand key challenges users have and (ii) check their web sites for whether these challenges are suitably addressed

Approaches

- Involve users with all single / multiple challenges in web site design, development, evaluation
- Use personas representing single/combination challenges to design/evaluate web sites
- Use Virtual Reality to simulate challenges
- Use augmented reality to simulate challenges
    - Many web browser plug-ins support one or more ‘simulators’
    - Usually take the form of an ‘overlay’ or trap input / output and pass through a ‘filter’
    - Some are configurable
    - Some are extensible

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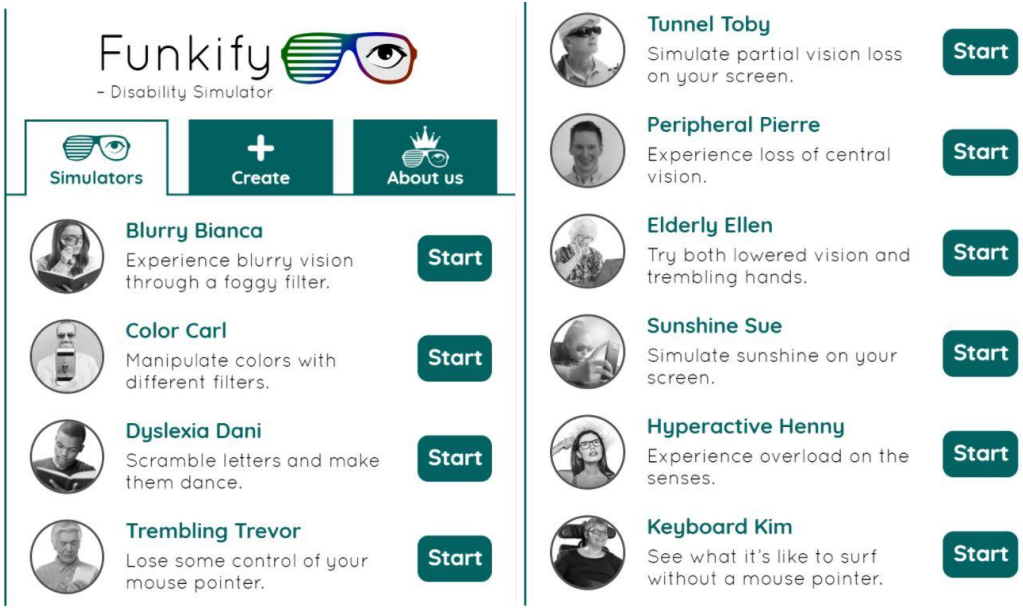
Funkify

- Augmented reality simulator
- Chrome browser extension
- Pre-defined set of ‘personas’ - simulators
- Premium version allows configuration, degrees of combination
- Various approaches - output filter, input filter
- Limited by some browser capabilities (see later)



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Approach

- Chose four personas
  - Blurred vision
  - Dyslexia
  - Tremor
  - Tunnel vision
- Chose three web sites
  - Commonwealth banking app
  - Amazon
  - Reddit
- Identified set of tasks per web site
- Carried out each task with each persona activated

Questions

- What range of diverse end user challenges does Funkify support?
  - How do simulations of such challenges manifest in the browser?
  - How well does the tool work with our selected websites when performing tasks?
- How compare to documented experiences of end users with these challenges?
  - Modification of website interaction based on actual evidence / literature?
- Does software developer get an idea of how someone with challenge would find the web site experience?
  - Can the software developer “empathise” with this target end user’s accessibility-related challenges?
- Can users with multiple challenges be supported?
  - Can new personas be added?
  - How well do these work?

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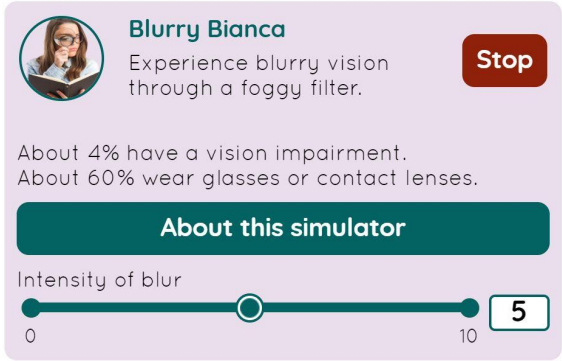
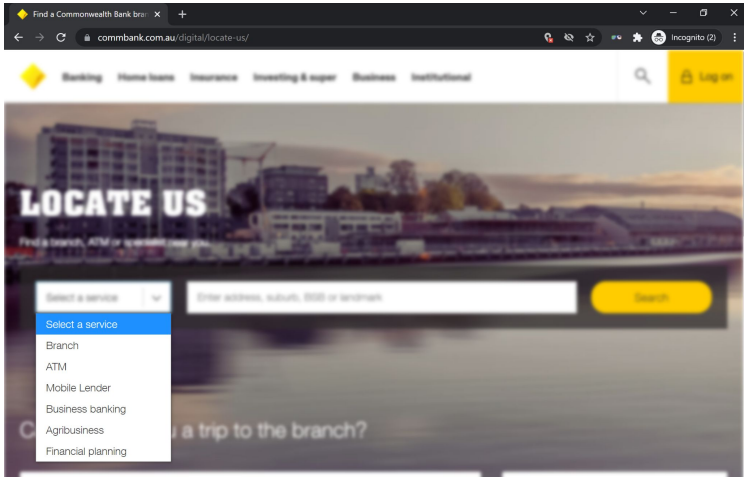
Blurred Vision simulator

