IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of:	Michael S Smith	
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Title:	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK	

DECLARATION OF DR. ANDREW COCKBURN

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LISTING OF CHALLENGED CLAIMS

Claim 1	
[1.pre]	An electronic device, comprising:
[1.a]	a display;
[1.b]	a touch-sensitive interaction surface;
[1.c]	an actuator;
[1.d]	one or more processors;
[1.e]	memory; and
[1.f]	one or more programs, wherein the one or more programs are stored in the memory and configured to be executed by the one or more processors, the one or more programs including instructions to:
[1.g]	display, on the display and via a user interface of a network browser application, a first web page including a hyperlink that identifies a second web page;
[1.h]	detect a first contact starting at a first contact point at a first contact time on the touch-sensitive interaction surface;
[1.i]	detect an end of the first contact at a second contact time;
[1.j]	determine a duration of the first contact as a difference between the first contact time and the second contact time;
[1.k]	determine whether there is a contact movement of the first contact between the first contact point and a second contact point;
[1.l]	determine whether the first contact point of the first contact corresponds with a location of the hyperlink of the first web page;
[1.m.i]	when: the first web page is displayed via the user interface of the network browser application,

[1.m.ii]	when:…the duration of the first contact is determined to be less than a first user-configurable predefined duration, and the end of the first contact is detected:
[1.m.iii]	avoid display, on the first web page, a result of any operation based on the first contact;
[1.n.i]	when: the first web page is displayed via the user interface of the network browser application,
[1.n.ii]	when…the duration of the first contact is determined to be greater than the first user-configurable predefined duration and less than a second user-configurable predefined duration,
[1.n.iii]	when…the first contact point of the first contact is determined to correspond with the location of the hyperlink of the first web page,
[1.n.iv]	when…it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point, and
[1.n.v]	when…the end of the first contact is detected:
[1.n.vi]	replace the display of the first web page with the second web page via the user interface of the network browser application; and
[1.o.i]	when: the first web page is displayed via the user interface of the network browser application,
[1.o.ii]	when…the duration of the first contact is determined to be greater than the second user-configurable predefined duration,
[1.o.iii]	when…the first contact point of the first contact is determined to correspond with the location of the hyperlink of the first web page,
[1.o.iv]	when…it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point, and
[1.o.v]	when…the end of the first contact is not detected:

[1.o.vi]	output, utilizing the actuator, a first feedback that is perceptible by touch and
[1.o.vii]	display a menu including at least one option for, in response to detection of a selection thereof, performing an operation on a web address associated with the hyperlink of the first web page, and
[1.o.viii]	further display at least a portion of the second web page, such that at least the at least portion of the second web page is displayed in at least one first virtual display layer which appears above at least one second virtual display layer that includes at least a portion of the user interface of the network browser application that remains at least partially visible.

Claim 2	
[2.pre]	The electronic device of claim 1, wherein the electronic device is configured such that:
[2.a]	the user interface of the network browser is configured for performing an operation in response to it being determined that there is the contact movement of the first contact between the first contact point and the second contact point; and
[2.b]	the at least portion of the second web page is displayed in a view that is not configured for performing the operation in response to it being determined that there is the contact movement of the first contact between the first contact point and the second contact point.

Claim 3	
[3]	The electronic device of claim 1, wherein the electronic device is configured such that the first feedback that is perceptible by touch is output prior to the display of the menu.

Claim 21	
[21.pre]	The electronic device of claim 1, wherein the electronic device is configured such that:
[21.a]	the user interface of the network browser is configured for displaying: scrolling of the second web page via the user interface of the network browser application in response to detection of longitudinal contact movement, opening of one or more hyperlinks of the second web page in response to detection of a selection thereof, and opening of one or more manually entered web addresses in response to detection of a manual entry thereof; and
[21.b]	the at least portion of the second web page is displayed in a view that is different from the user interface of the network browser application in that the view is configured for not displaying: the scrolling of the second web page via the user interface of the network browser application in response to detection of the longitudinal contact movement, the opening of the one or more hyperlinks of the second web page in response to detection of the selection thereof, and the opening of the one or more manually entered hyperlinks in response to detection of the manual entry thereof.

Claim 29	
[29]	The electronic device of claim 1, wherein the electronic device is configured such that the at least portion of the second web page is displayed in the at least one first virtual display layer where, in response to detection of a selection of the at least portion of the second web page, the second web page is enlarged.

Claim 30	
[30]	The electronic device of claim 1, wherein the electronic device is configured such that the at least portion of the second web page is displayed in the at least one first virtual display layer where, in response to detection of a selection of the at least portion of the second web page, the at least one first virtual display layer is enlarged.

Claim 31	
[31]	The electronic device of claim 1, wherein the electronic device is configured such that the at least portion of the second web page is displayed in the at least one first virtual display layer where, in response to detection of a selection of the at least portion of the second web page, the at least portion of the second web page is displayed via the user interface of the network browser application.

Claim 41	
[41.pre]	The electronic device of claim 40, wherein the electronic device is configured such that at least one of:
[41.a]	said touch-sensitive interaction surface and the display are components of a touch screen…

Claim 42	
[42.pre]	A method, comprising:
[42.a]	at an electronic device including a display, a touch-sensitive interaction surface, an actuator, one or more processors, and memory:

[42.b]	displaying, on the display and via a user interface of a network browser application, a first web page including a hyperlink that identifies a second web page;
[42.c]	detecting a first contact starting at a first contact point at a first contact time on the touch-sensitive interaction surface;
[42.d]	detecting an end of the first contact at a second contact time;
[42.e]	determining a duration of the first contact as a difference between the first contact time and the second contact time;
[42.f]	determining whether there is a contact movement of the first contact between the first contact point and a second contact point;
[42.g]	determining whether the first contact point of the first contact corresponds with a location of the hyperlink of the first web page;
[42.h]	based on detected usage where: the first web page is displayed via the user interface of the network browser application, the duration of the first contact is determined to be less than a first user-configurable predefined duration, and the end of the first contact is detected: avoiding display, on the first web page, a result of any operation based on the first contact;
[42.i]	based on detected usage where: the first web page is displayed via the user interface of the network browser application, the duration of the first contact is determined to be greater than the first user-configurable predefined duration and less than a second user-configurable predefined duration, the first contact point of the first contact is determined to correspond with the location of the hyperlink of the first web page, it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point, and the end of the first contact is detected: replacing the display of the first web page with the second web page via the user interface of the network browser application; and

[42.j]	based on detected usage where: the first web page is displayed via the user interface of the network browser application, the duration of the first contact is determined to be greater than the second user-configurable predefined duration, the first contact point of the first contact is determined to correspond with the location of the hyperlink of the first web page, it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point, and the end of the first contact is not detected: outputting, utilizing the actuator, a first feedback that is perceptible by touch and displaying a context menu including at least one option for, in response to detection of a selection thereof, performing an operation on a web address associated with the hyperlink of the first web page, and further displaying at least a portion of the second web page, such that at least the at least portion of the second web page is displayed in at least one first virtual display layer which appears above at least one second virtual display layer that includes at least a portion of the user interface of the network browser application that remains at least partially visible.

Claim 43	
[43.pre]	The method of claim 42, wherein:
[43.a]	the user interface of the network browser is configured for performing an operation in response to it being determined that there is the contact movement of the first contact between the first contact point and the second contact point; and
[43.b]	the at least portion of the second web page is displayed in a view that is not configured for performing the operation in response to it being determined that there is the contact movement of the first contact between the first contact point and the second contact point.

Claim 44	
[44]	The method of claim 42, wherein the first feedback that is perceptible by touch is output prior to the display of the context menu.

Claim 54	
[54.pre]	The method of claim 42, wherein:
[54.a]	the user interface of the network browser is configured for displaying: scrolling of the second web page via the user interface of the network browser application in response to detection of longitudinal contact movement, opening of one or more hyperlinks of the second web page in response to detection of a selection thereof, and opening of one or more manually entered web addresses in response to detection of a manual entry thereof; and
[54.b]	the at least portion of the second web page is displayed in a view that is different from the user interface of the network browser application in that the view is configured for not displaying: the scrolling of the second web page via the user interface of the network browser application in response to detection of the longitudinal contact movement, the opening of the one or more hyperlinks of the second web page in response to detection of the selection thereof, and the opening of the one or more manually entered hyperlinks in response to detection of the manual entry thereof.

Claim 62	
[62]	The method of claim 42, wherein the at least portion of the second web page is displayed in the at least one first virtual display layer where, in response to detection of a selection of the at least portion of the second web page, the second web page is enlarged.

Claim 63	
[63]	The method of claim 42, wherein the at least portion of the second web page is displayed in the at least one first virtual display layer where, in response to detection of a selection of the at least portion of the second web page, the at least one first virtual display layer is enlarged.

Claim 64	
[64]	The method of claim 42, wherein the at least portion of the second web page is displayed in the at least one first virtual display layer where, in response to detection of a selection of the at least portion of the second web page, the at least portion of the second web page is displayed via the user interface of the network browser application.

Claim 65	
[65]	The method of claim 42, wherein the at least portion of the second web page is displayed in the at least one first virtual display layer where, in response to detection of a selection of the at least portion of the second web page, the at least portion of the second web page is displayed via the user interface of the network browser application.

I, Andrew Cockburn, PhD, declare as follows:

I. INTRODUCTION

1. I have been retained as a technical expert by counsel on behalf of Apple Inc. ("Apple"/"Petitioner"). I understand that Apple is requesting that the Patent Trial and Appeal Board institute an *inter partes* review ("IPR") proceeding with respect to U.S. Patent No. 10,725,581 ("the '581 patent") (EX1001).

2. I have been asked to provide my independent analysis of the '581 patent in light of certain prior art publications, and I have done so based on my personal knowledge and experience.

3. I am not, and never have been, an employee of Apple. I received no compensation for this Declaration beyond my normal hourly compensation based on my time actually spent analyzing the '581 patent, the prior art publications cited below, and various issues related thereto. I will not receive any added compensation based on the outcome of any IPR or other proceeding involving the '581 patent.

II. QUALIFICATIONS

4. In formulating my opinions, I have relied on my knowledge, training, and experience in the relevant field. My education and experience are described more fully in the attached curriculum vitae (Appendix A). For ease of reference, I have highlighted certain information below.

5. My education and experience are described more fully in the attached curriculum vitae (Appendix A). I am a Professor at the Department of Computer Science and Software Engineering at the University of Canterbury, New Zealand. I also currently head the Human-Computer Interaction and Multi-Media research group at the University of Canterbury.

6. In 1988, I was awarded a Bachelor of Science with Honors in Computer Science from the University of York, England.

7. In 1993, I was awarded a Ph.D. from the University of Stirling, Scotland. My thesis was on "Computer Supported Cooperative Work," which relates to forms of group interaction supported on computers.

8. In 1993, I joined the University of Canterbury as a Lecturer in the Department of Computer Science (now the Department of Computer Science and Software Engineering). I was subsequently promoted to a Senior Lecturer, and then an Associate Professor, before my appointment as a Professor in 2010. I currently hold the title of Professor.

9. I have over 30 years of experience in the area of Human-Computer Interaction. The field of Human-Computer Interaction is generally concerned with ways of understanding and improving the interaction between humans and computers, with an aim toward understanding, evaluating, designing, and building new styles of interactions that improve on one or more of the end goals of making

computers faster to learn, more intuitive, more efficient to use, and more subjectively satisfying.

10. Throughout my career, I have published the results of many research projects that have involved building new user interfaces or reviewing existing user interfaces for performing a particular task, and evaluating their effectiveness. This includes publications relating to:

(a) investigating user experiences with web navigation interfaces, for example when using the "back" button on web browsers;

(b) reviewing and improving various interface schemes for traversing through documents in computer applications, including zooming, scrolling, and other techniques;

(c) analyzing new interfaces for text entry on mobile and touch-sensitive devices;

(d) addressing the problems arising from the small form factor of mobile devices with touch-sensitive displays, including wearable technologies;

(e) examining the influence of haptic feedback on user performance with mouse and touch screen input devices;

(f) evaluating the importance of spatially stable displays in user interfaces; and

(g) designing, analyzing and evaluating gesture-based input techniques for various user activities, including music data entry, web navigation, text entry, and scrolling.

11. I also have extensive experience in designing and building new user interfaces and reviewing existing user interfaces. This includes a number of projects regarding the design, development and evaluation of user interfaces that I have

undertaken with companies in the computing and Human-Computer Interaction industry, such as:

(a) working with Airbus SAS in 2016 on methods to assist pilots' gesture-based interaction with touch screens in turbulent environments;

(b) working with Hewlett-Packard Research Labs from 2010-2012 on the design and evaluation of gesture-based pointing techniques for remote displays, such as interactive TVs;

(c) a number of projects from 2006-2010 working with Logitech on the design, development, evaluation and improvement of user interfaces for next generation mice, including in relation to scrolling and window management tasks;

(d) working with IBM Almaden Research in 2006 on the design, development and evaluation of user interfaces for gesture-based text entry on mobile devices;

(e) working with Digit Wireless in 2002 on the evaluation of user performance for user interfaces for digital text entry on mobile devices; and

(f) working with Microsoft Research in 1999 on the development, evaluation and improvement of user interfaces for web browsing, in particular the mechanisms for revisiting pages (such as through the "back" button or bookmarks).

12. At the University of Canterbury, I currently teach a course on Human-Computer Interaction for final year undergraduate students and a course on research methods in Human-Computer Interaction for postgraduate students.

13. In the past, I have also taught introductory computer programming courses for first year students across disciplines, which included the implementation of graphical user interfaces.

14. I also manage an active research lab with a number of Ph.D. students. I have previously supervised fourteen students to successful completion of their Ph.D.s in the field of Human-Computer Interaction.

15. The Association for Computing Machinery (ACM) is the world's largest scientific and educational computing society. In 2015, I was elected to the ACM Conference on Human Factors in Computing Systems (CHI) Academy, which honors the principal leaders of the field of Human-Computer Interaction.

16. I also annually attend conferences relating to the field of Human-Computer Interaction and regularly read journals that cover research in the field of Human-Computer Interaction.

17. To keep abreast with industry trends, I regularly read broader journals, magazines and websites related to computer science and technology, including Communications of the ACM, ACM TechNews, BBC Technology, and New York Times Technology.

18. A detailed list of my other professional activities, memberships, and speaking engagements is included in my CV.

III. LEGAL PRINCIPLES

19. In forming my analysis and conclusions expressed in this Declaration, I have applied the legal principles described in the following paragraphs, which were provided to me by counsel for the Petitioner.

A. Person of Ordinary Skill in the Art

20. I understand that the factors considered in determining the ordinary level of skill in a field of art include: the level of education and experience of persons working in the field; the types of problems encountered in the field; the teachings of the prior art regarding solutions to such problems; and the sophistication of the technology at the time of the alleged invention. I understand that a person of ordinary skill in the art ("POSITA") is not a specific real individual, but rather is a hypothetical individual having the qualities reflected by the factors above and knowledge of all relevant prior art references, including the references I cite below.

B. Obviousness

21. I have been informed that a patent claim is invalid as "obvious" in light of one or more prior art references if it would have been obvious to a POSITA at the time of the alleged invention, taking into account (1) the scope and content of the prior art, (2) the differences between the prior art and the claims, (3) the level of ordinary skill in the art, and (4) any so called "secondary considerations" of non-obviousness, which include: (i) "long-felt but unresolved need" for the claimed invention, (ii) commercial success attributable to the claimed invention, (iii) unexpected results of the claimed invention, and (iv) "copying" of the claimed invention by others.

22. While I do not know the exact date that the alleged invention of the '581 patent was made, I do know that the '581 patent's earliest claimed priority date is August 5, 2011. For purposes of my obviousness analysis, I have applied a date of August 5, 2011 as the date of the alleged invention ("Critical Date"), although in many cases the same analysis would hold true even if the date of the alleged invention were earlier or later.[1]

23. I have been informed that a claim can be obvious in light of a single prior art reference or multiple prior art references. To be obvious in light of a single prior art reference or multiple prior art references, there must be a reason that would have prompted a POSITA to modify or supplement the single prior art reference, or to combine two or more references, in a manner that provides the elements of the claimed invention. This reason may come from a teaching, suggestion, or motivation to combine, or may come from the reference(s) themselves, the knowledge or "common sense" of a POSITA, or from the nature of the problem to be solved, and this reason may be explicit or implicit from the prior art as a whole. I have been informed that, under the law, the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield

[1] Note, however, that I do not concede that the '581 patent is entitled to its earliest claimed priority date.

predictable results. I also understand it is improper to rely on hindsight in making the obviousness determination.

24. I understand that an obviousness determination also requires that a POSITA would have had a reasonable expectation of success. This concept has been explained to me as relating to the relative likelihood or predictability—from the perspective of a POSITA—of successfully modifying the prior art in a manner that would meet the claimed limitations of the patent being challenged (here the '581 patent). I understand that the expectation of success need only be "reasonable" and, thus, does not require the absolute certainty gleaned from physically creating the proposed prior art modification.

C. Claim Interpretation

25. I understand that, for purposes of my analysis in this *inter partes* review proceeding, the terms appearing in the patent claims should be interpreted according to their "ordinary and customary meaning." In determining the ordinary and customary meaning, I understand that the words of a claim are first given their plain meaning that those words would have had to a person of ordinary skill in the art at the time of the alleged invention. I also understand that the structure of the claims, the specification and file history may be used to better construe a claim. Moreover, I understand that even treatises and dictionaries may be used, albeit under limited

circumstances, to determine the meaning attributed by a person of ordinary skill in the art to a claim term.

IV. MATERIALS CONSIDERED

26. My analysis in this Declaration is based on my knowledge and experience. Based on my above-described qualifications in Section II, the Patent Trial and Appeal Board should consider me to be an expert in the field. Also, based on my experiences, I understand and know of the capabilities of persons of ordinary skill in this field.

27. As part of my independent analysis for this Declaration, I have considered the following: the '581 patent (EX1001) and its prosecution history (EX1002); the background knowledge/technologies that were commonly known to persons of ordinary skill; my own knowledge and experience gained from my work in the field; my experience in teaching and advising others in this field; and my experience working with others involved in this field. In addition, I have analyzed the following publications and materials:

EX1004	US 2008/0259041 ("Blumenberg")
EX1005	US 2008/0235594 ("Bhumkar")
EX1006	US 2011/0248948 ("Griffin")
EX1020	NEWTON MESSAGEPAD, MODELS: ORIGINAL (OMP) AND 100 (MP100), https://web.archive.org/web/19990202045806/https://msu.edu/~luckie/gallery/mp100.htm (1999)

EX1021	OF MICE AND MENUS: DESIGNING THE USER-FRIENDLY INTERFACE, IEEE Spectrum (1999)
EX1022	NEWTON 2.0 USER INTERFACE GUIDELINES (1996)
EX1023	US 7,479,949
EX1024	US 8,954,887
EX1025	US 2009/0244023
EX1026	US 4,885,565
EX1027	ACTIVE CLICK: TACTILE FEEDBACK FOR TOUCH PANELS (2001)
EX1028	SNAP-CRACKLE-POP: TACTILE FEEDBACK FOR MOBILE TOUCH SCREENS (2006)
EX1029	TACTILE FEEDBACK FOR MOBILE INTERACTIONS (2007)
EX1030	DESIGN AND EVALUATION OF IDENTIFIABLE KEY-CLICK SIGNALS FOR MOBILE DEVICES (2011)
EX1031	US 2006/0197753
EX1032	ISSUES AND TECHNIQUES IN TOUCH-SENSITIVE TABLET INPUT (1985)
EX1033	US 5,612,719
EX1034	US 2008/0036743
EX1035	US 8,830,181
EX1036	US 9,760,241
EX1037	ANDROID DEVELOPERS GUIDE, CREATING MENUS, https://web.archive.org/web/20110216140646/http://developer.android.com/guide/topics/ui/menus.html (2011)
EX1038	THE STATE OF THE ART OF MOBILE APPLICATION USABILITY EVALUATION (2012)
EX1039	USABILITY HEURISTICS FOR TOUCHSCREEN-BASED MOBILE DEVICES (2012)
EX1040	WEB USABILITY: A REVIEW OF THE RESEARCH (1999)
EX1041	US 11/367,749
EX1042	EVOLUTION OF MOBILE DEVICES AND OPERATING SYSTEMS (2013)
EX1043	US 2008/0094368

EX1044	US 2008/0168405
EX1045	iPHONE USER GUIDE: FOR iPHONE OS 3.1 SOFTWARE (2009)
EX1050	XLIB—C LANGUAGE X INTERFACE, X WINDOW SYSTEM STANDARD (2002)
EX1051	US 2013/0007665
EX1052	US 2011/0252380

28. My citations to non-patent literature throughout this Declaration reference the absolute page number added to the exhibit (as opposed to the original pagination of the document). For patent literature, I've used the column/line numbers or paragraph numbers. Unless I've indicated otherwise, all emphasis (bold/italics/underline) in any quoted text are ones I have added.

