

Inclusive Design Resources and Links

This document contains a list of resources and links compiled in 2016 about:

1. [General inclusive design](#)
2. [Kitchens](#)
3. [Kitchen appliance design guidelines and recommendations](#)
4. [Heating controls](#)
5. [Smart meters](#)

Acknowledgements

This was produced by RICA (now the Research Institute for Disabled Consumers) with support from Thomas Pocklington Trust.

General inclusive design

What is Universal Design? (2012)

The Centre for Excellence in Universal Design (part of National Disability Authority)

Overview of universal design (UD), including definition, outline of the 7 principles, who benefits and 10 things to know about UD

universaldesign.ie

Evaluating the Universal Design Performance of Products (2003)

The Center for Universal Design (NC State University)

Guidelines for evaluating how well products satisfy the Principles of Universal Design to highlight strengths and weaknesses

[Read the guide](#)

Inclusive Design Toolkit

University of Cambridge

Definition of inclusive design, list of user capabilities (such as vision, hearing, thinking and mobility) to consider, why and how to practice inclusive design

www.inclusivedesigntoolkit.com

Designing with people: Methods

Designing with people (Helen Hamlyn Centre for Design)

20 methods which can help designers develop an understanding of their users' capabilities, wants and needs in order to design with, not just for, people (participatory design). Consider the principles relating specifically to user interfaces and as products become more complex with more functions, the user/product interaction increases

designingwithpeople.rca.ac.uk

Usability Heuristics for User Interface Design

Jakob Nielsen (Nielsen Normal Group)

10 usability 'rules of thumb' (heuristics) of how a user interface should be made to navigate and

Inclusive Design Resources and Links

what it should offer users

www.nngroup.com/articles/ten-usability-heuristics

Kitchens

How we test.....?

Which?

Describes how they test products, including what they look for in an ease of use assessment and what is considered good design and a 'Best Buy'

Search on [Which? website](#): 'How we test [insert product]'

Kitchen Living in Later Life: Exploring Ergonomic Problems, Coping Strategies and Design Solutions (2014)

Loughborough Design School (International Journal of Design)

How the kitchen environment affects the use of appliances, including comments on difficulties with certain appliances (kettle 81-82, dishwasher 82) and the location of appliances (85)

[Read the original article](#)

Kitchen design that stands the test of time. Features that make your kitchen easier for everyone to use

Consumer reports

A few suggestions on how to make a kitchen environment more accessible

[Read Kitchen design that stands the test of time](#)

Kitchen Appliance design guidelines and recommendations

Requirements needed in European household appliance performance standards to improve ease of use of appliances by older and disabled people (2011)

Loughborough Design School and ANEC

Overview of control types for potential use on household appliances. Includes suggestions of controls for tasks on variety of household appliances, the qualities of control types, additional considerations and quantitative recommendations of controls

[Read Requirements needed in European household appliance performance standards](#)

Addendum to final report: Requirements needed in European household appliance performance standards to improve ease of use of appliances by older and disabled people (2012)

Loughborough Design School

Addendum to the final report. Re- visiting the guidelines for font size and text contrast.

[Read Addendum to final report](#)

Development of guidelines for designing appliances for older persons (2012)

Work

Focuses mainly on the technology behind domestic appliances and how this should be designed for

Inclusive Design Resources and Links

ease of use of older persons (for instance 'mental models')

[Read Development of guidelines](#)

The use of domestic appliances by cognitively impaired users (2013)

Glasgow and Higgins, Engineering and Industrial Sciences- Aus (Cognitive Performance Support)

Consideration of older users' mental models in designing appliances and/or user interfaces

<http://www.inderscienceonline.com/doi/full/10.1504/IJCPS.2013.053589>

Usability Study. A range of Opinions: A survey on the Accessibility of Today's Home Appliances (2006)

American Foundation for the Blind: Access World Magazine

Testing of controls used on domestic appliances with blind and visually impaired people. It's an old study, but highlights the difficulties faced by using touchpads and screens and how these affect user confidence. Touchscreens are being used more frequently so is there increased difficulty now?

[Read Usability Study](#)

Ease of use: Appliances

Intertek

Training course

[Read Ease of use: Appliances](#)

Left to your own devices: Results of a study on the usability of everyday household and electronic products for people with vision loss (2011)

American Foundation for the Blind: Access World Magazine

Suggestions of features needed on household and electronic equipment to improve usability for blind and visually impaired users. (User-centred research to understand people's preferences and whether product accessibility would influence their buying)

www.afb.org/afbpress/Pub.asp?DocID=aw121106

Guidelines for designing kitchen appliances for the elderly (2006)

Auburn University

Student dissertation (for Masters degree) developing guidelines for designing kitchen appliances for the elderly

etd.auburn.edu/bitstream/handle/10415/265/RAVEN_SUSAN_15.pdf?sequence=1&ts=1438177808720

Human factors design guidelines for the elderly and people with disabilities (1992) - incomplete draft?