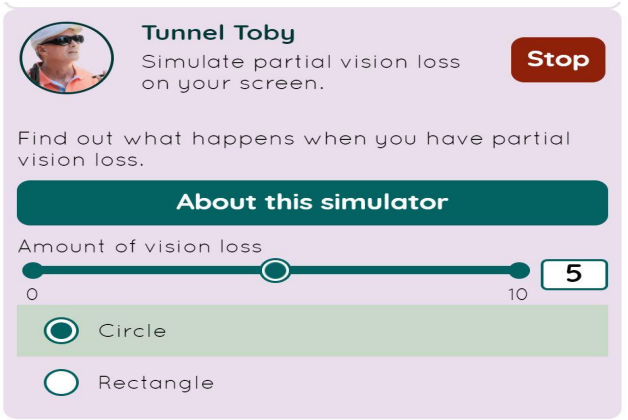
- ‘Blurry Bianca’ persona
- Very common sight challenge
- Can set amount of ‘blurr’
- Most web components blurred when in use
- A few exceptions - drop down menus etc (see right)
- VERY straining using text heavy web sites e.g. reddit
- On higher settings, very little is readable
- Contrasting colours, bold, icons all help user

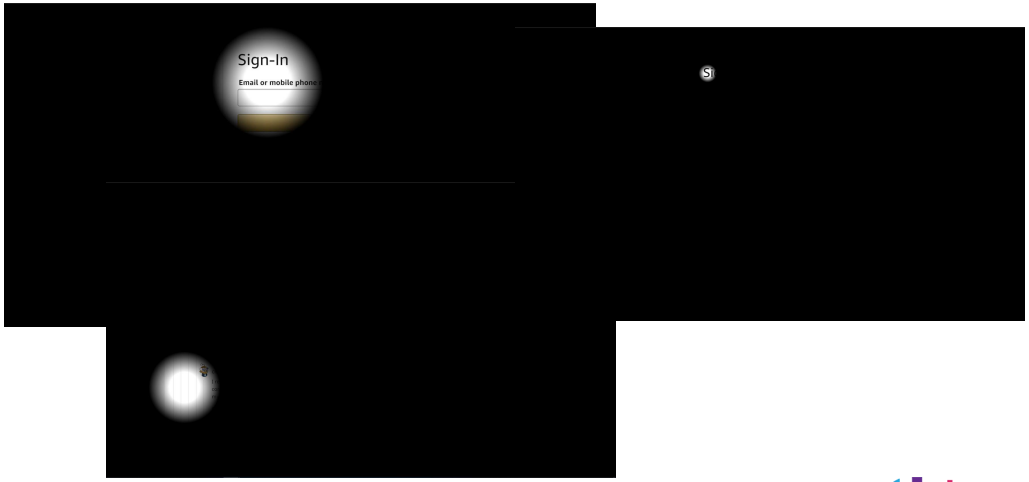




Tunnel Vision simulator

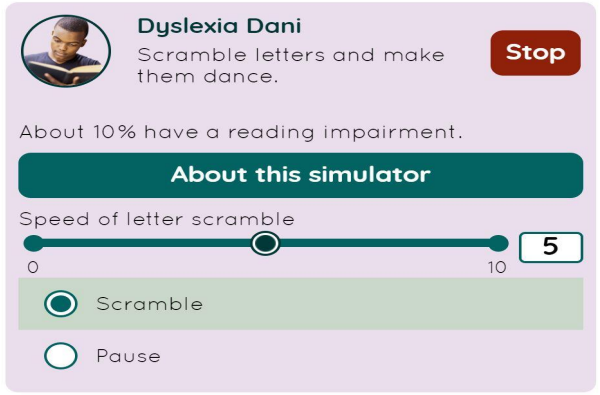
- ‘Tunnel Toby’ persona
- Much less common
- Settings range from severe to virtually none
- VERY hard to navigate and interact, even on lower settings
- Impossible to use even on moderate settings
- Unfamiliar sites make navigation extremely slow
- UI norms e.g. button location, breadcrumbs, indentation etc all help
- Product search super-difficult
- Lots of bugs in this simulator…