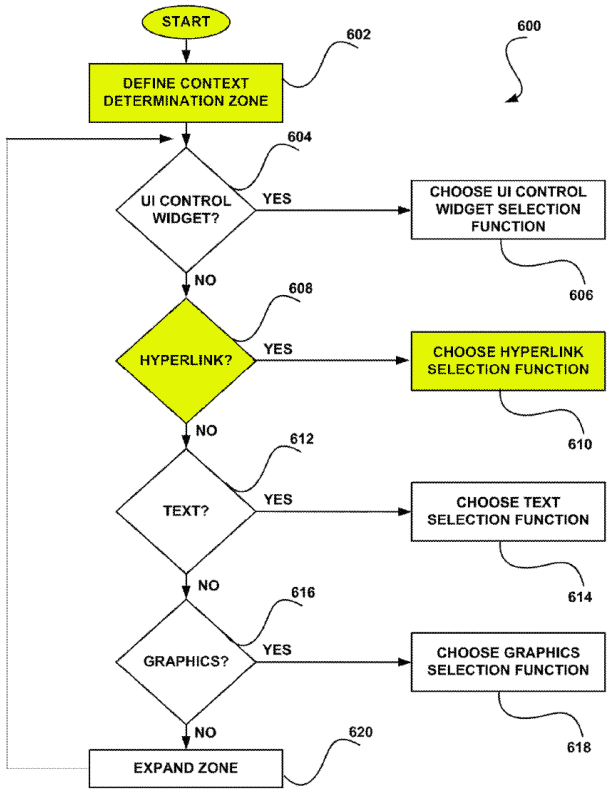
29. Although I cite and quote to selected portions of various references in this Declaration, the reader should understand that these citations are representative examples. A POSITA would have viewed each reference in its entirety and in combination with other references. Accordingly, I intend the references identified in this Declaration to be viewed as incorporated in their entireties.

V. THE '581 PATENT

A. Pertinent Disclosure

30. The '581 patent "generally relate[s] to touch screens" and describes embodiments where "a user experience [with a touch screen device] may be altered" based on a "touch signal." EX1001 ('581 patent), 1:38-39, 14:26-15:64, Figure 3.

31. In one such embodiment, a method involves defining a "context determination zone" associated with the point or area of the user's touch contact and choosing an appropriate "selection function" based on the user interface elements within that zone. EX1001 ('581 patent), 26:41-35:53, Figure 6. For example, "a context sensitive embedded hyperlink selection function is chosen" when the context determination zone includes "at least one hyperlink." *Id.*, 30:44-50.



EX1001 ('581 Pat.), Figure 6 (highlighted)

32. According to the '581 patent, the hyperlink selection function "may have selection establishment conditions," e.g., "if the contact pressure level surpasses a value of P_1, but not P_2, the selection establishment condition may change

to require the selection of an option from a hyperlink contextual menu." EX1001 ('581 patent) 31:39-45. "The contextual menu may provide options common to web browsers, including but not limited to 'open link', 'copy link', and/or any other action which may be performed on or with a hyperlink." *Id*., 31:46-49.

B. Claimed Subject Matter

33. The '581 patent's independent claims 1 and 42 outline three scenarios regarding a user's contact with a touch screen device displaying a webpage via a web browser application.

34. The first scenario includes the contact duration being less than a first predefined duration. *See* Element [1.m.ii]. The second scenario includes the contact corresponding to a hyperlink and the contact duration being greater than the first predefined duration and less than a second predefined duration. *See* Element [1.n.ii]. The third scenario includes the contact corresponding to a hyperlink and the contact duration being greater than the second predefined duration. *See* Element [1.o.ii].

35. Claims 1 and 42 further recite a respective functionality associated with each of the three contact scenarios. The functionality for the first scenario involves avoiding display of any operation. *See* Element [1.m.iii]. The functionality for the second scenario involves replacing the current webpage with the webpage identified by the hyperlink. *See* Element [1.n.vi]. The functionality for the third scenario involves outputting tactile feedback, displaying at least one selectable menu option,

and displaying a portion of the webpage identified by the hyperlink. *See* Elements [1.o.iv], [1.o.v], [1.o.vi].

VI. PERSON OF ORDINARY SKILL IN THE ART

A. A POSITA's Ordinary Level of Skill

36. Based on my knowledge and experience in the field and my review of the '581 patent and its file history, I believe that a POSITA would have included a Bachelor of Science degree in computer science, computer engineering, or a comparable field and at least two years of professional experience working with graphical user interfaces and applications for computers. Such experience could be obtained through research and study in a graduate program or through comparable exposure through industry employment, and additional years of experience could substitute for the advanced-level degree.

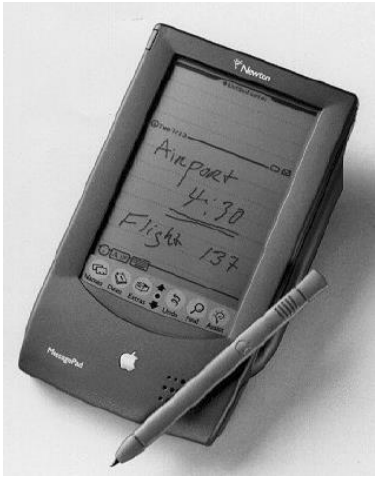
37. My analysis and conclusions expressed in this Declaration are based on the perspective of a POSITA having this level of knowledge and skill. My education, technical expertise and personal knowledge discussed in Section II shows that I meet the qualifications of a POSITA.

B. A POSITA's Background Knowledge and Understanding of the Pertinent Technology

1. Touch Screen Mobile Computing Devices

38. The field of touch screen mobile devices (e.g., smartphones, tablets, and PDAs) was mature and robust by the time of the Critical Date in 2011. The

emergent phase was long past and the commercial adoption was in full swing. For example, Apple Inc.—the Petitioner in this case—introduced and marketed a touch screen PDA called the "Newton MessagePad" in 1993.[2] EX1020, p.1. In 2007, Apple launched a touch screen smartphone device—the revolutionary iPhone. *See generally* EX1045; https://www.youtube.com/watch?v=x7qPAY9JqE4&ab.



EX1020, p.6



EX1045, p.20

39. An industry leader in the field, Apple applied for numerous patents on touch screen mobile device technology. The '581 patent identifies several Apple patents and patent application that precede the Critical Date in 2011, suggesting that they "may or may not be incorporated into any of the embodiments disclosed herein." EX1001 ('581 patent), 91:65-102:40. It cannot be reasonably disputed that

[2] At the time, Apple Inc. held a different name—i.e., Apple Computer Inc.

the underlying technology and alleged innovations of the '581 patent had already been discovered and disclosed by Apple and others in the field by 2011.

2. Menus in Computer Graphical User Interfaces

40. The '581 patent's claims recite the notion of ***displaying a menu including at least one option***. EX1001 ('581 patent), 103:44-48 (Element [1.o.vii]).

41. Menus were a common feature of graphical user interfaces (GUIs) by the time of the Critical Date in 2011. A "menu" in this context is simply "a list of command options currently available to the computer user; some stay onscreen, while pop-up or pull-down menus are requested by the user." EX1021, p.1. Some GUIs "use nested hierarchies of menus; others offer different menu versions—one with the most commonly used commands for novices, another with all available commands for the experienced user." EX1021, p.4.

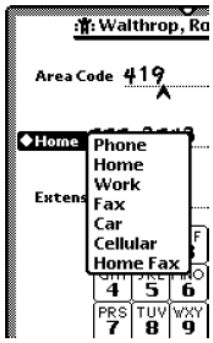
42. Like windows and icons, menus are among the central "ingredients of computer interfaces" and "are now an integral part of the user-friendly interface." EX1021, pp.1, 4. Simply put, menus are an effective, time-tested solution to the problem in user-interface design of presenting available actions and functionalities for quick and efficient selection by the user. Because of GUI menus, "users no longer need to refer to manuals or memorize available options"—"[i]nstead, the choices can be called up at a moment's notice whenever needed." EX1021, p.1, 4.

This fact is one of many reasons personal computing has become a mainstay of modern technology and society.

43. The concept of using "[m]enus [to] list choices of action" in a GUI was developed in the 1970s by Xerox Corp's Palo Alto Research Center (PARC), and advanced even further by Apple and others in the 1980s. EX1021, pp.1, 3-4. For example, Apple introduced a "menu bar"—i.e., a menu that appears as "a single bar" and "relates only to the window in use"—in its "Lisa" computer in 1983. EX1021, pp. 3-4. Moreover, Apple's Newton MessagePad (1993) and iPhone (2007) touch screen mobile device products both heavily utilized menus in their respective GUIs. EX1022, pp. 128-141 (discussing "list picker" menus); EX1045, pp. 34 (text editing menus), 117 (contextual menu for Maps application), 128 (contextual menu for Voice Memos application). In my experience, by 2011, menus were a ubiquitous feature in computer GUIs, implemented in virtually all consumer personal computing devices, both mobile and desktop.



Picker from a picture button



Picker from a label

EX1022, p. 133





EX1045, p. 117

44. The ’581 patent concedes that the notion of incorporating menus into the GUI of a touch screen mobile device had already been thoroughly disclosed by Apple. For example, the ’581 patent references Apple’s U.S. 7,479,949, entitled “Touch Screen Device, Method, and Graphical User Interface for Determining Commands by Applying Heuristics,” which shows and describes numerous different contextual menus that appear and present the user with available options based on the state and operational mode of the device. EX1001, 92:3; EX1023, Figures 17, 18I, 26E, 35F, 35I, 39K.



Figure 17

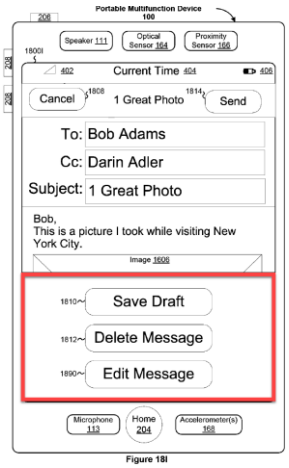


Figure 18I

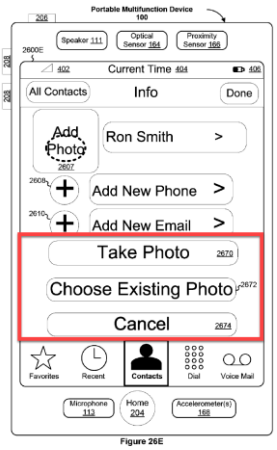


Figure 26E



Figure 35F

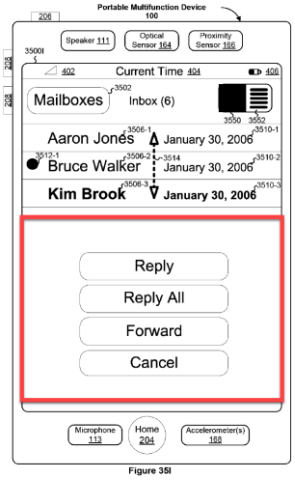


Figure 35I



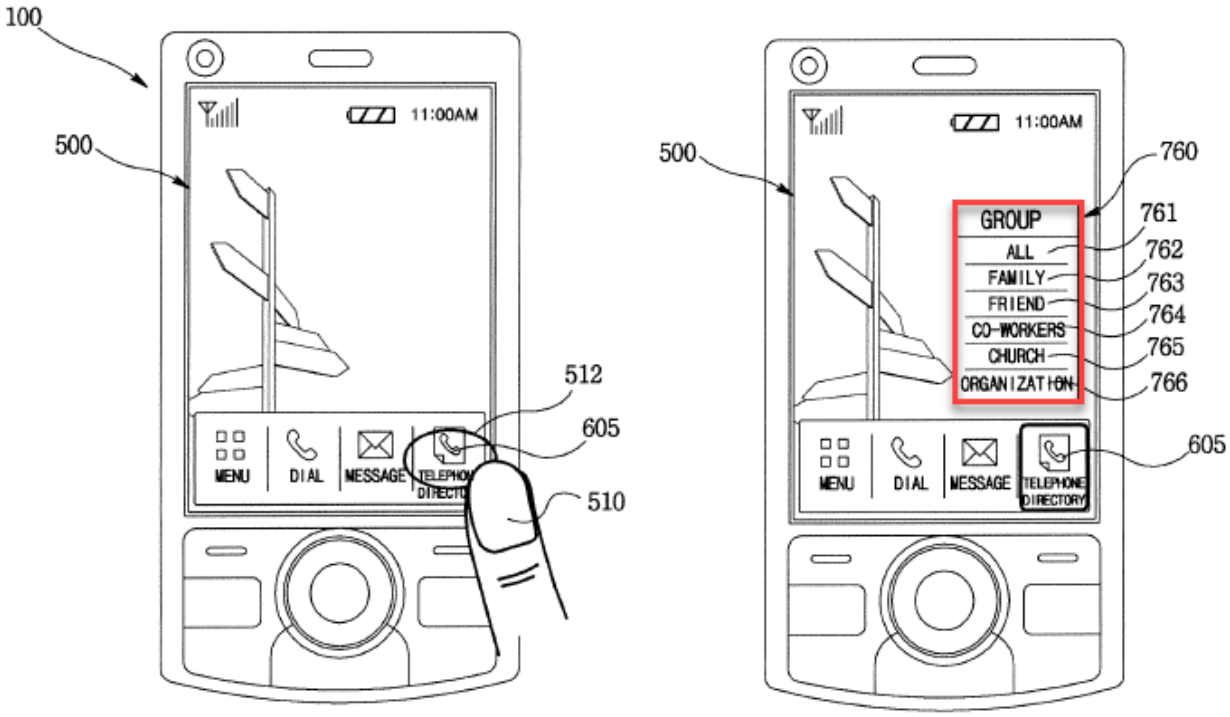
Figure 39K

45. Even beyond Apple's '949 Patent, various other disclosures in the patent literature described touch screen GUIs with contextual menus before 2011. For example, U.S. 8,954,887, filed on February 9, 2009, described "a mobile telephone having a touch screen user interface," where a "long press selection" reveals "additional functionality" in the form of "a pop up control that a user may then interact with"—e.g., "a pop up contextual menu that relates to an element in the display." EX1024, 1:38-65; *see also id.*, 4:25-5:51, Figure 1 (excerpt featuring contextual menu below).



EX1024, Figure 1 (annotated)

46. As another example, US 2009/0244023, filed March 23, 2009, describes a touch screen mobile device where performing a "touch operation for a predetermined period of time" invokes "a second level menu." EX1025, [0182-0183], Figures 12c-12d (illustrating menu).



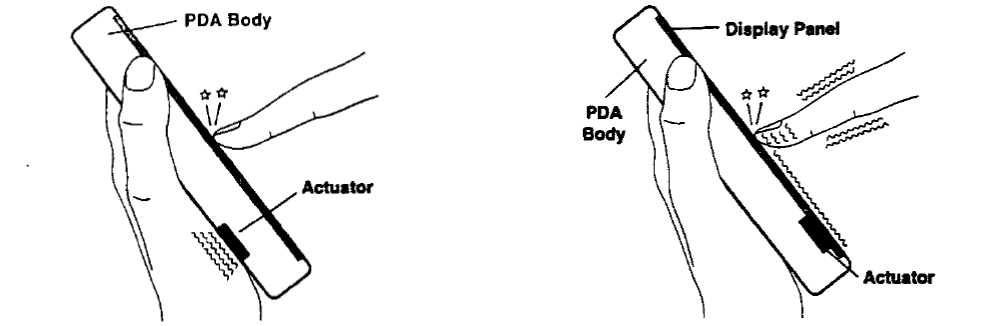
EX1025, Figures 12c-12d (annotated)

3. Tactile Feedback in Touch Screen Mobile Devices

47. The '581 patent's claims recite the notion of ***outputting, utilizing an actuator, a first feedback that is perceptible by touch***. EX1001 ('581 patent), 103:43-44 (Element [1.o.vi]).

48. The concept of using tactile feedback in touch screens was decades-old by the time of the Critical Date in 2011. For example, US 4,885,565—a patent that

issued more than 20 years beforehand—described an "[a]pparatus for providing tactile feedback in response to the touch input command of a user to [a] touchscreen." EX1026, Abstract. By the turn of the 21st century—a decade before the 2011 Critical Date—skilled artisans were already exploring ways to integrate tactile feedback into touch screen mobile devices. A paper titled "Active Click: Tactile Feedback for Touch Panels" described "a new interface mechanism for adding tactile feedback" by attaching "[a] small actuator…to a body of [a] PDA or the backside of a [PDA] touch panel," as shown below. *E.g.*, EX1027, p.1.



EX1027, p.2.

49. Continued research and development in this area throughout the early 2000s led skilled artisans to conclude that:

> Adding tactile feedback to touch screens has the potential to improve usability by providing additional feedback to the user, e.g., confirming that a button has been pressed. This may be particularly beneficial in noisy environments, where audio feedback would not be heard. In

> addition, tactile feedback could improve the user experience by making virtual widgets feel more like real physical widgets.

EX1028, p.1; EX1029, p.4 (explaining that tactile feedback "is likely to help all button interactions on touch-screens, not just text entry, which would be a considerable benefit as buttons are very common").

50. By 2011, tactile feedback was a clear design "need" for touch screen mobile devices. EX1030, p.1 ("Most mobile devices also provide touch feedback in the form of vibration alerts, a useful and discreet feature especially when the device is in silent mode."). And beyond merely confirming the occurrence of a given user input, it was well known by skilled artisans that tactile feedback could be used as a signal "to provide contextual cues to users" regarding the state and operation of the device. EX1030, p.11; *see also id*., p.1 (discussing the idea of associated tactile feedback "with different functions on a mobile device"); EX1028, p.2 (discussing the idea of "help[ing] confirm user actions by providing different tactile feedback" to signal different operations).

51. The '581 patent concedes that the notion of incorporating tactile feedback into the design of a touch screen mobile device had already been thoroughly disclosed by Apple. For example, the '581 patent references Apple's U.S. 2006/0197753 ("the '753 Publication"), entitled "Multi-Functional Hand-Held Device," which shows and describes a device that "uses a touch screen as the primary

input [mechanism]" and features a "haptics mechanism" capable of "providing force feedback in the form of vibration or shaking." EX1031, [0061], [0161]. The tactile feedback "can be used in conjunction with an input event…[and] may provide information so that the user knows that they actually implemented an input." *Id*., [0163].

4. Duration-Based Touch Gestures in Touch Screen Mobile Devices

52. It has long been the case that users can interact with a given GUI element in multiple different ways to access different operations and functions. For example, in a conventional desktop setting, a single mouse click may select an application icon, while a double mouse click on the icon may activate the corresponding application. GUIs for touch screen mobile devices likewise recognize distinct user touch inputs—called "gestures"—that serve as commands to trigger distinct operations.

53. The idea of detecting touch gestures is quite old. For example, a paper titled "Issues and Techniques in Touch-Sensitive Tablet Input" broached the subject in 1985, decades before the 2011 Critical Date. EX1032, p.1-4. This 1985 paper described an exemplary touch gesture recognition technique that "would permit [the user] to select options from a menu, or activate light buttons by positioning the tracking symbol over the item and 'pushing," which "is consistent with the gesture

used with a mouse." EX1032, p.3-4. Thus, the author surmised that a "touch tablet is capable of duplicating the behaviour [sic] of a one-button mouse." *Id*.