Honeywell

Effect of ageing and certain conditions on user abilities. Covers the different types of controls, visual displays (rest missing), noting when to use certain types and suggested dimensions

www.cs.cmu.edu/~khaigh/ILSAEXTERNALWEBSITE/content/publications/1992-HumanFactors.pdf

Development of a usability evaluation framework with quality function deployment: from customer sensibility to product design (2009, Korea)

Human Factors and Ergonomics in Manufacturing

onlinelibrary.wiley.com/doi/10.1002/hfm.20145/epdf

Inclusive Design Resources and Links

Designing inclusive futures. Chapter 12: Sustaining autonomous living for older people through inclusive strategies for home appliance design. 12.3.4 Design advantages (Page 124) (2009)

A few basic design recommendations for appliances and the kitchen environment

[Read Designing inclusive futures](#)

Accessible Appliances and Universal Design (1996)

Special Interest Forum on Accessible Appliances and Universal Design. Centre for Inclusive Design and Environmental Access

Report on special interest forum on accessible appliances. Includes information on which principles of design to consider and lists range of domestic appliances and what to consider in their design

[Read Accessible Appliances and Universal Design](#)

Examples of inclusively designed kitchen appliances

Designing for the Senior Surge (2008)

The Wall Street Journal

Gives examples of changes in appliance design to accommodate older users

www.wsj.com/articles/SB120908542602343631

How to choose kitchen appliances for universal design

Houzz

Briefly covers some of the different styles of a range of domestic appliances and their usability. Focus is 'accessibility and safety features for kitchen appliances'

www.houzz.co.uk/ideabooks/5350132/list/how-to-choose-kitchen-appliances-for-universal-design

Kitchen: Accessible Appliances

Briefly discusses development of inclusive appliances including a few examples for improved usability (visibility and ease of use)

www.improvenet.com/a/accessible-appliances

Kitchen appliance buying advice

Home appliances

Which?

[Reviews of home appliances by Which?](#) (Need to sign up to view)

Accessible Appliances and Universal Design (1996)

Special Interest Forum on Accessible Appliances and Universal Design. Centre for Inclusive Design and Environmental Access

Report on special interest forum on accessible appliances. Includes information on which principles of design to consider and lists a range of domestic appliances and what to consider in their design

[Read Accessible Appliances and Universal Design](#)

Easy to use home and tech products

Which?

Gives advice on the elements of different home and tech products to consider when purchasing an easy to use product (Includes: Kettles, microwaves, toasters, washing machines and more). When

Inclusive Design Resources and Links

logged in, for each product also have access to a list of the best models for ease of use as selected from Which? reviews.

[Easy to use kettles](#)

[Easy to use microwaves](#)

[Easy to use toasters](#)

[Easy to use washing machines](#)

Fridge accessibility (2015)

Choice

A guide to choosing an accessible fridge. Details some specific design features which are more beneficial than others for users with different impairments

www.choice.com.au/home-and-living/kitchen/fridges/articles/fridges-accessibility

Dishwasher accessibility (2015)

Choice

A guide to choosing an accessible dishwasher. Details some specific design features which are more beneficial than others for users with different impairments

www.choice.com.au/home-and-living/kitchen/dishwashers/articles/dishwashers-accessibility

Washing machine accessibility (2015)

Choice

A guide to choosing an accessible washing machine. Details some specific design features which are more beneficial than others for users with different impairments

[Read Washing machine accessibility](#)

The kinds of controls you will encounter

American Foundation for the Blind

Explains, and gives examples of, which controls are accessible, inaccessible, and ambiguous to a blind or visually impaired user

[Read The kinds of control you will encounter](#)

AccessWorld Appliance Accessibility Guide

American Foundation for the Blind

Product and shopping advice for blind or visually impaired users for stoves, ovens, microwaves, dishwashers, washing machines and dryers

www.afb.org/info/living-with-vision-loss/using-technology/selecting-home-appliances/123

Heating controls

Types of boiler and heating controls

Which?

Explanations of the different types of boiler and heating controls

[Read Types of boiler and heating controls](#)

Inclusive Design Resources and Links

Consumer and domestic heating controls: a literature review

Consumer Focus

Identifies barriers associated to control usability, industry's attitude towards developing and installing usable controls

[Read Consumer and domestic heating controls](#)

What people want from their heating controls: a qualitative study

Department of Energy and Climate Change

Diary study: how people currently use heating controls and how they want to (PDF)

[Read What people want from their heating controls](#)

How people actually use thermostats (2010)

American Council for an Energy-Efficient Economy (ACEE)

Reviews previous research to establish the thermostats used, whether successful thermal goals are reached, and energy saving and the difficulties experienced during use. Includes table identifying barriers from previous testing. Usability testing on thermostats includes interviews, online surveys and tasks to complete which highlight the barriers to users (PDF)

aceee.org/files/proceedings/2010/data/papers/1963.pdf

Advice on how to use heating controls

NatCen Social Research for Department of Energy and Climate Change

Findings of a randomised control trial in Newcastle testing whether tailored advice from a 'trusted messenger' on how to use heating controls can help households reduce energy consumption (PDF)

[Read Advice on how to use heating controls](#)

Thermostat Interface and Usability: A Survey (2014)