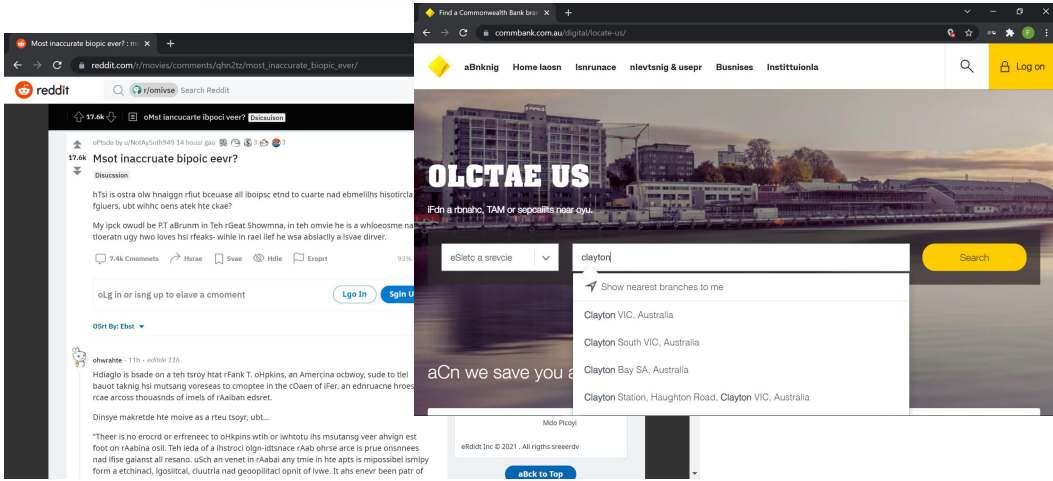




Dyslexia simulator

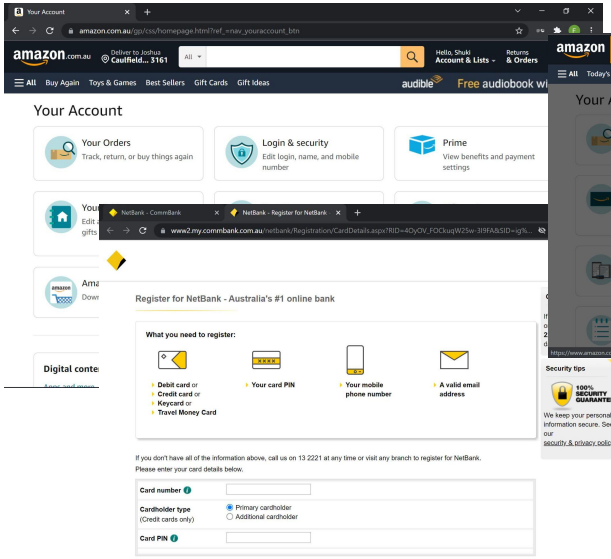
- ‘Dyslexia Dani’ persona
- Quite common, but impact varies, affect varies…
- Only changes page text, not e.g. buttons, menus, drop-downs, typed in text etc => limits immersive experience
- On higher settings - unreadable text
- Limited to visual aspects => can’t simulate different cognitive impacts etc
- Hearing, writing etc not impacted
- Unclear how design for
- Unclear how realistic vs literature

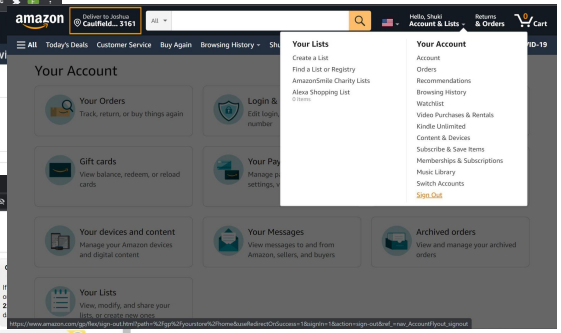




Tremor simulator

- ‘Trembling Trevor’ persona
- Quite common esp as age, after brain trauma etc
- Adjustable amount of tremor
- Simulates with mouse extra moves unpredictable directions
- Text heavy interactions become very hard
- Small target selection very hard
- Radios, check boxes etc become unusable
- Requires some careful redesign/alternate interaction thought
- Could be modified to better align with medical literature described impacts and different kinds tremor





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Future Work

- Other aspects of personas - demographics, use cases, goals etc - for domain
- Sharing for multiple developer teams
- Predefined intensities
- Broader range and rethink some sensitivities
- Support different aspects of challenge as documented in medical literature / user studies ; document where from
- Persona/simulator combination
- Include guidelines of how to address a challenge for developers
- Browser plug-in limitations => need application overlay or even VR
- Further simulators e.g. hearing loss, discalculia, autism, …

Summary

- Designing and evaluating web sites for challenged end users is hard
- Augmented reality-based approaches show some promise
- Funkify provides a wide range of ‘personas’ or simulators
- Range in effectiveness / realistic simulation
- Some limitations due to browser-based implementation
- Lead to some design decision improvements / alternative interface designs to better support users with various challenges
- Need to combine approaches - real challenged users, personas, guidelines, simulators…
- Need to invest effort in ensuring diverse, challenged end users are supported