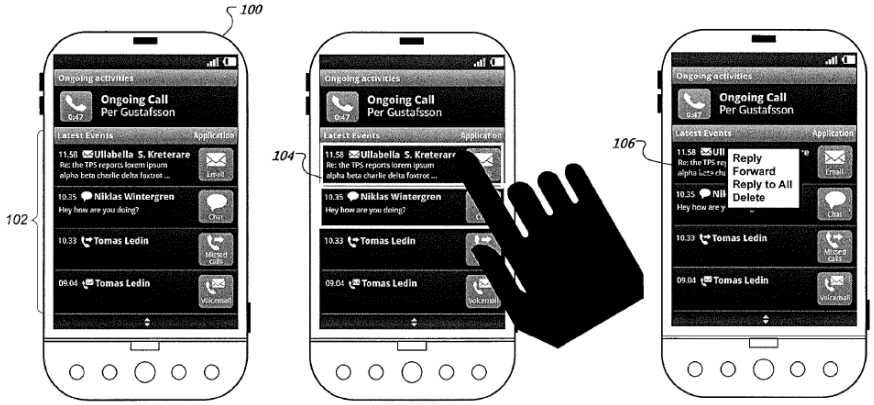
54. Over time, touch surface technology and gesture recognition techniques matured beyond that of a one-button mouse. For example, US 5,612,719, a patent filed in 1994 and issued in 1997 to Beernink et al., disclosed the concept of a "gesture sensitive button for a graphical user interface," where executing different gestures—e.g., a tap, check-mark, or X-mark—on the button triggers different functionality. EX1033, Abstract, 2:5-45, Figures 8-9. Similarly, Apple's pre-existing Newton MessagePad touch screen mobile device product was designed to distinguish between gestures based on the duration of a touch input—i.e., instances where the user interacts with a GUI element via a "tap" gesture versus a gesture where "the user presses and holds." EX1022, p.84; *see also id*., p.190 ("To select an object, a user holds down the pen on or near the object until a heavy mark appears under the pen and the Newton device makes a high-pitched sound."), p.205 ("When a user holds the pen on a key for a certain amount of time, the system acts as if the user were repeatedly tapping that key.").

55. Prior art disclosures like Apple's U.S. 2006/0197753 take gesture recognition a step further, leveraging the development of multi-touch touch screen technology and advancing robust "vocabularies" of touch gestures based on a "variety of variables including the UI mode, the force of the touch (e.g., light or

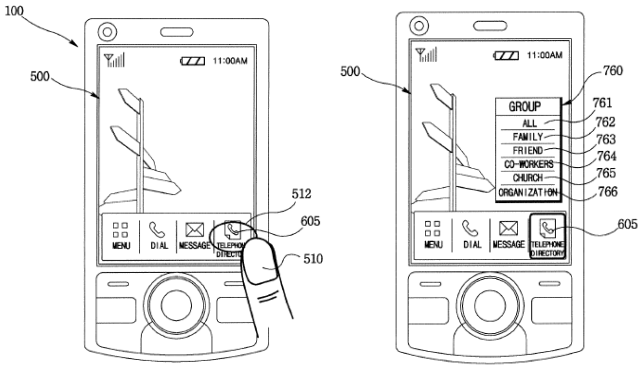
hard), the number of fingers used, whether or not there is any movement during the touch, the duration of the touch, and the touch location, all or some of which can be combined to form a variety of behaviors and user feedback." EX1031, [0145], [0149], Figures 26, 27A-27B. Amongst various other gestures, an exemplary vocabulary of the '753 Publication maps a "short" single-finger touch on a virtual button element with no movement (e.g., a tap) to the function of "execut[ing] the item clicked," and maps a "LONG" single-finger touch with no movement (e.g., a touch-and-hold gesture) to the function of "bring[ing] up [a] context sensitive menu." *Id*., Figures 27A-27B.

56. Apple's '753 Publication is one of numerous prior art patent documents that describe duration-based touch gestures in touch screen mobile devices. The patent literature was replete with such disclosures, as demonstrated by the table below.

Document	Description
EX1034 US 2008/0036743 Inventors: Westerman, *et al*. Filed: Jan. 31, 2007	**[0119]:** The gesture event may include first order parameters such as motion, tapping, dwell, pressure and/or the like. The gesture event may also include second order parameters that define the first order parameters such as speed, direction, shape, timing/duration, length, and/or the like. Thereafter, in block 130, actions associated with gesture events can be implemented when gesture events are performed.

EX1024 US 8,954,887 Inventors: Tseng, *et al*. Filed: Feb. 9, 2009	**5:11-17:** A user selection (e.g., by pressing on a touch screen interface) of any of the messages may open the selected message. A user selection of an application icon next to one of the messages may open the full application, such as with the associated message opened in the application. Such actions may occur upon an up press event on the item when the user selects the item quickly. **5:35-45:** The third, and right-most, display shows the functionality generated by a long press by the user. In this example, the functionality involves the generation of a contextual pop up menu 106 associated with the first message in the latest events area 102 that was long-pressed by the user. The menu is contextual because its content depends on the thing that was long pressed—here, the context involves basic operations that can be performed on the e-mail message that was selected (e.g., reply, forward, etc.). If a different event were selected, the contextual menu might have different values (e.g., it may not be possible to forward a missed telephone call).  EX1024, Figure 1 **8:66-9:19:** At box 404, the process 400 determines whether sufficient time has expired for a long press period on the device. If such a time period has not yet expired, the process 400 determines whether the selected item exhibits

	long press functionality (box 405). If it does not, the process 400 simply continues waiting for an up press event. If the selected item does exhibit long press functionality, the selected item is shown in highlighted form on the display (box 406)…Once the long press period has expired (box 404), the process 400 may cause a contextual menu to be displayed on the device. Such a menu may include a pop up menu that appears over or near the selected item or at the point where the selection occurred, for example (box 408).
EX1035 US 8,830,181 Inventors: Clark, *et al*. Filed: Jun. 1, 2009	**2:63-67:** In one embodiment, a gesture recognition system identifies gestures based on characteristics such as the duration of the contact, start and end times of the contact, acceleration of motion of the contact, direction of motion of the contact, or a path of motion of the contact. **11:19-24:** The gesture recognition unit 102 may further distinguish between a tap and a touch by comparing the duration of the contact with a maximum duration for a tap, or a minimum duration for a touch. For example, the gesture recognition unit may detect any non-moving contact with a duration of less than 500 milliseconds as a tap, rather than a touch. **16:42-48, Figure 14:** At block 1409, in response to identifying the gesture, gesture recognition unit 102 executes instructions associated with the identified gesture. For example, a particular gesture may be associated with a function such as, for example, moving objects in a GUI, playing sounds or displaying images, activating relays or other switches, or initiating transmissions of data.
EX1025 US 2009/0244023 Inventors: Kim, *et al*. Filed: Mar. 23, 2009	**[0182]** FIG. 12c illustrates a graphic user interface provided to a touch screen during proximity touch operation of an input medium according to another embodiment of the present invention.

	[0183] A selection marker 512 of FIG. 12c defines an area where an input medium 510 has proximity-touched the telephone directory execution icon 605 displayed on the touch screen 500 within a touch identification distance of the touch screen 500. The controller 180 determines that the input medium 510 has performed the proximity touch operation for a predetermined period of time and may display on the touch screen 500 a second level menu for providing a function associated with the telephone directory execution icon 605, as illustrated in FIG. 12d.  EX1025, Figures 12c-12d
EX1036 US 9,760,241 Inventors: Lewbel Filed: Nov. 5, 2010	**13:44-55:** FIGS. 9A-9B illustrate an example of variable tactile output in response to detection of a time duration of a touch input applied to the display 202 and/or the touch sensor 204. For example, as illustrated in FIG. 9A, when a user's finger 902 touches the surface 904 of the display 202 for a first time duration T_1, a first intensity level or type of localized tactile output 906 may be provided as indicated by the broken lines. On the other hand, as illustrated in FIG. 9B, when the user's finger 902 touches the display 202 (at the same or different location) for a second, longer duration of time T_2, a second, different level or type of localized tactile output 908 may be provided as indicated by the broken lines.

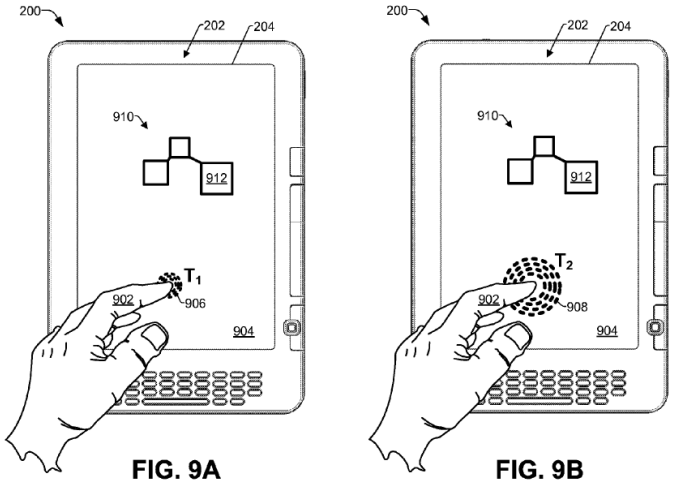


FIG. 9A FIG. 9B

EX1036, Figures 9A-9B

14:5-16: In one example, an eBook or other content item may include an image 910 having a particular feature 912 displayed on the display 202. When the user's finger 902 touches the particular feature 912 for a first duration of time T_1, a first type or intensity of tactile output may be generated, the feature 912 may change visually to a first configuration, and the electronic device may produce a first sound. When the user's finger 902 continues to touch the particular feature 912 until the second duration of time T_2 is reached, a second type or intensity of tactile output may be generated, the feature 912 may change visually to a second configuration, and the electronic device may produce a second sound.

VII. OVERVIEW OF CONCLUSIONS FORMED

57. This Declaration explains the conclusions that I have formed based on my independent analysis. To summarize those conclusions: Based upon my knowledge and experience, and my review of the materials listed above, I believe

that Claims **1**-3, 21, 29-31, 41, **42**-44, 54, 62-65 of the '581 patent are obvious in view of Blumenberg (EX1004), Bhumkar (EX1005), and Griffin (EX1006). *See* Ground 1 at Section VIII.

VIII. GROUND 1: BLUMENBERG, BHUMKAR, GRIFFIN

A. Blumenberg (EX1004)

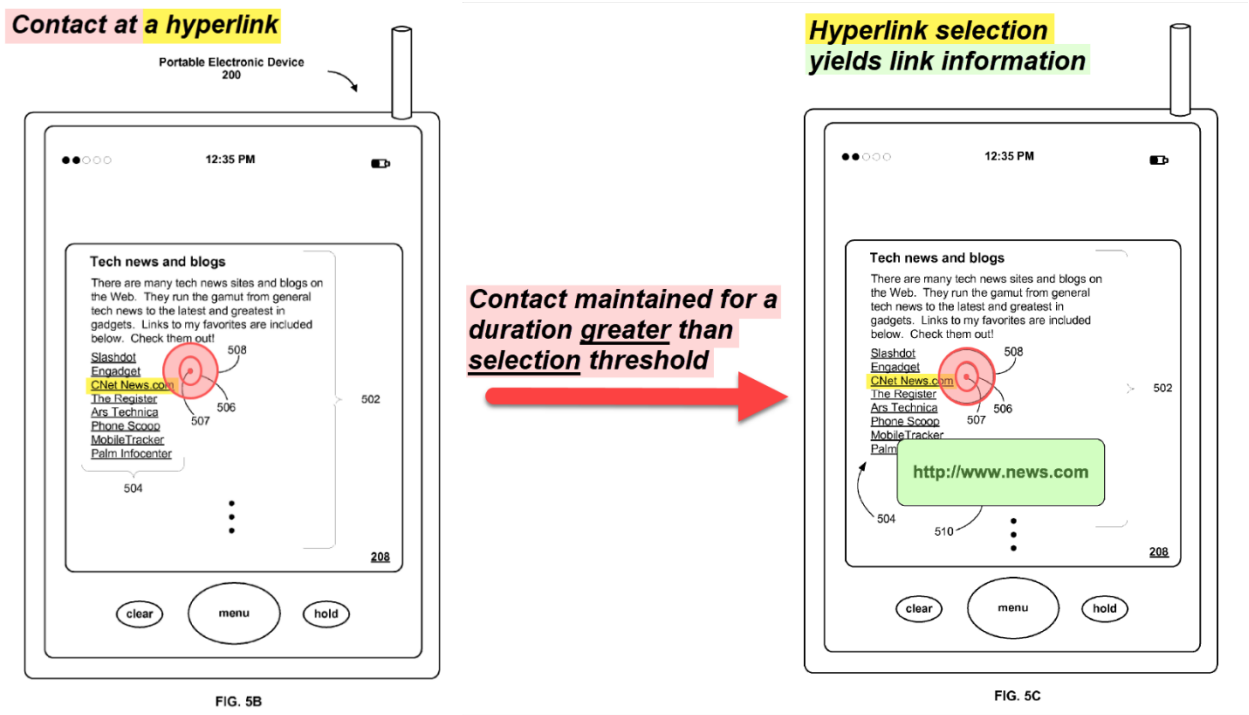
58. Blumenberg's "disclosed embodiments relate generally to user interfaces for portable devices, and more particularly, to activating hyperlinks on a portable electronic device." EX1004 (Blumenberg), [0002]. Specifically, Blumenberg's embodiments alleviate the "frustrat[ion]" users experience when using portable devices with small screens to browse the web. *Id*., [0002-0005]. In short, "because links in webpages displayed on a small screen may not be perceived easily by users," "getting information about the hyperlinks and navigating to other webpages via the hyperlinks takes on a hit-or-miss character." *Id*.

59. Blumenberg teaches different scenarios regarding a user's contact with an area of a touch screen display that corresponds to a hyperlink and associates each of those scenarios with a particular functionality.

60. A first scenario includes an "inadvertent" contact—e.g., when the user contacts the touch screen for a duration of less than a threshold of "0.2 seconds"—which registers no selection and triggers no change on the display. EX1004

(Blumenberg), [0034], [0049]. For ease of discussion, I reference the touch duration threshold in Blumenberg's first scenario as the selection threshold.

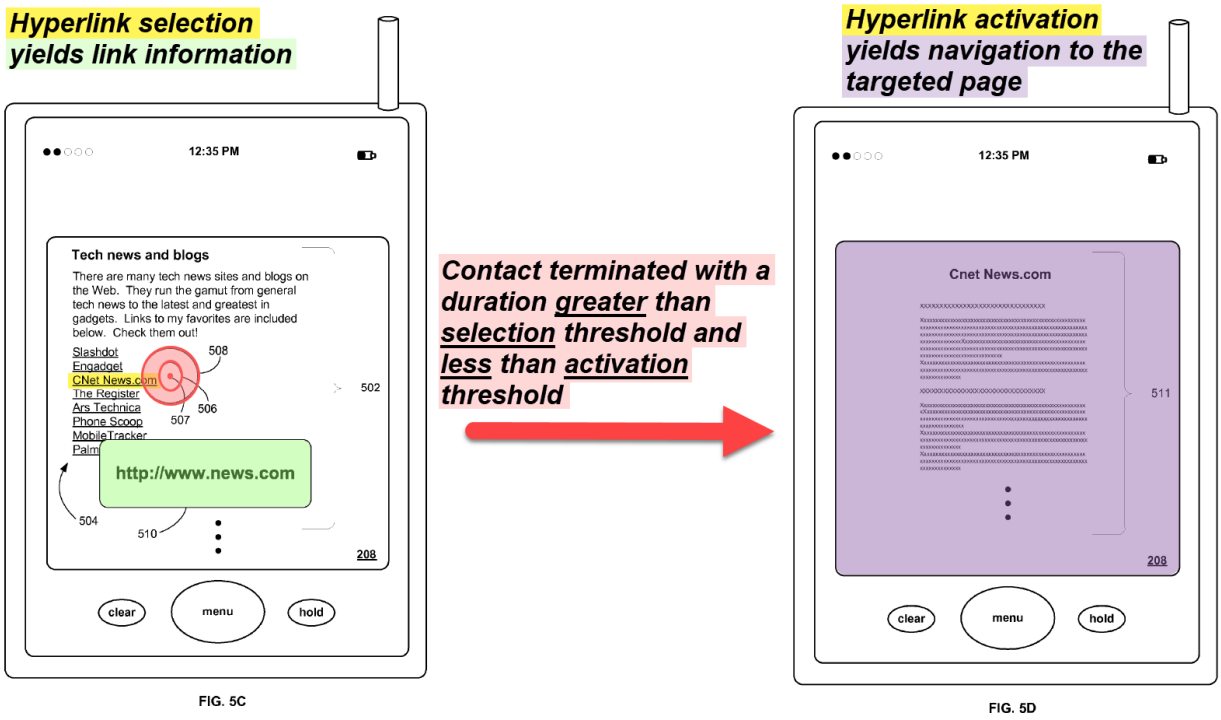
61. A second scenario includes contact at a hyperlink that extends beyond the selection threshold and, therefore, selects the hyperlink. EX1004 (Blumenberg), [0049]. When a hyperlink is selected, the display shows "link information" associated with the hyperlink, such as "a snippet of content from the page to which the link points." *Id.*, [0048].



EX1004 (Blumenberg), Figure 5B-5C (annotated)

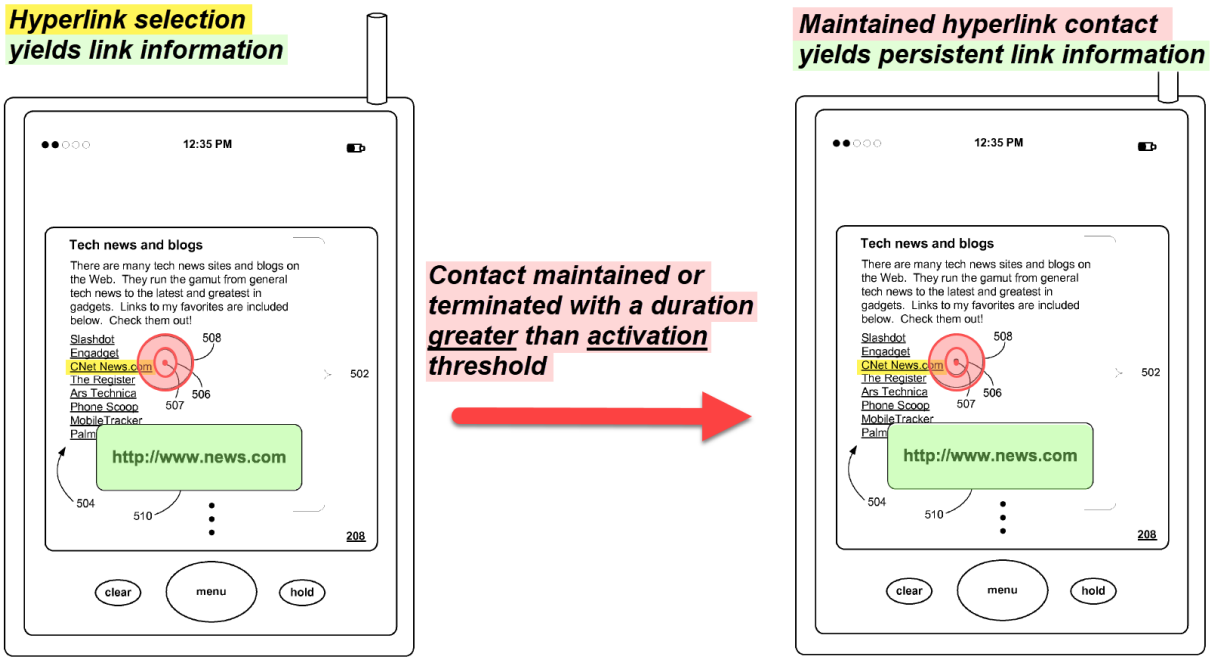
62. From there, if the duration of the contact terminates before a "predetermined amount of time"—which I refer to as the activation threshold—the selected link is activated and the browser navigates to the targeted webpage.