Ernest Orlando Lawrence Berkeley National Laboratory, USA

A survey of the research and literature relating to residential thermostats

www.researchgate.net/publication/255220886 [Thermostat Interface and Usability A Survey](#)

Development of heating control evaluation technique (including usability testing)

Facilitating Energy Savings with Programmable Thermostats: Evaluation and Guidelines for the Thermostat User Interface (2012)

Ergonomics

Overview of different design principles. Usability testing of programmable thermostats where users were given tasks to complete. Identifies elements of the design that work well and contribute to success of tasks. Develops guidelines for the design of thermostat that may also be applicable to domestic appliances. Doesn't relate to inclusive design but fixing problems which affect everyone would make design more inclusive (PDF) wcec.ucdavis.edu/wp-content/uploads/2012/09/SustErgFinal.pdf

Usability of residential thermostats: Preliminary investigations (2011)

Building and Environment

Summarises problems identified from previous research on usability issues of thermostats. Proposed a calculation/tool to give a single measure of usability consisting of the time taken to complete and ability to complete task - only initial, and gives idea for further research to test validity (PDF) [Click here for Usability of residential thermostats](#)

Inclusive Design Resources and Links

The characteristics of a usable temperature control

Helsinki University of Technology, Finland

Design guidelines, tested on an office work environment (PDF) [Click here for The characteristics of a usable temperature control](#)

Enabling sustainable user interaction with domestic heating controls

Nicola Combe et al, Proceedings of the research students' conference on 'Buildings don't use energy, people do?'

Gives initial design guidelines for heating controls (PDF)

bura.brunel.ac.uk/bitstream/2438/6061/2/Fulltext.pdf

Are users necessary for inclusive design? (2005)

15th International Conference on Engineering Design, Melbourne, Australia

Considers how designers can use Exclusion Analysis to prioritise accessibility problems without referring to older or disabled users, based on an estimate of the number of people affected and the frequency of occurrence of problems during user/device interaction

www.designsociety.org/publication/23148/are_users_necessary_for_inclusive_design

Evaluation and design recommendations for heating controls (including usability testing)

An investigation into usability and exclusivity issues of digital programmable thermostats (2011)

Engineering Design, Brunel University

Aims to investigate why older users in particular have difficulty using heating controls effectively.

Uses '[Exclusion calculator](#)' from Cambridge inclusive design toolkit. Makes design recommendations for effective controls and confirms are problems with design affecting both younger and older users

(PDF) dspace.brunel.ac.uk/bitstream/2438/6060/2/Fulltext.pdf

Reducing domestic energy consumption through inclusive interface design

Nicola Combe, Brunel University

Dissertation. Examines the scale of exclusion to digital programming (of people living on one estate) and the reasons for exclusion, through in-depth study focusing on the difficulties experienced by older people. Findings of both studies contributed to the design of a more inclusive control interface which, when tested, gave tasks an increased success rate and indicated potential energy savings

(PDF) bura.brunel.ac.uk/bitstream/2438/7172/3/FulltextThesis.pdf

Assessing the 'Design Exclusion' of Heating Controls at a low-cost, low-carbon housing development (2014)

International Journal of Sustainable Engineering, Brunel University

Details three main user capabilities that are challenged by heating controls: vision, dexterity, and 'thinking'. For each, lists how the design affects the user and how usability could be improved.

(Appendix has detailed HTA on using thermostats and a table on the capabilities required by users) [Read Accessing the 'Design Exclusion'](#)

Exploring consumer preferences for home energy display functionality (2009)

Centre for Sustainable Energy

Qualitative feedback from users after using different heating controls for a week in their own home.

Two workshops were conducted: a workshop before testing to develop a specification for desired heating controls, and a workshop after testing to reevaluate their preferences. Key design issues were

Inclusive Design Resources and Links

identified and a core specification for the design of heating controls developed (PDF) [Read exploring consumer preferences for home energy display functionality](#)

How people use thermostats in homes: review (2011)

Building and Environment

Gives overview of usability testing done and recommendations to improve design (PDF)

[Read How people use thermostats in homes](#)

Usability testing of smarter heating controls

Department of Energy and Climate Change

Usability testing (PDF)

[Read Usability testing of smarter heating controls](#)

Reducing domestic energy consumption through inclusive interface design

Nicola Combe, Brunel University

Dissertation. Examines the scale of exclusion to digital programming (of people on one estate) and the reasons for exclusion through in-depth study focusing on the difficulties experienced by older people. Findings of both studies contributed to the design of a more inclusive control interface which, when tested, gave tasks an increased success rate and indicated potential energy savings

bura.brunel.ac.uk/bitstream/2438/7172/3/FulltextThesis.pdf

Consumer advice

Choosing central heating controls and saving energy (2015)

RiDC

www.ridc.org.uk/content/central-heating-controls

Controls

Heating control specific

Controls for end users: a guide to good design and implementation (2007)

Building Controls Industry Association

Barriers between the intention to provide good controls and users' real-life experience. Includes checklist for control manufacturers and suppliers (PDF)

[Read Controls for end users](#)