EX1004 (Blumenberg), [0051] ("the activation of the link may be triggered by a gesture, such as a quick tap").



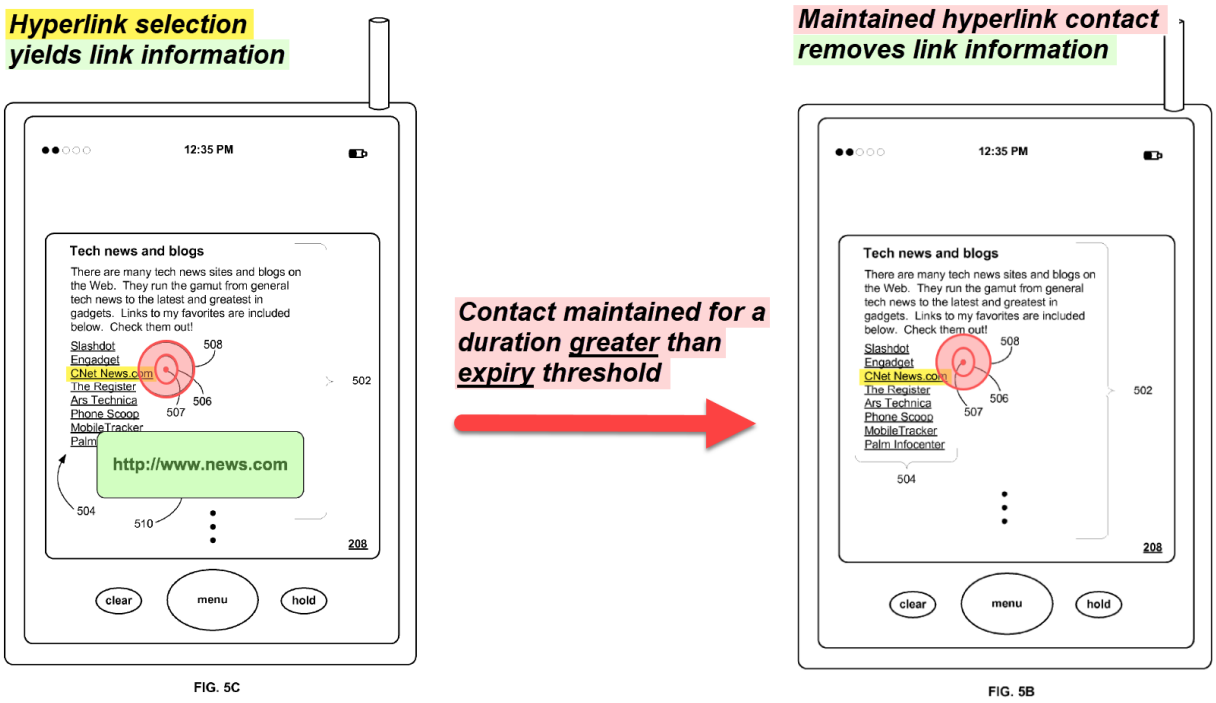
EX1004 (Blumenberg), Figures 5C-5D (annotated)

63. A third scenario includes contact at the hyperlink that extends for a duration beyond the activation threshold. EX1004 (Blumenberg), [0051]. In that case, the "link information" remains on the display even after the user breaks contact, and the user must execute a confirmatory tap to activate the selected hyperlink and visit the targeted webpage. *Id*.



EX1004 (Blumenberg), Figure 5C (duplicated and annotated)

64. A fourth scenario includes contact at the hyperlink that extends for a duration beyond yet another "predetermined amount of time (e.g., three to five seconds)," an expiry threshold beyond which "the [link] information is removed from display." EX1004 (Blumenberg), [0049].

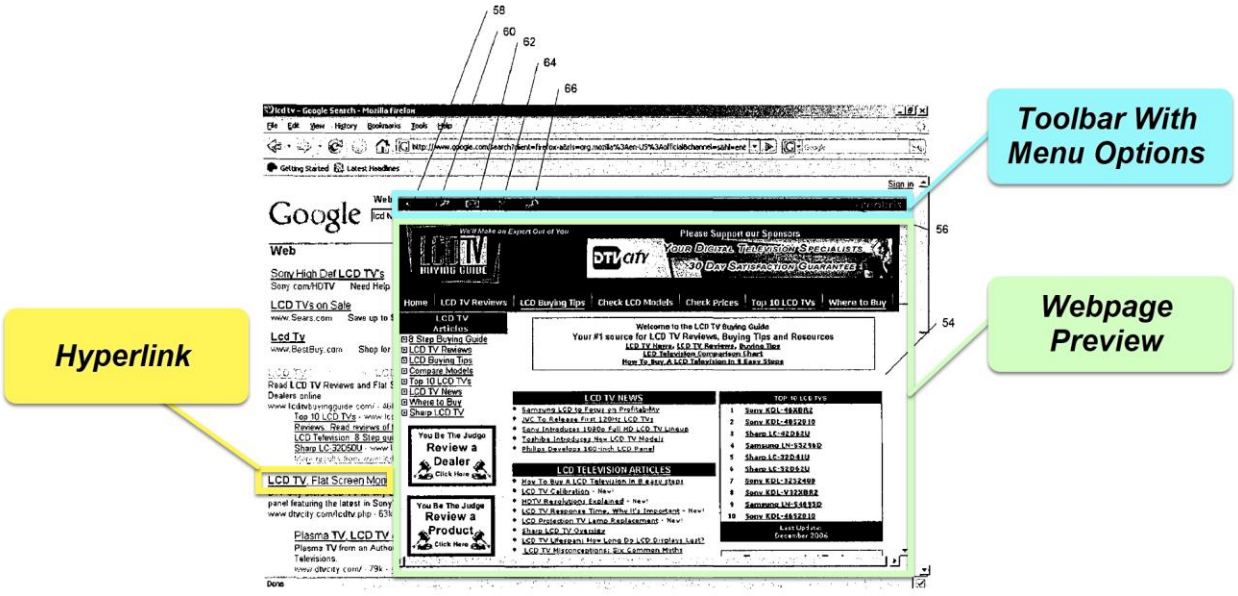


EX1004 (Blumenberg), Figures 5C, 5B (annotated)

B. Bhumkar (EX1005)

65. Bhumkar "relates to the display and/or consumption of information, such as over the Internet," and describes techniques to facilitate "navigating, displaying, extracting, sharing and/or storing links, text and/or media using gesture-based or similar interfaces." EX1005 (Bhumkar), [0002]. For example, as shown below, Bhumkar discloses embodiments featuring "a 'quick view' or 'preview' of a target web site." *Id.*, [0038]. Bhumkar's webpage "preview" can "be used with any hyperlinks or similar anchors associated with any [w]eb page rendered in a browser." *Id.* In the Figure 5 embodiment annotated below, Bhumkar's preview window includes a variety of options displayed on a "toolbar" menu for extracting and

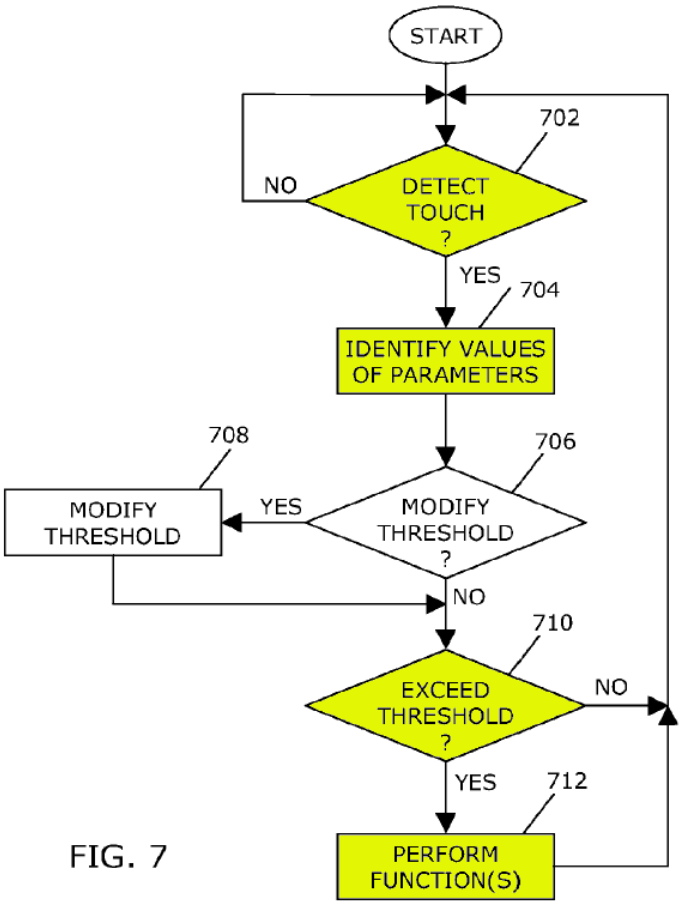
sharing content of the previewed webpage. *Id.*, [0071-0075]; *see also* [0021], [0042-0043].



EX1005 (Bhumkar), Figure 5 (annotated)

C. Griffin (EX1006)

66. Griffin discloses the concept of applying "touch thresholds" to certain monitored "parameters" of the user's contact with a touch screen. EX1006 (Griffin), [0032], [0040], [0053]. When the value of a touch parameter surpasses a given threshold, the device performs a corresponding functionality and optionally provides tactile feedback, as demonstrated in the flow chart below from Griffin's Figure 7. *Id.*, [0053]. In this way, the user can access a variety of different functions by varying the duration, force, and/or area of contact.



EX1006 (Griffin), Figure 7 (highlighted)

D. The Blumenberg-Bhumkar-Griffin Combination

67. The Blumenberg-Bhumkar-Griffin combination represents the predictable and expected result of applying in the context of Blumenberg's web browser: **[a]** Bhumkar's teachings about providing menu options for interacting with a webpage preview window corresponding to a hyperlink; **[b]** Griffin's teachings regarding multiple user-configurable touch duration thresholds; and **[c]** Griffin's further teachings about triggering selective tactile feedback.

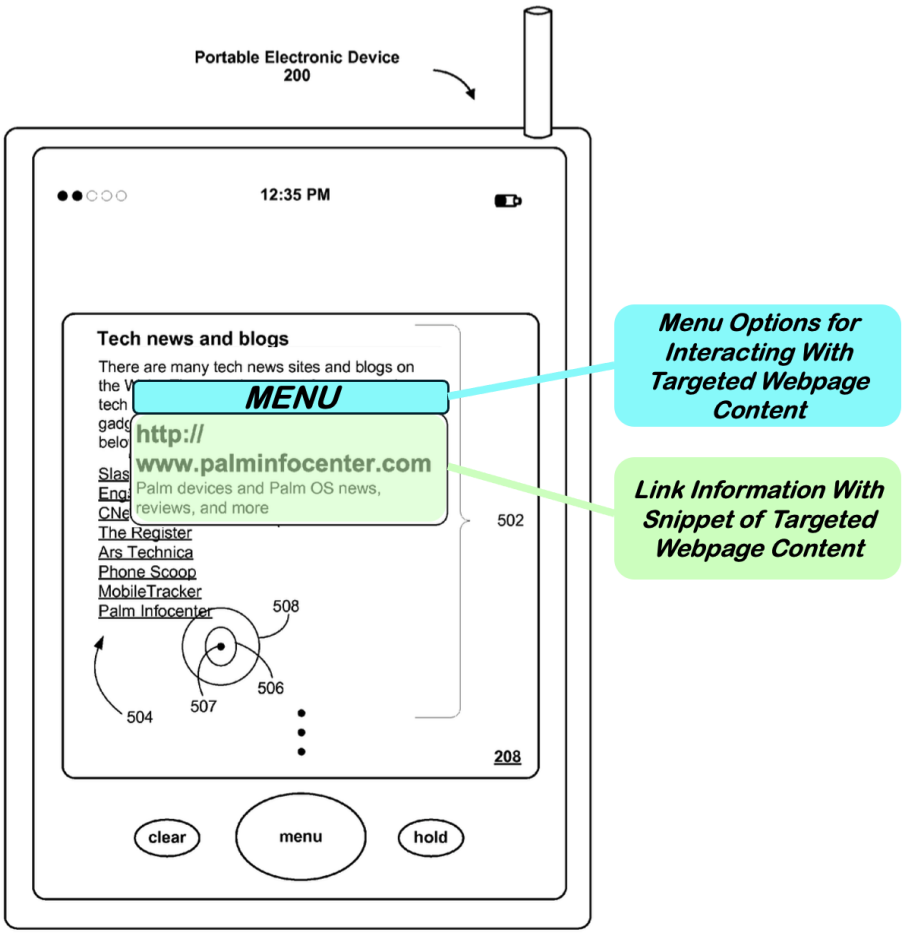
68. From a POSITA's perspective in 2011, integrating the supplemental teachings of Bhumkar and Griffin with Blumenberg's disclosure would have involved nothing more than applying known solutions to known problems in the field of computer interfaces and applications to achieve predictable outcomes. In other words, Bhumkar's teachings about displaying contextual menu options and Griffin's teachings about tactile feedback and touch duration thresholds are all consistent with the POSITA's background knowledge and understanding as of 2011, a relevant portion of which I described above at Sections VI.B.2 (menus), VI.B.3 (tactile feedback), and VI.B.4 (duration-based touch gestures). Supplementing Blumenberg's disclosure about a web browsing GUI with other complementary GUI technologies would have been simple and straightforward for a POSITA. The fundamental aspects of Blumenberg's disclosure would remain intact, bolstered by the well-known and beneficial teachings of Bhumkar and Griffin to render obvious the '581 patent's claimed invention.

1. Reasons to Combine

(i) Applying Bhumkar's teachings about providing menu options for interfacing with a webpage preview in the context of Blumenberg's web browser

69. A POSITA would have been motivated to incorporate Bhumkar's teachings about providing menu options for a webpage preview with Blumenberg's teachings about displaying "link information" previewing content from a webpage

targeted by a selected hyperlink. The predictable result of this Blumenberg-Bhumkar combination includes a touch screen mobile device with a web browser that displays "link information" previewing a snippet of targeted webpage content, as Blumenberg teaches, and further displays a menu of options for interacting with that targeted webpage content, per Bhumkar. The visual aid below demonstrates an exemplary display of a web browser embraced by the Blumenberg-Bhumkar combination, illustrating both the webpage previewing "link information" (green) and an accompanying menu (blue).



70. Each of the following independent reasons supports the Blumenberg-Bhumkar combination.

71. First, providing menu options associated with the displayed content of an application or information window was a ubiquitous feature in computer GUIs by 2011. Indeed, menus had been a core feature in GUIs for nearly half a century beforehand. As I explained above at Section VI.B.2, GUI menus date back at least to the 1970s and were subsequently implemented by skilled artisans in a variety of different forms (e.g., pop-up, drop down, toolbar, etc.) and in a variety of different settings, including touch screen mobile devices like Apple's Newton MessagePad (1993) and iPhone (2007). In the context of touch screen mobile devices, a POSITA would have known that "[a]ll but the simplest applications have menus." *See also* EX1037 (ANDROID DEVELOPERS GUIDE, CREATING MENUS), pp. 1 ("Menus are an important part of an application that provide a familiar interface for the user to access application functions and settings.") (defining "Context Menu" as "[a] floating list of menu items that appears when the user performs a long-press on a View"), 4 (discussing the topic of "Creating a Context Menu").

72. Described in the technical literature as one of the central "ingredients" of a "user-friendly interface," menus were an exceedingly well-known solution to the equally well-known problem of presenting available actions and functionalities for selection by the user. EX1021, pp.1, 4. Bhumkar employs a menu to augment a

webpage preview for this purpose, and it would have been axiomatic for a POSITA to do the same in the context of Blumenberg's "link information" that previews webpage content.

73. Second, a POSITA would have recognized that applying Bhumkar's teaching of a menu for a webpage preview window would predictably improve Blumenberg's browser from a usability standpoint. EX1038, p.2 (identifying "Contextual Menus" as one of the "characteristics" relevant to "the usability of mobile devices"). Specifically, it would have been apparent to the POSITA that providing menu options in connection with a webpage preview window, as Bhumkar teaches, would allow the user to accomplish common tasks associated with the target webpage (e.g., sharing the page with an acquaintance) more quickly and efficiently (e.g., with fewer user inputs). Reducing the user's cognitive load by displaying relevant tasks and functionalities in a menu would make Blumenberg's device and its web browser easier to use. EX1039, p.3 (explaining certain "usability heuristics…for touchscreen-based mobile devices" that include "minimiz[ing] the user's memory load by making objects, actions, and options visible" and "provid[ing] shortcuts to the most frequent tasks").

74. As the POSITA would have known, usability in this context—e.g., the degree to which a given web browser efficiently facilitates the user's desired task—was a key differentiator amongst competing web browsers. EX1040, p. 1 ("Web

usability is the efficient, effective and satisfying completion of a specified task by any given Web user."). While the same web content could be accessed on two competing web browsers, differences in the user interface could make accessing that content more efficient on one of the two. The browser with a superior interface from a usability standpoint would be more desirable by consumers. As detailed in a contemporaneous technical paper entitled "The State of the Art of Mobile Application Usability Evaluation":

> Mobile devices and their applications provide significant advantages to their users, in terms of portability, location awareness, and accessibility. Lower price points and improvements in the hardware and software capabilities of smartphones in particular, the so-called "handhelds," have led to tremendous expansion of the mobile and related markets. This has led to huge numbers of mobile applications ("apps") being developed over the past few years.
>
> This vast and increasing number of mobile apps in the marketplace has challenged developers to develop apps of superior quality in order to compete [1]. There are many aspects to the quality of mobile apps, an important one being usability.

EX1038, p.1.

75. Third, a POSITA would have been prompted to pursue this combination based on Bhumkar's express teachings and motivations. Bhumkar recognized certain problems with earlier "interfaces to the Internet":

> The present interfaces make extracting information somewhat restrictive and often involve multiple steps. For example, saving an image from a Web page accessed via the Internet requires a user to right-click a mouse (or similar cursor control device) and specify a file name and storage location for a local copy of the image to be saved…
>
> In addition, the "point of information share," such as email or instant messaging is very disconnected from "the point of navigation and consumption." For example, sharing a link with oneself or others requires a user to copy and paste the link into a new message window in the user's email client. There is also no easy, intuitive method of sharing multiple files, links, text, images or videos.

EX1005 (Bhumkar), [0009-0010].

76. Bhumkar's solution involves providing a window to display a preview of a target webpage for a hyperlink on a current webpage and pairing the preview window with an associated set of menu options for, among other things, saving or sharing content of the target webpage without leaving the current webpage or invoking a separate application (e.g., an email client). EX1005 (Bhumkar), [0038-0043]; *see also* [0021]. Like Bhumkar, Blumenberg also promotes the idea of previewing web content—i.e., "link information" that features "a snippet of the content in the webpage…to which the link links." EX1004 (Blumenberg), [0039]. Understanding the similarities between Blumenberg's "link information" and Bhumkar's webpage preview, the POSITA would have sought to predictably

improve Blumenberg's browser in the same way Bhumkar did—by displaying a set of associated menu options for interacting with the previewed content.

77. Fourth, a POSITA would have been prompted to pursue this combination based on the teachings and motivations evident from Blumenberg.

78. As I explained above at Section VIII.A, Blumenberg sets forth multiple touch duration thresholds that dictate how the device and its web browser application respond to touch inputs. When the user's touch is terminated with a duration less than the selection threshold, the browser ignores the inadvertent contact. When the user's touch is maintained for a duration that is greater than the selection threshold, the browser responds by displaying link information. A POSITA would have understood that the display of link information would allow the user to more clearly perceive which link will be activated if the user releases their finger.

79. When the user's touch is terminated with a duration that is greater than the selection threshold and less than the activation threshold (e.g., a tap), the browser responds by activating the link and loading the target webpage. On the other hand, when the touch is maintained for a duration that is greater than the activation threshold (e.g., a hold), the browser maintains a preview of the targeted webpage ("link information" featuring a "snippet of content") and requires a confirmatory tap before activating the selected link and loading the target webpage. Regarding this latter scenario, a POSITA would have understood that Blumenberg's browser

requires a confirmatory tap because the extended touch duration indicates the user's competing interests in **[i]** potentially interacting with the candidate target webpage; and/or **[ii]** leaving the current webpage. Accordingly, the POSITA would have appreciated that introducing some degree of functionality to interact with Blumenberg's webpage preview after the activation threshold would naturally assist the user with choosing and accomplishing their next step.

80. In an attempt to address the user's competing interests, the POSITA would have sought to integrate functionality for the user to interact with the candidate target webpage without leaving the current webpage. Bhumkar, a prior art reference analogous to both the '581 patent and Blumenberg, provides exemplary teachings on the subject of interactive webpage previews and, therefore, would have commended itself to the POSITA.

81. Moreover, the POSITA would have appreciated that there are additional benefits to introducing menu options to the displayed webpage preview after the duration of the user's touch surpasses Blumenberg's activation threshold. For example, it would have been apparent to the POSITA that modifying the display to add menu options accompanying the webpage preview at this time would provide some degree of visual feedback to the user, indicating that the device has transitioned to a different state where a confirmatory tap is required to activate a selected

hyperlink. When a computing device changes between different states/modes users typically expect to see a corresponding change of some sort via the GUI.

82. Further still, a POSITA would have understood that menu items are typically selected by tapping the menu item, and the POSITA would have therefore appreciated that menu items would not typically be selectable until after the user has released their finger from the display. As releasing the finger from the display between Blumenberg's selection and activation thresholds causes the browser to activate the link (removing the link information from the display), a POSITA would have recognized that the menu items may only be accessible to the user once Blumenberg's activation threshold had passed. Therefore, a POSITA would have been motivated to introduce the menu items following Blumenberg's activation threshold, after which the user can release their finger from the display and review the menu options prior to making a tap selection. Introducing the menu options to the display when they become selectable by the user—i.e., after the activation threshold—would provide a more effective prompt for the user to consider and interact with the menu options. Additionally, displaying the menu options only when they are selectable would enhance usability by avoiding an otherwise confusing scenario that would occur if the options were presented before the user could fully interact with them.

(ii) Applying Griffin's teachings regarding tactile feedback in the context of Blumenberg's web browser

83. As I explained above at Section VIII.C, Griffin teaches a portable touch screen device that triggers specific functionalities based on corresponding touch thresholds. Griffin also teaches that these triggered functionalities can be paired with tactile feedback induced by actuators beneath the touch screen. *E.g.*, EX1006 (Griffin), [0032] ("tactile feedback is provided and the currently highlighted selection option is selected"), [0053] (discussing an embodiment where a virtual keyboard function is paired with tactile feedback when a predetermined touch thresholds is met), [0057]. In the context of a web browser, Blumenberg similarly describes how touch duration thresholds can be used to trigger application-specific functionalities. I detailed these aspects of Blumenberg above at Section VIII.A. With this understanding of Griffin and Blumenberg as a backstop, a POSITA would have been motivated to incorporate Griffin's notion of applying selective tactile feedback in this context for at least the following reasons.

84. First, a POSITA would have been prompted to seek out and incorporate Griffin's teachings on tactile feedback in view of Blumenberg's teachings and suggestions to do so. According to Blumenberg, the touch-sensitive display of its disclosure can be implemented "as described in…U.S. patent application Ser. No. 11/367,749, 'Multi-Functional Hand-Held Device,' filed on Mar. 3, 2006" and

"incorporated by reference herein." EX1004, [0026]. This incorporated '749 Application expressly describes a "haptics mechanism…configured to vibrate" in response to certain "touch events" for the purpose of "alert[ing] a user that a user input has been made." EX1041, p. 42 ([0161]); *see also generally id.*, pp. 42-43 ([0160-0163]).

85. Appreciating that the "touch events" in Blumenberg are associated with predetermined touch duration thresholds, it would have been apparent to the POSITA that the haptic/tactile feedback Blumenberg teaches (via incorporation of the '749 Application) should be used to alert the user when a given threshold is reached, just as Griffin describes. Stated differently, the POSITA would have referenced the '749 Application as part of Blumenberg's disclosure, gleaned the teaching to provide tactile feedback as an alert for pertinent touch events, and recognized the application of that teaching in the context of Blumenberg's touch duration thresholds. Seeking more information on this topic, the POSITA would have sought and integrated complimentary teachings from references like Griffin.

86. Second, as I explained above at Section VI.B.3, tactile feedback was a well-known solution to the longstanding problem in mobile device computing of confirming user inputs, providing alerts, and giving contextual cues to users. By the time of the Critical Date in 2011, "[m]ost mobile devices" incorporated tactile feedback for one or more of these purposes. EX1030, p.1 ("Most mobile devices

also provide touch feedback in the form of vibration alerts, a useful and discreet feature especially when the device is in silent mode."). A POSITA, therefore, would have been prompted by ongoing design trends and market forces to implement a similar solution, as taught by Griffin, in the context of Blumenberg. As I explained above at Section VIII.A, one of the significant events in Blumenberg occurs when the user's touch duration reaches and surpasses the activation threshold, meaning the user must execute a confirmatory tap to visit the target webpage. The POSITA, appreciating that the user should be alerted to this event and given a cue to execute the confirmatory tap, would have been motivated to use the widespread solution of providing tactile feedback as a response to the user's touch-and-hold input.

87. Third, a POSITA would have recognized the similarities between Griffin and Blumenberg and understood that Griffin's tactile feedback teaching would apply equally to Blumenberg. Per my earlier discussions at Section VIII.A (Blumenberg) and VIII.C (Griffin), both of these references describe touch screen mobile devices that trigger different functionalities based on the duration of the user's touch. Thus, it would have been clear to a POSITA that Griffin's teaching to use tactile feedback in conjunction with a triggered functionality would accomplish the same alerting/prompting benefit in Blumenberg as it does in Griffin. Using tactile feedback to alert and prompt the user of a touch screen device was an exceedingly simple and ubiquitous feature by 2011. A POSITA reading Griffin's

teaching to provide "tactile feedback" in response to a given touch threshold would have immediately appreciated the broad applicability of that teaching to other analogous touch screen device disclosures like Blumenberg's.

88. Fourth, a POSITA would have appreciated that the inclusion of tactile feedback would prove particularly beneficial in Blumenberg because the result of exceeding the activation threshold—i.e., the requirement to give a confirmatory tap input—may not be otherwise perceivable to the senses of some users. For example, any material change to the display when the device transitions to a different state after the activation threshold may be difficult for some users to perceive (e.g., users with vision impairments, users whose attention is directed elsewhere while awaiting the activation threshold (such as pedestrians), and users with large thumbs that occlude much of the display), particularly on a small-screen mobile device.[3] Indeed, Blumenberg teaches that the "link information" may "continue[] to be displayed" after the duration of the user's touch surpasses the activation threshold. EX1004

[3] Above, I explain that a POSITA would have been motivated to introduce menu options on the display to accompany the webpage preview after the activation threshold. Among other things, doing so will provide some degree of visual feedback to the user, indicating that the device has transitioned to a different state where a confirmatory tap is required to activate a selected hyperlink. This prior explanation regarding visual feedback does not detract from my further discussion here on the subject of tactile feedback. It was routine in the art to provide multiple types of feedback (e.g., audible, tactile, visual) because some users may be more attuned to one form of feedback than another depending on their personal sensory awareness or surrounding environment.

(Blumenberg), [0051]. In situations where the same "link information" remains on the screen unchanged, some users may not be able to discern that the device has changed states. Similarly, the user may be in an environment where audible alerts are undesirable or undistinguishable from ambient noise. *See* EX1028, p.1 (explaining that tactile feedback "may be particularly beneficial in noisy environments, where audio feedback would not be heard"); EX1030, p.1 ("Most mobile devices also provide touch feedback in the form of vibration alerts, a useful and discreet feature especially when the device is in silent mode."). In all these ways, tactile feedback would be especially effective and desired. For a POSITA, alerting the user to a change in the operational state/mode of the device with tactile feedback would have been a natural, common-sense solution to the rudimentary user interface problem Blumenberg presents. *E.g.*, EX1028, p.2 ("This tactile feedback indicates that the user has entered the scrolling mode.").

(iii) Applying Griffin's teachings regarding multiple user-configurable touch duration thresholds in the context of Blumenberg's web browser

89. As I explained above at Sections VIII.A and VIII.C, Griffin and Blumenberg both describe touch screen mobile devices where different functionalities are triggered by touch duration thresholds. Griffin further provides an exemplary process flow with implementation details associated with tracking touch contact, comparing the contact to predetermined touch duration thresholds,

and modifying the thresholds automatically and/or based on user input. See EX1006 (Griffin), [0032], [0040], [0053], Figure 7. For at least the following independent reasons, a POSITA would have had multiple reasons to pursue a predictable combination that applies Griffin's rudimentary implementation details in the context of Blumenberg's disclosure.

90. First, Blumenberg's instruction to trigger specific web browser functionalities based on the duration of the user's touch contact on a given hyperlink would have prompted a POSITA to seek out and apply the teachings from references in the same field, like Griffin, that provide rudimentary and well-known implementation details. From the POSITA's perspective, the straightforward discussion in Griffin about tracking touch duration, comparing the touch duration to predetermined thresholds, and modifying those thresholds are evident from Blumenberg.

91. To explain further, Blumenberg teaches that "link information" will not be displayed until and unless "the contact is maintained for at least a predetermined time (e.g., 0.2 seconds, or another value between 0.1 and 0.25 seconds)." EX1004, [0049]. A POSITA reading Blumenberg would, therefore, face the simple design problem of determining when the contact reaches or exceeds the "predetermined time." The solution to that problem would have been evident to the POSITA—track

the touch duration and compare the duration to a threshold that reflects the "predetermined time." This solution is precisely what Griffin teaches.

92. In short, the POSITA would have been motivated by Blumenberg's teachings and suggestions to pursue a predictable combination that incorporates the rudimentary implementation details provided by Griffin.

93. Second, a POSITA would have appreciated that Griffin's implementation details were all well-known techniques. As I explained in detail above at Section VI.B.4, the prior art was replete with literature describing duration-based touch gestures and real-world products employing the same. Like Griffin, the pertinent literature on this subject described the common-sense solution of recognizing a touch-based gesture by tracking the duration of the user's touch and comparing the duration to a predetermined threshold. EX1035, Abstract, 4:17-20, 16:26-41 ("comparing a duration of a contact with a range of durations"), Figure 14. Applying Griffin's basic implementation details for touch-based gesture recognition in the context of a similar reference like Blumenberg to obtain a substantially similar result would have been obvious.

94. Third, Griffin's exemplary process would have been seen as particularly advantageous from the POSITA's perspective because it allows for automatic and manual modifications to the touch thresholds, increasing usability by

making the device more adaptable and customizable to the user's preferences. *E.g.*, EX1006, [0014], [0040-0042], Figure 7.

95. The idea of making operational GUI parameters user-configurable was well known to those of skill in the art of computing devices by 2011. Configuration options of this type were often found in a "settings" or "control panel" menu. For example, long before 2011, operating systems for conventional desktop computers provided configuration options to change GUI parameters relating to various mouse properties—e.g., double-click speed, pointer speed, etc. Configurable settings associated with touch-gesture recognition for mobile device GUIs were also known. *E.g.*, EX1034, [0096] (discussing multipoint touch input devices in portable form factors, including "PDAs, cell phones, and the like"), [0117] (describing that "the user may use a control panel to change settings associated with the [touch] gesture map"), [0166] ("the user can change their settings"). By 2011, Griffin's teaching to incorporate user-configurable touch gesture settings would have been considered routine and generally applicable to similar devices like Blumenberg's.

2. Reasonable Expectation of Success

96. A POSITA would have reasonably expected a successful outcome from the above-discussed combination of teachings from Blumenberg, Bhumkar, and Griffin. This conclusion is supported by my prior discussion on the POSITA's background knowledge at Section VI.B and my prior discussion on motivation-to-

combine at Section VIII.D.1. As I have explained, the GUI features involved in the Blumenberg-Bhumkar-Griffin combination—e.g., contextual menus, tactile feedback, and duration-based touch gestures—were all very well known and widely adopted by 2011. A POSITA bringing these well-known features together in the manner I've proposed would have been reasonably certain that the result of the combination would arrive at the purported invention of '581 patent (as outlined below in Section VIII.E). The POSITA would have also understood that these integrated features are fully compatible and would work in combination in the same (or substantially the same way) that they work individually.

E. Claim Element Analysis

1. Claim 1

(i) *Element [1.pre] An electronic device, comprising:*

97. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [1.pre] and Claim 1 as a whole. For example, Blumenberg discloses "a portable ***electronic device***." EX1004 (Blumenberg), [0009], [0020], Figures 1-2, 5A-5I.

(ii) *Elements [1.a] a display; [1.b] a touch-sensitive interaction surface;*

98. The Blumenberg-Bhumkar-Griffin combination renders obvious Elements [1.a], [1.b] and Claim 1 as a whole. For example, Blumenberg describes

"a portable electronic device having a ***touch-sensitive display*** 112," which "is sometimes called a 'touch screen.'" EX1004 (Blumenberg), [0023]; *see also* [0007-0009], [0022] (describing the "***touch*** screen" as a type of "physical user interface device"), [0025] (identifying "***touch sensitivity*** technologies" for "detect[ing] contact and any movement of break thereof" with the surface of the touch screen), [0026] ("Multipoint ***Touch Surface*** Controller"), Figures 1-2, 5A-5I. Consistent with Blumenberg's description, and as a POSITA would have known, a "***touch*** screen" is designed to facilitate user input via ***touch interactions*** on the outer screen ***surface***. *E.g.*, EX1034, [0094], (explaining that a "gesture event may be defined as a stylized interaction with the sensing surface"), [0098] (identifying a "touch screen" as a type of touch surface/sensing device).

(iii) *Element [1.c] an actuator;*

99. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [1.c] and Claim 1 as a whole. For example, as I explained above at Section VIII.D.1.ii, this combination incorporates Griffin's teaching to give "tactile feedback provided by [one or more] ***actuators***" in response to determining that the user's contact on the touch screen has reached a given touch threshold. EX1006 (Griffin), [0034]; *see also* [0014], [0024], [0030], [0032], [0035], [0053], [0057], Figure 1; *see also* EX1004 (Blumenberg), [0026] (incorporating the disclosure of a

touch screen device with a "haptics mechanism…configured to vibrate" from U.S. patent application Ser. No. 11/367,749 (EX1041, pp. 42-43 ([0160-0163])).

(iv) ***Elements [1.d] one or more processors; [1.e] memory; and [1.f] one or more programs, wherein the one or more programs are stored in the memory and configured to be executed by the one or more processors, the one or more programs including instructions to:***

100. The Blumenberg-Bhumkar-Griffin combination renders obvious Elements [1.d], [1.e], [1.f] and Claim 1 as a whole. For example, Blumenberg describes "a portable electronic device having a touch-sensitive display 112" including "a memory controller 120 [and] one or more data ***processors***, image ***processors*** and/or central ***processing units*** 118." EX1004 (Blumenberg), [0023]; *see also* [0009], Figure 1. "The memory controller 120 may be coupled to ***memory*** 102." *Id*., [0029]; *see also* [0009]. The memory 102 "***store[s]***" various "sets of ***instructions***" in the form of "***programs***, procedures or modules" to perform the functionality described throughout Blumenberg. *Id*., [0029-0033]; *see also* [0009] ("[A] portable electronic device includes a touch screen display, ***one or more processors, memory; and a program***. ***The program is stored in the memory and configured to be executed by the one or more processors***."), Figure 1.

(v) ***Element [1.g] display, on the display and via a user interface of a network browser application, a first web page including a hyperlink that identifies a second web page;***

101. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [1.g] and Claim 1 as a whole. For example, Blumenberg illustrates and describes "[a] portable device 200 with a touch-sensitive ***display*** 208 (also known as a touch screen)" configured to "***display a [first] webpage*** or some other document 502" including "one or more ***links*** 504."[4] EX1004 (Blumenberg), [0045], Figure 5A; *see also* [0030] (defining "link" as shorthand for "hyperlink"). As is conventional, webpage content in Blumenberg is "rendered in a web ***browser application***." *Id*., [0036]; *see also* [0002-0005] (describing the disclosure as directed to "web browsing via a wireless ***network***"), [0020], [0024], [0030-0031] (explaining that the web browser application "render[s] pages written in [various]…language suitable for composing webpages or other online content"), Figure 1.

[4] I note that numerical terms like "first" and "second" in the '581 patent's claims serve the conventional purpose of distinguishing between otherwise identical nouns like "webpage," "contact," etc. That is, "first" and "second" are merely labels and do not connote substantive limitations or features. Here, and throughout this Declaration, these numerical terms are added to the quoted text from the prior art to clarify the mapping.

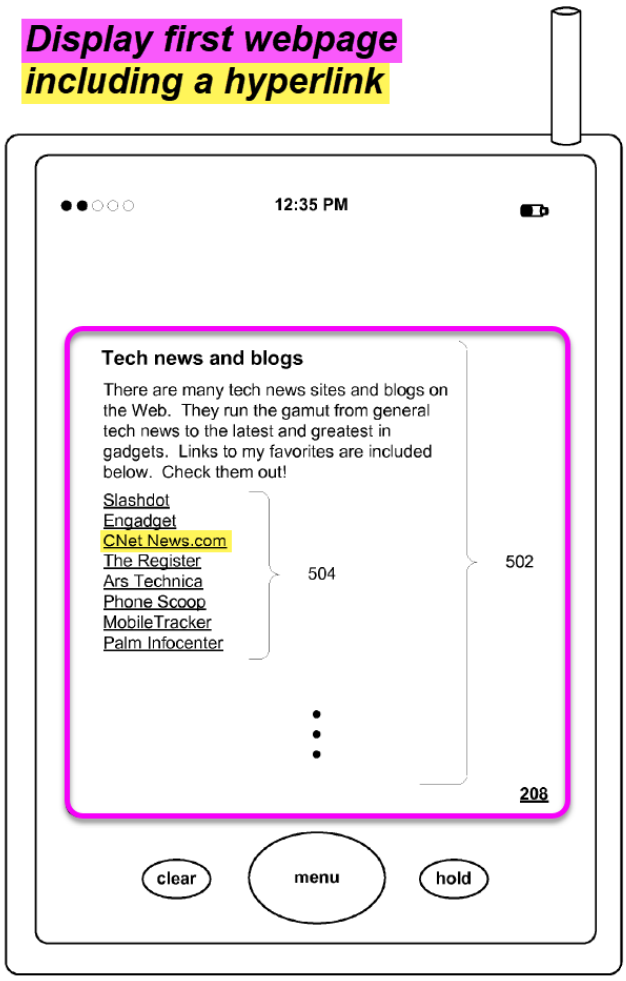


FIG. 5A

EX1004 (Blumenberg), Figure 5A (annotated)

102. According to Blumenberg, when the user's touch input associated with a link is determined to have met certain criteria, "[t]he determined ***link*** is activated," meaning "the device navigates to ***the [second] page*** to which the determined link points and the contents of ***the [second] linked page*** are displayed on the device." EX1004 (Blumenberg), [0044].

(vi) ***Elements [1.h] detect a first contact starting at a first contact point at a first contact time on the touch-sensitive interaction surface; [1.i] detect an end of the first contact at a second contact time;***

103. The Blumenberg-Bhumkar-Griffin combination renders obvious Elements [1.h], [1.i] and Claim 1 as a whole. For example, Blumenberg describes a process flow where a "***[first] contact*** with the touch screen is ***detected***" and a "***[first] point*** within the contact area [of the detected ***first contact***] is determined." EX1004, [0036-0038] (Blumenberg), Figure 3; *see also* [0007-0011], [0025], [0029], [0032], [0034], [0042-0043], [0046-0047], [0049], [0051], Figures 3-4; *supra*, Element [1.a] (mapping Blumenberg's "touch screen" teachings to the ***touch-sensitive interaction surface***). Griffin similarly describes that "touch contacts…may be detected" and a processor "may determine attributes of the touch, including a location of a touch." EX1006 (Griffin), [0023]; *see also* [0034], [0040], Figure 7; *supra*, Section VIII.D.1.iii (motivation-to-combine Griffin's teachings regarding touch-based gesture recognition).

104. Blumenberg further describes functionality to "***detect [a first] contact*** and any movement or break thereof." EX1004 (Blumenberg), [0025]; *see also* [0034] ("selection…occurs when the user breaks contact"), [0051] ("the activation is triggered by breaking the contact") ("the activation may be triggered after the breaking of contact before or after a first predetermined amount of time has elapsed").

105. It would have been apparent or obvious to a POSITA that a "break," as disclosed by Blumenberg, marks ***an end of the first contact***. To the POSITA, Blumenberg's description of a "break" in the contact means the user is no longer contacting the surface of the touch screen—e.g., a finger lift-off. Those skilled in the art typically consider the 'start' of a particular touch contact to be when the user initially makes contact with the touch screen. That particular touch contact persists while the user maintains contact with the touch screen. And that particular touch contact 'ends' when the user breaks contact with the touch screen. This conventional understanding is reinforced by the context of Blumenberg's disclosure as a whole. In other words, Blumenberg refers to breaking contact in the typical way that connotes the end of a given touch contact.

106. Accordingly, it would have been evident to a POSITA from Blumenberg and Griffin's disclosures that a ***first contact*** at a determined ***first contact point*** on the touch screen begins at a ***first contact time*** and ends at a ***second contact time***. The following additional reasons also support my conclusion. First, the POSITA would have appreciated that a touch contact/gesture on a touch screen, like any real-world event, must begin and end at some point in time. Second, the POSITA would have understood that the notion in Blumenberg and Griffin of detecting an event such as a touch contact typically includes identifying when—in time—the event begins and ends. Third, the surrounding context of Blumenberg and

Griffin signals to the POSITA that the device records the start time of the touch contact and the end time of the touch contact in order to determine whether and when a given touch duration threshold is met. *E.g.*, EX1004 (Blumenberg), [0051] ("[T]he activation may be triggered after the breaking of contact…"). For at least these same reasons, to the extent ***a first contact time*** and ***a second contact time*** is not evident from Blumenberg and/or Griffin (which they are), these trivial features would have been obvious to a POSITA exercising common sense and ordinary creativity, especially given the nature of the problems to be solved in prior art references like Blumenberg and Griffin that describe techniques where device functionality is at least in part dictated by touch duration.

(vii) *Element [1.j] determine a duration of the first contact as a difference between the first contact time and the second contact time;*

107. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [1.j] and Claim 1 as a whole. For example, consistent with the discussion at Elements [1.h]-[1.i], [1.m]-[1.o] and Section VIII.A, Blumenberg describes a technique where a given web browser functionality is triggered when the "***[first] contact*** is maintained for [a] predetermined amount of time." EX1004 (Blumenberg), [0049]; *see also* [0051]. From a POSITA's perspective, Blumenberg's disclosure of selectively performing specific functions when a touch contact is "maintained" for a certain amount of time teaches the claimed concept of

determining a duration of the first contact. As I explained above at Section VIII.D.1.iii, a POSITA reading Blumenberg would have faced the simple design problem of determining when the user's touch contact exceeds the "predetermined amount of time." The solution to that problem would have been evident to the POSITA—determine the duration of the touch and compare the duration to a threshold that reflects the "predetermined amount of time." This approach was conventional in the prior art and would have been part of the POSITA's background knowledge. *See supra*, Section VI.B.4; EX1035, Abstract, 4:17-20, 8:21-30, 16:26-41 ("comparing a duration of a contact with a range of durations"), Figure 14.

108. As I explained above at Section VIII.C and Section VIII.D.1.iii, Griffin provides supplemental and confirmatory teachings on ***determining a duration of the first contact***. Griffin, for example, describes a process flow where specific "values of one or more various parameters are identified." EX1006 (Griffin), [0040], Figure 7 (elements 702, 704). These "parameters may include…touch parameters" like "touch ***duration***." *Id*.; *see also* [0032], [0037], [0042-0043], [0050]. Later in Griffin's process flow, the touch duration value is compared to one or more touch duration thresholds to determine whether a particular function should be performed. *See id*., [0053], [0032], Figure 7 (element 710).

109. Additionally, consistent with the discussion above at Elements [1.h]-[1.i], it would have been apparent and/or obvious to a POSITA exercising common

sense and ordinary creativity, that the first contact touch ***duration*** of Blumenberg and Griffin accounts for the ***difference between the first contact time and the second contact time***. Indeed, the notion of a "touch duration" in Griffin and a touch "maintained for [a] predetermined amount of time" in Blumenberg contemplates the difference between a start time of the touch contact and an end time of the contact.

110. To the extent Patent Owner argues or the Board finds that the Challenged Claims require an explicit calculation of the first contact duration by arithmetically taking the ***difference between the first contact time and the second contact time***, Element [1.j] and Claim 1 as a whole are no less obvious. Subtracting the start time from a later time, such as the current time during an event or the end time of the event, was a common approach to determining the event's duration. *E.g.*, EX1035, 8:21-30 ("In one embodiment, the gesture recognition unit 102 calculates the duration of a contact based on the difference between the start and end times of the contact. With reference to FIG. 3, for example, a start time 303 of a contact 301 at time t=1s may correspond to a time at which a finger is touched to the sensor array 121, while an end time 305 of the contact at t=5s corresponds to the time at which the finger is lifted from the sensor array 121. In this example, the duration 304 of the contact caused by the finger touch is 4s, from the difference of 5s and 1s.").This trivial feature would have been obvious to a POSITA exercising common sense and ordinary creativity, especially given the nature of the problems to be solved in prior

art references like Blumenberg and Griffin that describe techniques where device functionality is at least in part dictated by touch duration.

(viii) *Element [1.k] determine whether there is a contact movement of the first contact between the first contact point and a second contact point;*

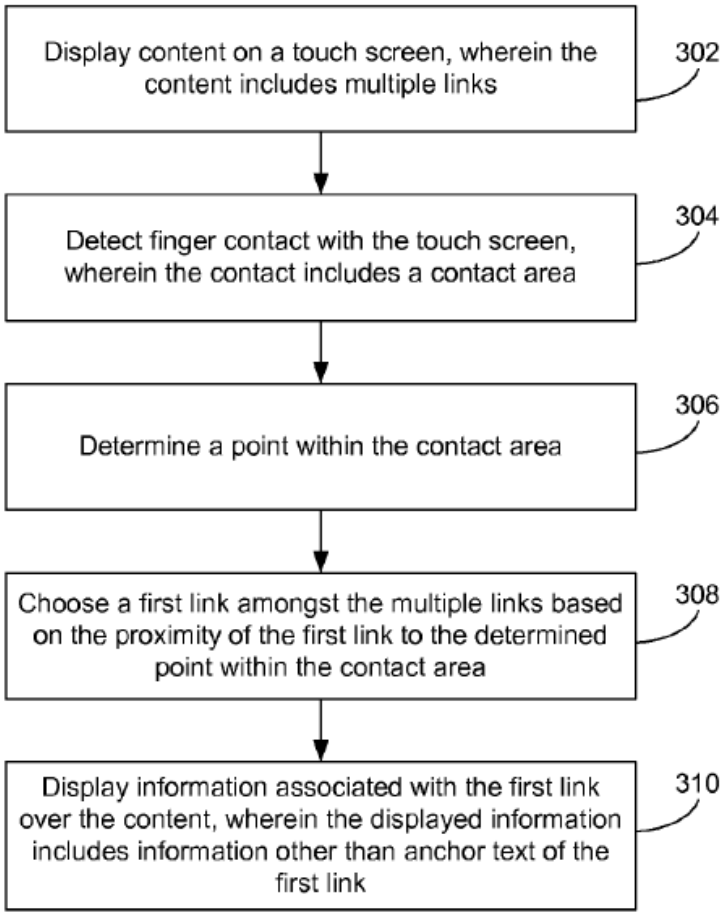
111. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [1.k] and Claim 1 as a whole. For example, Blumenberg describes functionality to "detect ***[a first] contact*** and any ***movement*** or break thereof." EX1004 (Blumenberg), [0025]; *see also* [0029] ("***determine*** one or more ***points of contact*** and/or their ***movement***"), [0046] (explaining that a "***point***" of the contact "may be re-determined" to account of "***movement*** of the [user's] finger"), [0049], [0052].

112. It would have been apparent and/or obvious to a POSITA exercising common sense and ordinary creativity that Blumenberg's discussion of detecting a contact and tracking its movement fulfills the claimed feature of ***determining whether there is a contact movement between the first contact point and a second contact point***. Simply put, "movement" in the context of contact with a touch screen connotes at least two different points—a first contact point on the touch screen where the touch begins and at least a second contact point along the path of movement. Thus, from a POSITA's perspective, Blumenberg teaching of "determin[ing] one or

more points of contact and/or their movement" means ***determining movement between first and second contact points***.

(ix) ***Element [1.l] determine whether the first contact point of the first contact corresponds with a location of the hyperlink of the first web page;***

113. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [1.l] and Claim 1 as a whole. For example, as discussed at Element [1.h], Blumenberg describes a process flow where a "***[first] contact*** with the touch screen is detected" and a "***[first] point*** within the contact area [of the detected ***first contact***] is determined." EX1004 (Blumenberg), [0036-0038], Figure 3 (steps 304, 306). According to Blumenberg, "content is displayed on [the] touch screen" that includes the "***[first] webpage***" featuring "a plurality of links." *Id*. [0036], Figure 3 (step 302). Later in the process flow, "[a] ***link*** from the plurality of links is chosen…based on at least the proximity to the ***[first] point*** in the ***contact*** area"). *Id*. [0037-0039], Figure 3 (step 308); *see also* [0007-0011], [0032] ("closest link module"), [0041-0048], [0052], Figures 1-5I; *supra*, Element [1.g]. In one example, "[t]he link that is chosen is the one that is the closest to the determined point." *Id*., [0039].



EX1004 (Blumenberg), Figure 3

114. It would have been apparent and/or obvious to a POSITA exercising common sense and ordinary creativity that Blumenberg's discussion of selecting a link based on its proximity to the first contact point fulfills the claimed feature of determining whether the first contact point ***corresponds with a location of the hyperlink***. For example, Blumenberg's step of choosing a link based on its proximity to the contact point shows that the link and the point of contact ***correspond*** to one another in terms of their relative distance with respect to the touch screen.

(x) ***Element [1.m.i] when: the first web page is displayed via the user interface of the network browser application,***

115. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [1.m.i] and Claim 1 as a whole for at least the same reasons discussed above at Element [1.g]. In Blumenberg, ***the first web page is displayed*** during the various scenarios I discussed above in Section VIII.A and that I rely upon in the mapping analysis below.

(xi) ***Element [1.m.ii] when:…the duration of the first contact is determined to be less than a first user-configurable predefined duration, and the end of the first contact is detected:***

116. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [1.m.ii] and Claim 1 as a whole.

117. As discussed, Blumenberg alone or taken with Griffin provides determining ***the first contact duration***, including the ***duration*** between the beginning and ***the end of the first contact***. *Supra*, Elements [1.h]-[1.j].

118. Moreover, Blumenberg explains that "inadvertent contact with an icon may not select a corresponding symbol." EX1004 (Blumenberg), [0034]. Applying this disclosure to the above-discussed functionality of selecting a hyperlink on a webpage (*supra*, Elements [1.g]-[1.l]), Blumenberg teaches and/or suggests that inadvertent contact at a point that corresponds with the location of the hyperlink will not select or activate the hyperlink. A POSITA would have reached this

understanding of Blumenberg's teachings by applying basic common sense and reasoning. Blumenberg's statement about disregarding inadvertent contact with icons as a general matter would certainly apply to Blumenberg's preferred embodiments about hyperlinks. It would not make sense for Blumenberg to make a general statement about selecting GUI elements that is inapplicable to the main GUI element of concern—hyperlinks. Moreover, the purpose of disregarding inadvertent contact logically applies generally to all different types of selectable GUI elements, including hyperlinks. Whether a hyperlink, button, or slider, the POSITA would have appreciated the general aim of Blumenberg's design is to prevent any/all of those types of GUI elements from being mistakenly selected by inadvertent contact.

119. Accordingly, Blumenberg's disclosure as a whole makes clear that information associated with the link will not be displayed until and unless "the contact is maintained for at least a predetermined time (e.g., 0.2 seconds, or another value between 0.1 and 0.25 seconds)." EX1004 (Blumenberg), [0049]. In effect, Blumenberg's technique disregards inadvertent contact, such as contact maintained for—i.e., initiated and ended within—an exceedingly short duration. As I explained above at Section VIII.A, this ***first*** and shortest ***predefined duration*** in Blumenberg is referenced throughout this Declaration as the selection threshold.

120. Consistent with and confirming Blumenberg's disclosure, Griffin similarly discloses the use of "[b]aseline thresholds…to reduce inadvertent input."

EX1006 (Griffin), [0033]; *see also* [0061]; *supra*, Section VIII.D.1.iii (motivation-to-combine). Like Blumenberg, Griffin explains that "[a] touch may be considered inadvertent…based on…duration of touch." *Id*., [0043]. And touches deemed "inadvertent" may be "disregarded." *Id*., [0033]. As such, in Griffin's process flow, "[w]hen the one or more values related to the touch [e.g., the touch duration] do not meet any touch threshold, the process continues" without performing any functions. *Id*., [0053], Figure 7.

121. In sum, Blumenberg alone or taken with Griffin provides the concept of ***determining when the duration of the first contact is less than a first predefined duration***. In this scenario, the contact is deemed inadvertent and disregarded without triggering an additional function.

122. Finally, the combination includes Griffin's teaching of the menial implementation detail that the ***predefined*** touch ***duration*** thresholds are ***user-configurable***. *Supra*, Section VIII.D.1.iii (discussing motivation, e.g., increasing usability by allowing customization). For example, Griffin explains that touch thresholds can be modified by "changing the value of one or more characteristics associated with the touch threshold…such as the duration." EX1006 (Griffin), [0042]; *see also* [0014], [0040-0041], Figure 7. Griffin further describes that touch thresholds can be modified automatically or "based on user parameters such as user history, user profile, and manual threshold settings." *Id*. [0050]; *see also generally*

[0046-0052]. This teaching from Griffin applies equally to the following discussions at Element [1.n.ii] regarding the ***second user-configurable predefined duration***.

(xii) ***Element [1.m.iii] avoid display, on the first web page, a result of any operation based on the first contact;***

123. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [1.m.iii] and Claim 1 as a whole for at least the same reasons discussed above at Element [1.m.ii]. As discussed, in the combination, inadvertent contact—e.g., contact maintained less than a ***first*** minimum ***predefined duration***—triggers no additional functions. [In other words, the combination ***avoids display, on the first web page, a result of any operation based on the first contact***.

(xiii) ***Element [1.n.i] when: the first web page is displayed via the user interface of the network browser application,***

124. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [1.n.ii] and Claim 1 as a whole for at least the same reasons discussed above at Element [1.g]. In Blumenberg, ***the first web page is displayed*** during the various scenarios I discussed above in Section VIII.A and that I rely upon in the mapping analysis below.

(xiv) ***Element [1.n.ii] when…the duration of the first contact is determined to be greater than the first user-configurable predefined duration and less than a second user-configurable predefined duration,…[1.n.v] and the end of the first contact is detected***

125. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [1.m.ii] and Claim 1 as a whole.

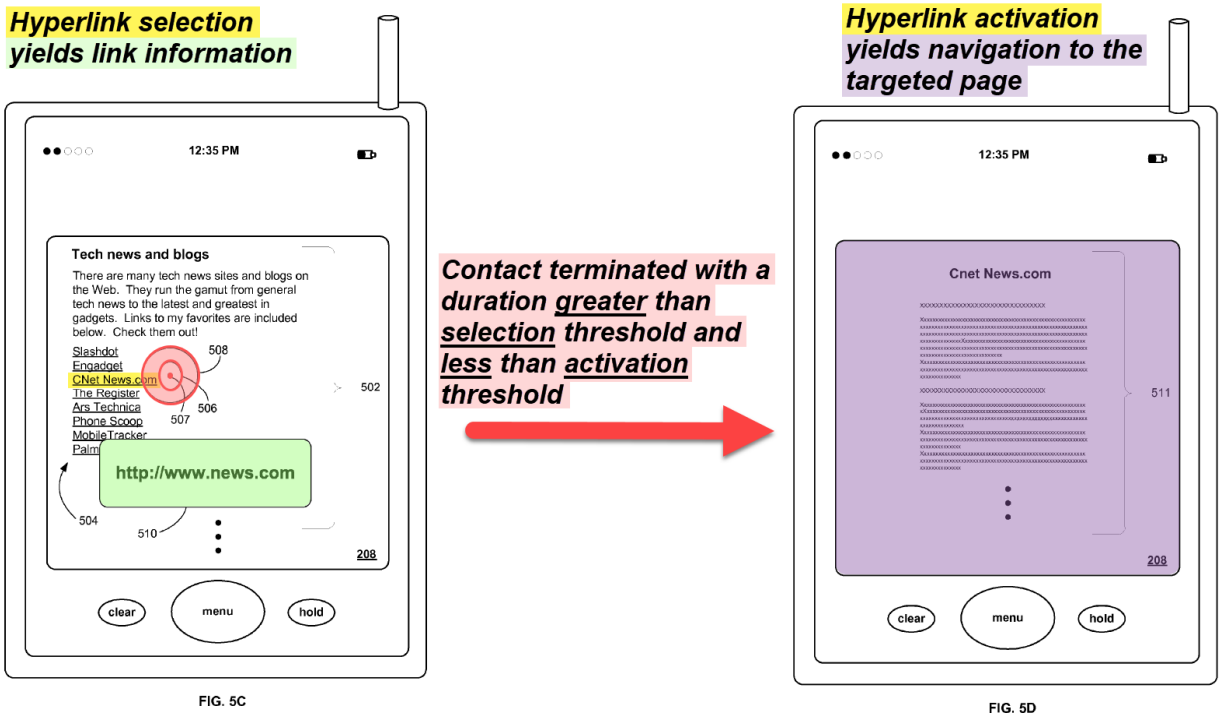
126. As discussed, Blumenberg alone or taken with Griffin provides determining ***the first contact duration***, including the ***duration*** between the beginning and ***the end of the first contact***. *Supra*, Elements [1.h]-[1.j].

127. As was also discussed, Blumenberg alone or taken with Griffin teaches that when the contact at a point associated with a given hyperlink has a duration less than the selection threshold, the link is not selected or activated. *Supra*, Element [1.m.ii], Section VIII.A; EX1004 (Blumenberg), [0034], [0049]. When, by contrast, the contact ***duration*** is ***greater than*** the selection threshold (***first user-configurable predefined duration***), the link is selected and information associated with the link is displayed. *Supra*, Section VIII.A; EX1004 (Blumenberg), [0049] ("[T]he information is displayed after the contact is maintained for at least a predetermined time (e.g., 0.2 seconds, or another value between 0.1 and 0.25 seconds)…"). Beyond the selection threshold, Blumenberg further provides what I refer to as an activation threshold. *Supra*, Section VIII.A. When the user ***ends*** the contact attributed to a selected link at a ***duration*** that is ***less than*** the activation threshold (***second***

predefined duration), the selected link is activated and the target webpage is loaded by the web browser. EX1004 (Blumenberg), [0051] ("[T]he selected link is activated by a contact break if the link information was displayed ***less*** than [a] predetermined amount of time[.]"[5]) ("the activation of the link may be triggered by a gesture, such as a quick tap").

128. To summarize, in Blumenberg, a link is activated when the user ends the contact with the link at a ***duration*** that is ***greater than*** the selection threshold (***first user-configurable predefined duration***) and ***less than*** the activation threshold (***second user-configurable predefined duration***).

[5] The quoted passage in Blumenberg refers to this particular predetermined time using the descriptor "first" to distinguish it from a distinct "second" predetermined time discussed in the same passage. I have removed the word "first" here to avoid confusion with respect to the first/second language in the '581 patent's claims.



EX1004 (Blumenberg), Figures 5C-5D (annotated)

129. Finally, as noted at Element [1.m.ii], Griffin's supplemental teaching that ***duration*** thresholds are ***user-configurable*** applies here at Element [1.n.ii] to the activation threshold (***second predefined duration***).

(xv) ***Element [1.n.iii] when…the first contact point of the first contact is determined to correspond with the location of the hyperlink of the first web page,***

130. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [1.n.iii] and Claim 1 as a whole for at least the same reasons discussed above at Elements [1.l] and [1.n.ii]. In Blumenberg, ***the first contact point is determined to correspond with the location of the hyperlink*** during the various

scenarios I discussed above in Section VIII.A and that I rely upon in the mapping analysis below.

(xvi) ***Element [1.n.iv] when…it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point,***

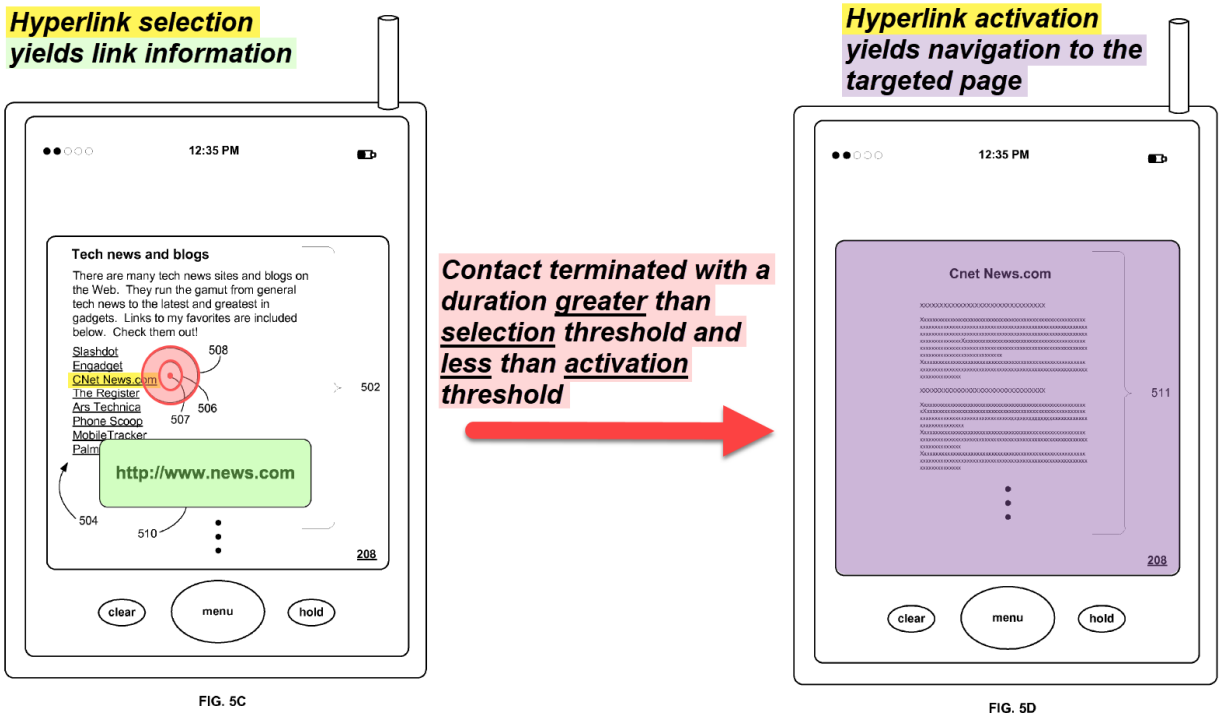
131. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [1.n.iv] and Claim 1 as a whole. As discussed, Blumenberg describes functionality to ***determine whether there is a contact movement of the first contact***. *Supra*, Element [1.k]. According to Blumenberg, when the user moves their finger, the contact area and the contact point change accordingly. EX1004 (Blumenberg), [0025], [0029], [0046] (explaining that a "***point***" of the contact "may be re-determined" to account of "***movement*** of the [user's] finger"), [0049], [0052]. When the contact point changes, so too may the selected/activated link, which, in turn, would change the displayed link information and the target webpage. *Id*., [0052].

132. On the other hand, a POSITA would have understood that Blumenberg also contemplates the alternative scenario of the user ***not*** moving their finger, with the point of contact and selected/activated hyperlink remaining unchanged. EX1004 (Blumenberg), [0049] ("if the contact area 506 is ***not*** moved"). In other words, when there is no movement in the user's contact, Blumenberg's device will be in a condition where ***it is not determined that there is the contact movement***. This fact is axiomatic from the perspective of a POSITA applying common sense and ordinary

creativity. Indeed, it makes sense that the device would only determine that there is contact movement when the user actually makes a movement. But, in many use cases, the user will not initiate any movement at all—e.g., when the selected hyperlink is the hyperlink that the user targeted and intended to select/activate.

(xvii) ***Element [1.n.vi] replace the display of the first web page with the second web page via the user interface of the network browser application; and***

133. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [1.n.vi] and Claim 1 as a whole. As I explained above at Section VIII.A, in Blumenberg, a link is activated when the user ends the contact with the link at a ***duration*** that is ***greater than*** the selection threshold (***first user-configurable predefined duration***) and ***less than*** the activation threshold (***second user-configurable predefined duration***). When a link is "activated" in this way, "the device navigates to the page to which the [activated] link points and the contents of the linked page are displayed on the device." EX1004 (Blumenberg), [0044], Figure 4; *see also* [0030-0031] (explaining that webpage content is rendered by the device's web ***browser application***), [0036] (similar), [0041] (similar). Accordingly, ***the display of the first webpage***, the page including the activated link, ***is replaced by the second webpage***, the page to which the activated link points. EX1004, [0045-0050], Figures 5A-5D.



EX1004 (Blumenberg), Figures 5C-5D (annotated)

(xviii) ***Element [1.o.i] when: the first web page is displayed via the user interface of the network browser application,***

134. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [1.o.i] and Claim 1 as a whole for at least the same reasons discussed above at Element [1.g]. In Blumenberg, ***the first web page is displayed*** during the various scenarios I discussed above in Section VIII.A and that I rely upon in the mapping analysis below.

(xix) ***Element [1.o.ii] when…the duration of the first contact is determined to be greater than the second user-configurable predefined duration,***

135. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [1.m.ii] and Claim 1 as a whole.

136. As discussed, Blumenberg alone or taken with Griffin provides determining ***the first contact duration***. *Supra,* Elements [1.h]-[1.j]. As was also discussed, Blumenberg alone or taken with Griffin teaches that when the user ends the contact attributed to a selected link at a duration less than the activation threshold, the selected link is activated and the target webpage is loaded by the web browser. *Supra*, Element [1.n.ii]; Section VIII.D.1.iii. On the other hand, when the user maintains the contact for a ***duration greater than*** the activation threshold (***second user-configurable predefined duration***), the web browser remains on the current page and continues previewing the target webpage. *E.g.*, EX1004 (Blumenberg), [0049], [0051].

137. For example, the link information would remain during the contact until the duration reaches what I refer to as an expiry threshold. EX1004 (Blumenberg), [0049] ("[T]he information is removed from display if the contact area 506 is not moved for longer than a predetermined amount of time…(e.g., three to five seconds)[.]"). The link information would also remain when the contact is broken before the expiry threshold, and the user would be required to execute a confirmatory tap to achieve activation. *Id*., [0051] ("[I]f the link information was displayed for more than that amount of time, then the user must break contact and tap the link information (which is continued to be displayed after the contact break) to activate the selected link.)").

138. Based on these scenarios, where the user holds the contact until the activation and expiry thresholds are surpassed, it would have been evident to a POSITA that Blumenberg contemplates tracking the ***first contact duration*** cyclically and continuously for as long as the contact is maintained.

139. Griffin's supplemental disclosure is even more express on this point. As I explained at Section VIII.C, Griffin describes a process flow depicted in Figure 7 (below) where specific "values of one or more various parameters are identified." EX1006, [0040], Figure 7 (elements 702, 704). These "parameters may include…touch parameters" like "touch ***duration***." *Id*.; *see also* [0032], [0037], [0042-0043], [0050]. Later in Griffin's process flow, the touch duration value is compared to one or more touch duration thresholds. *See id*., [0053], [0032], Figure 7 (element 710). After determining that a given threshold is not met or after performing the functions triggered by meeting a given threshold, Griffin's process flow continues to monitor the touch duration value. *Id*., Figure 7 (elements 710, 712→ 702, 704).

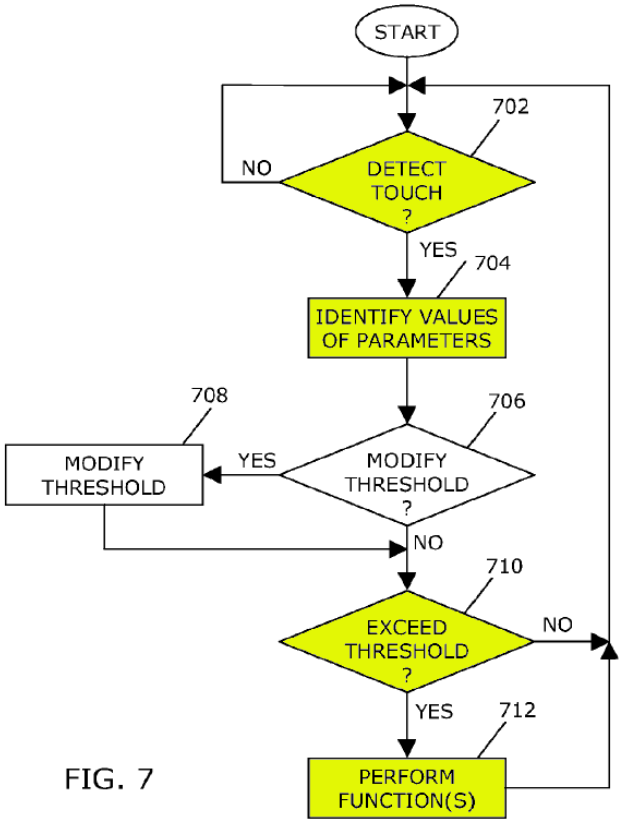


FIG. 7

EX1006 (Griffin), Figure 7 (highlighted)

140. Accordingly, it would have been apparent or obvious to a POSITA that, in the Blumenberg-Griffin combination, the value of the ***first contact touch duration*** is evaluated repeatedly over time until the contact breaks. This approach is [i] consistent with a POSITA's understanding of Blumenberg's teaching to identify when the user holds the contact beyond the activation and expiry thresholds, [ii] reflected in Griffin's cyclical process flow; and [iii] consistent with ordinary practice in the prior art and the common sense of a POSITA.

141. In particular, a POSITA would have understood that since the earliest graphical user interfaces, it has been common practice to use an "event loop" to monitor input events from the user, and that platforms for programming user interfaces (including those for mobile devices) provide constructs for implementing such event loops. For example, the "Xlib C Language X Interface," a reference guide first released in 1985 for the graphical window system called "X Window System," states: "Most applications are simply event loops: they wait for an event, decide what to do with it, execute some amount of code that results in changes to the display, and then wait for the next event." EX1050, p. 12. Similarly, US 2013/0007665 to Chaudhri, et al. states: "An Application Framework may …provide a main event loop for a program that responds to various events defined by the Framework. The API allows the application to specify the events and the responses to the events." EX1051, [0060].[6] Furthermore, in the context of a user interface for a touch screen device, a POSITA would have understood that the loop monitoring for touch events continues during the continuation of a touch gesture. This basic concept is illustrated by US 2011/0252380 to Chaudhri, which explains that once a hit view (i.e., a target interface component) has been identified for a

[6] Note that while this published patent application was filed in June of 2012, it claims priority to an earlier filed provisional application in 2011. Additionally, the statement from this publication that I reference reflects my understanding of what a POSITA would have known before 2011 regarding event loops.

gesture, it will "typically receive all sub-events related to the same touch or input source." EX1052, [0149].

(xx) ***Element [1.o.iii] when…the first contact point of the first contact is determined to correspond with the location of the hyperlink of the first web page,***

142. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [1.o.iii] and Claim 1 as a whole for at least the same reasons discussed above at Elements [1.l], [1.n.ii], and [1.o.ii]. In Blumenberg, ***the first contact point is determined to correspond with the location of the hyperlink*** during the various scenarios I discussed above in Section VIII.A and that I rely upon in the mapping analysis below.

(xxi) ***Element [1.o.iv] when…it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point, and***

143. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [1.o.iv] and Claim 1 as a whole for at least the same reasons discussed above at Elements [1.n.iv] (no contact movement scenario) and [1.o.ii] (contact remains beyond the activation threshold).

(xxii) ***Element [1.o.v] when…the end of the first contact is not detected:***

144. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [1.o.v] and Claim 1 as a whole for at least the same reasons discussed above at Elements [1.h]-[1.j] (tracking contact duration) and [1.o.ii] (contact remains

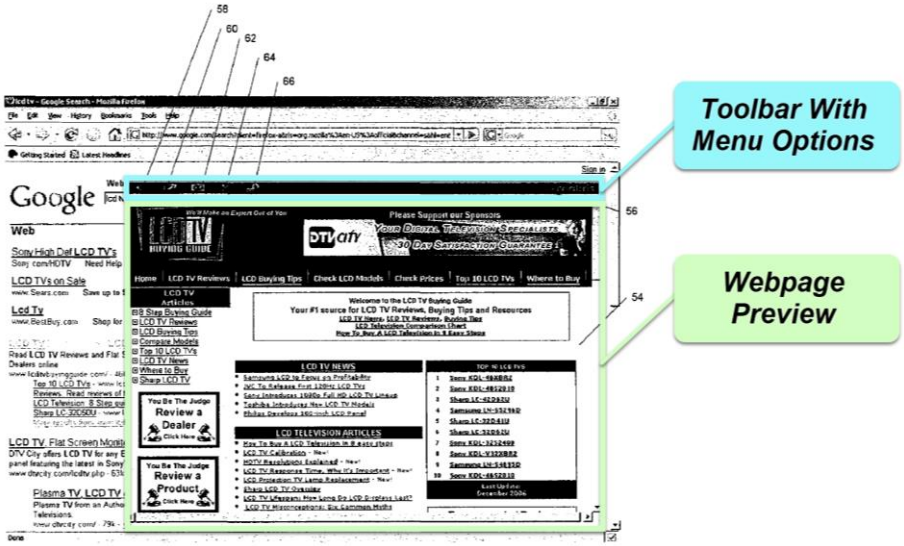
beyond the activation threshold). As I have explained, Blumenberg alone or taken with Griffin provides for cyclically and continuously tracking the magnitude of the contact duration throughout the ***first contact***, from the beginning to the end of the first contact. As the POSITA would have understood, between the beginning and the end of the first contact, Blumenberg's device is in a condition where ***the end of the first contact is not detected***.

(xxiii) ***Element [1.o.vi] output, utilizing the actuator, a first feedback that is perceptible by touch and***

145. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [1.o.vi] and Claim 1 as a whole. For example, this combination incorporates Griffin's teaching to give "tactile ***feedback*** provided by [one or more] ***actuators***" in response to determining that the user's contact on the touch screen has reached a given touch threshold. EX1006 (Griffin), [0034]; *see also* [0014], [0024], [0030], [0032], [0035], [0053], [0057], Figure 1; Section VIII.D.1.ii (explaining that a POSITA would have been motivated to implement tactile feedback to signal Blumenberg's activation threshold). As a POSITA would have known, "tactile" feedback connotes ***feedback that is perceptible by touch***. The word "tactile" means perceptible by touch, both colloquially and in the technical context of touch screen devices and GUIs.

(xxiv) ***Element [1.o.vii] display a menu including at least one option for, in response to detection of a selection thereof, performing an operation on a web address associated with the hyperlink of the first web page, and***

146. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [1.o.vii] and Claim 1 as a whole. For example, as discussed, this combination incorporates Bhumkar's teaching to ***display*** a ***menu*** of ***options*** associated with a webpage preview, a disclosed embodiment of Blumenberg's "link information." *Supra*, Section VIII.B (motivation-to-combine); EX1005 (Bhumkar), [0021], [0042-0043] (describing ***options displayed*** on a "toolbar" ***menu*** for extracting and sharing "the content of the preview window"), [0071-0075], Figures 5 & 7; EX1004 (Blumenberg), [0048] (explaining that "[i]nformation associated with the link" may include "a snippet of content from the page to which the link points").

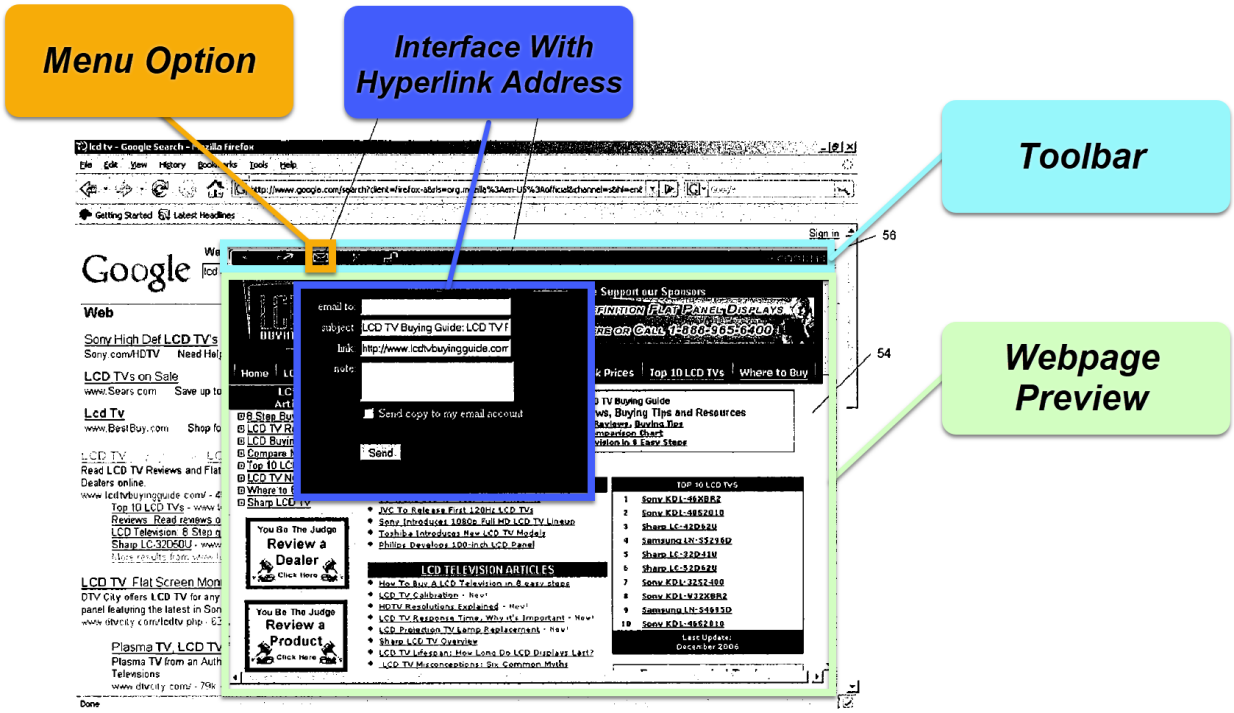


EX1005 (Bhumkar), Figure 5 (annotated)

147. My analysis and conclusions regarding Element [1.o.vii] would not change even if Claim 1 were interpreted to require a causal or exclusive conditional relationship between Elements [1.o.i]-[1.o.v] and Elements [1.o.vi]-[1.o.viii]. As I explained above at Section VIII.D.1.i, a POSITA would have been motivated to incorporate Bhumkar's teachings with Blumenberg's by introducing Bhumkar's ***menu options*** after (and as a result of) the duration of the user's touch contact surpasses the activation threshold (***second user-configurable predefined duration***, per Element [1.o.ii]).

148. Moving on, a POSITA would have understood that Bhumkar's ***menu*** includes ***at least one option for, in response to detection of a selection thereof, performing an operation on a web address associated with the hyperlink of the first web page***. For example, Bhumkar discloses that "***selecting*** share icon 62 [(***menu option***)] may open an interface 68 through which a user can share (e.g., via email or other means) the webpage currently displayed in preview window 54 with others." EX1005, [0074]. As shown below in Bhumkar's Figure 7, the interface 68 includes a "link" field containing the ***web address associated with the hyperlink on the (first) webpage*** to which the preview window 54 relates. Accordingly, it would have been apparent or obvious to the POSITA that launching an interface containing the web address corresponds to and satisfies the claimed feature of ***performing an operation on the web address***. Here, the ***operation performed*** involves launching

the interface, and this operation is performed ***on the web address*** at least in the sense that it involves populating a field of the interface with the web address.



EX1005 (Bhumkar), Figure 7 (annotated)

149. As another example, Bhumkar discloses that "***selecting*** full screen icon 60 [***menu option***] will open a new browser window or tab and direct the browser to the [w]eb address associated with the page currently displayed in preview window 54." EX1005, [0073]. It would have been apparent or obvious to the POSITA that navigating to the webpage at the web address corresponds to and satisfies the claimed feature of ***performing an operation on the web address***. Here, the ***operation performed*** involves opening the new browser window/tab, and this

operation is performed ***on the web address*** at least in the sense that it involves using the web address to navigate to the corresponding page.

(xxv) ***Element [1.o.viii] further display at least a portion of the second web page, such that at least the at least portion of the second web page is displayed in at least one first virtual display layer which appears above at least one second virtual display layer that includes at least a portion of the user interface of the network browser application that remains at least partially visible.***

150. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [1.o.viii] and Claim 1 as a whole.

151. As discussed at Element [1.o.ii], in Blumenberg, when the user maintains the contact for a duration greater than the activation threshold, the web browser remains on the current page and continues displaying the link information. *E.g*., EX1004 (Blumenberg), [0049], [0051]. Blumenberg further explains that "the ***displayed*** [link] information also includes a snippet of the content in [(***at least a portion of***)] the [***second***] webpage or document to which the link links[.]" *Id*., [0040], [0048], Figures 5C, 5E-5I.

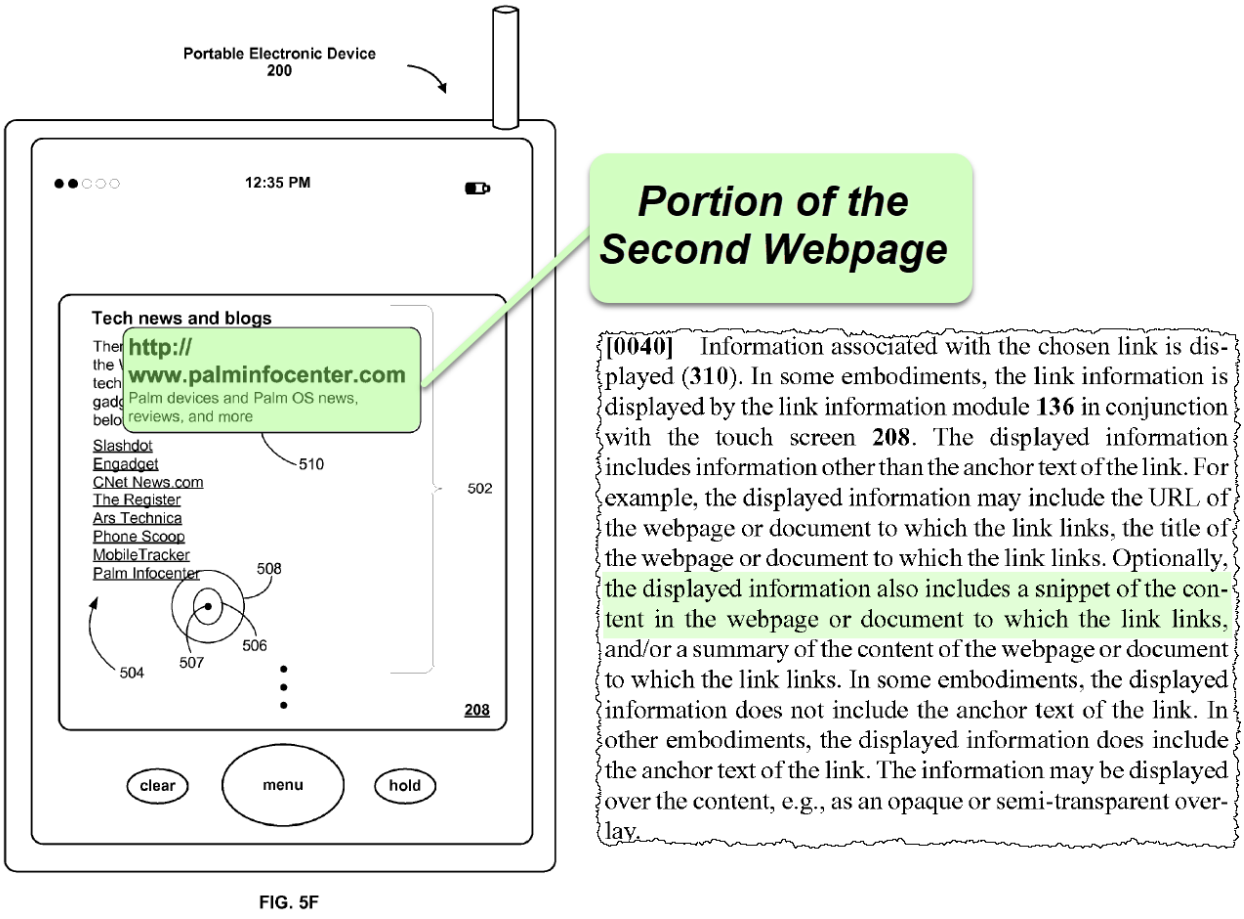


FIG. 5F

EX1004 (Blumenberg), Figure 5F (annotated)

152. Blumenberg's teaching is buttressed by Bhumkar's disclosure of "a 'quick view' or 'preview' of a target web site." EX1005 (Bhumkar), [0038]; *see also id*., Abstract, [0014] ("display an image of content from the second Web page in a window superimposed over or adjacent to the first Web page as displayed in the browser"), [0017], [0021], [0039-0041], [0047], [0055] ("[T]he basic procedure 30 involved in creating [a] preview is one of capturing content of a target web page…"), [0071], Figures 2, 4, 5, 7. In other words, a POSITA would have understood

Blumenberg's "snippet of content" to be consistent with Bhumkar's webpage "preview." Accordingly, Bhumkar provides an alternative basis for the disclosure of ***displaying at least a portion of the second web page***. Given the similarities between Blumenberg and Bhumkar in this regard, it would have been a matter of simple substitution to employ Bhumkar's webpage "preview" in place of Blumenberg's "snippet of content."

153. Blumenberg, alone or in combination with Bhumkar, further teaches and/or suggests that ***the portion of the second web page is displayed in at least one first virtual display layer which appears above at least one second virtual display layer***. For example, according to Blumenberg, the "link information" (***portion of the second web page***) is "***displayed***…as an opaque or semi-transparent overlay." EX1004, [0040]. As a POSITA would have known, the notion of an "overlay" in the context of a graphical user interface connotes one virtual layer positioned over another—i.e., ***a first virtual layer appearing above a second virtual layer***. *See also* EX1005 (Bhumkar), [0054] ("The image of the target web site…is now inserted as a layer onto the displayed search result page."). Moreover, Blumenberg's disclosure of an "overlay" is consistent with the '581 patent's illustrative description that "a virtual display layer refers to a collection of display elements which have all been assigned the same apparent depth." EX1001 ('581 patent), 68:39-42. As a POSITA would have understood, Blumenberg's "overlay" involves a display element in the

form of the link information/snippet of content (***portion of the second web page***) that is assigned to a foreground layer depth (***first virtual layer***) ***above*** the background layer depth (***second virtual layer***) where the webpage including the selected hyperlink reside. This arrangement is evident from the fact that the link information/snippet of content partially occludes the webpage with the hyperlink in Blumenberg's figures (e.g., Figure 5F, annotated above). Object occlusion is one of the most common depth cues employed in computer GUIs.

154. Alternatively, the '581 patent's claimed ***virtual layer*** feature would have been exceedingly obvious to a POSITA using common sense and ordinary creativity while addressing the straightforward design problem of implementing Blumenberg's teaching to present the link information/snippet of content as an opaque or semi-transparent overlay and/or Bhumkar's teaching to present a webpage preview in an overlapping layer. Given that the overwhelming majority of displays for computing devices in 2011 were flat two-dimensional structures, the use of multiple ***virtual layers*** to create a three-dimensional depth effect in a 2D-GUI environment was common practice. As the POSITA would have known, ***virtual layers*** are commonly used in applications and operating systems to make overlapping windows appear stacked or overlaid. *E.g.*, EX1021, p.4 (explaining the difference between "tiled windows, which are laid out side by side" and "overlapping windows, which can be stacked on top of each other, or overlaid,

obscuring all or part of the lower ***layers***"). The following excerpt illustrates the common use of virtual layers in mobile devices around 2011:

> Mobile GPUs offer graphics acceleration in 2D and 3D modes. While 3D graphics are mostly used for gaming, 2D graphics is the default way of presenting information to the user in most applications. 2D graphics acceleration works with different 2D layers that are stacked on top of each other. In the web browser, for example, the background layer could contain the web page, while independent layers on top of the background contain other elements such as buttons. The web page on the background layer is usually much larger than the screen size; so, only a portion of it is shown at a time. When the user then scrolls through the page, the CPU simply instructs the GPU to show a different part of the already prepared background layer. This requires little processing power on the CPU and little communication with the GPU as the bitmap for the background layer is already present in the GPU's memory. The GPU can therefore create an appealing scrolling effect with little computational effort involved. The buttons on higher layers remain in their place on the screen even when the web page is scrolled.

EX1042, p.13.[7]

155. Accordingly, a POSITA reading Blumenberg and Bhumkar would have been motivated to implement their "link information" and webpage "preview" teachings by using ***virtual layers*** in the manner claimed by the '581 patent, which was conventional in the art by 2011.

[7] I note that this document bears a copyright date of 2013. I also note that the majority of cited references within this document are from the 2006 to 2012 timeframe. The quoted excerpt I rely on above is consistent with my knowledge and personal experience regarding the state of the art as of 2011.

156. Additionally, as shown below, Blumenberg also teaches that, while the "link information" (***portion of the second web page***) is displayed, ***at least a portion of the user interface of the network browser application remains at least partially visible***—namely, the portion of the browser displaying the current/first webpage on which the selected hyperlink appears. *Id*., [0054] (explaining that the "link information" is displayed on only "half of the touch screen…so that the user's finger [] does not obstruct the user's view"), Figures 5C, 5E-5I. The same is true in Bhumkar. EX1005 (Bhumkar), [0054], Figures 2, 4, 5, 7.

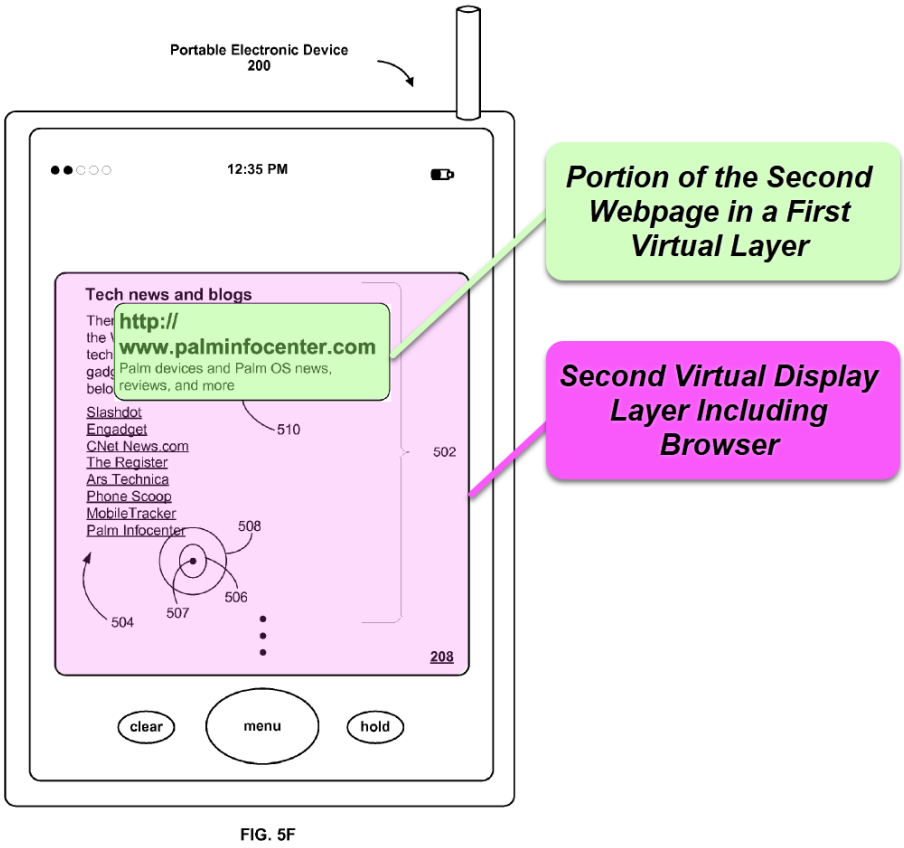


FIG. 5F

EX1004 (Blumenberg), Figure 5F (annotated)

157. That Blumenberg's link information (***portion of the second webpage***) is initially displayed before the activation threshold does not change my analysis or conclusions regarding Element [1.o.viii]. As I have explained, Blumenberg's link information remains on the display after and as a result of the user maintaining contact for a duration greater than the activation threshold, which plainly satisfies a basic when-then conditional relationship, and even a causal conditional relationship, between Elements [1.o.i]-[1.o.v] and Elements [1.o.vi]-[1.o.viii].[8]

158. Additionally, I would maintain my obviousness conclusions even under a narrow interpretation requiring an exclusive causal/conditional relationship between Elements [1.o.i]-[1.o.v] and Elements [1.o.vi]-[1.o.viii]. As I've explained, a POSITA would have been motivated to incorporate the supplemental teachings of Griffin and Bhumkar such that the output of ***feedback perceptible by touch*** (as taught by Griffin) and the display of a ***menu*** (as taught by Bhumkar) occur in response to the user's contact ***duration*** exceeding the activation threshold. *Supra* §VIII.D.1.i, ¶¶77-82 ("Fourth" motivation rationale regarding Bhumkar) and §VIII.D.1.ii, ¶88 ("Fourth" motivation rationale regarding Griffin). In other words, the POSITA would have been motivated to implement the Blumenberg-Bhumkar-

[8] Note that the Elements [1.o.i]-[1.o.viii] only recite a basic when-then relationship and do not use typical causal language (such as "in response to") or exclusive conditional language (such as "only when") between the stated touch condition at Elements [1.o.i]-[1.o.v] and the stated functionality at Elements [1.o.vi]-[1.o.viii].

Griffin combination such that the complete set of limitations at Elements [1.o.vi]-[1.o.viii] is caused by and only occurs in conjunction with the complete set of limitations at Elements [1.o.i]-[1.o.v]. In this case, while Blumenberg's link information (***portion of the second webpage***) is initially displayed before the activation threshold, it would be paired with tactile ***feedback*** and a ***menu*** only after and as a consequence of the activation threshold.

2. Claim 2

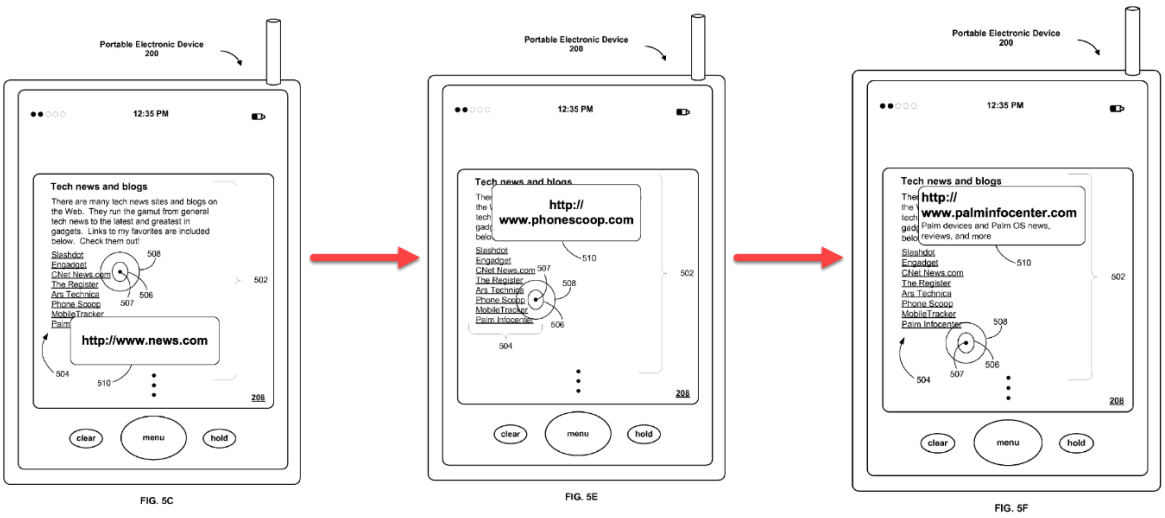
(i) ***Element [2.pre] The electronic device of claim 1, wherein the electronic device is configured such that: [2.a] the user interface of the network browser is configured for performing an operation in response to it being determined that there is the contact movement of the first contact between the first contact point and the second contact point; and***

159. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [2.pre], [2.a] and Claim 2 as a whole. As discussed, Blumenberg describes functionality to ***determine that there is a contact movement of the first contact between the first contact point and the second contact point***. *Supra*, Element [1.k]. Blumenberg further explains that, "[a]s the finger 212 moves, so do the contact area 506 and the [contact] point 507," meaning "the link that satisfies the one or more criteria…may change." EX1004 (Blumenberg), [0052], Figures 5C, 5E-5F; *see also* [0030-0031], [0036], [0041], [0046-0047], Figure 1.

160. To illustrate, with reference to Figures 5C, 5E, and 5F, Blumenberg describes a scenario featuring downward ***contact movement*** along the touch screen from a ***point*** on the first webpage associated with the "CNet News.com" link (Figure 5C) to a lower ***point*** on the first webpage associated with the "Phone Scoop" link (Figure 5E) to an even lower ***point*** on the first webpage associated with the "Palm Infocenter" link (Figure 5F). EX1004 (Blumenberg), [0052]. This downward ***contact movement*** results in corresponding updates to the determination of the selected link and, thus, to corresponding updates of the displayed link information content. *Id*. That is, the link information content is updated to match the selected link if/when the selected link is updated based on the contact movement.

> In FIG. 5E, the contact area 506 and the point 507 have moved downward. The link "Phone Scoop" becomes the link that satisfies the shortest distance criterion. Thus, the information associated with the link "CNet News.com" is no longer displayed and information 510 associated with the link "Phone Scoop," such as its URL, is displayed. As the contact area 506 moves even further down, as shown in FIG. 5F, other links, such as the link "Palm Infocenter," becomes the link that satisfies the closest point criterion with respect to the point 507. The information associated with the previous determined link is no longer displayed and information associated with the link "Palm Infocenter" is displayed.

EX1004 (Blumenberg), [0052].



EX1004 (Blumenberg), Figures 5C, 5E, 5F (annotated)

161. Accordingly, a POSITA would have gleaned from Blumenberg's teachings that ***the interface of the browser performs an operation in response to determining that there is a contact movement of the first contact between a first contact point and a second contact point*** on the displayed first webpage—namely, the ***operation*** of updating its determination of the selected link to account for the change in contact position and, if warranted, updating the displayed link information content to reflect a change in the selected link.

(ii) ***Element [2.b] the at least portion of the second web page is displayed in a view that is not configured for performing the operation in response to it being determined that there is the contact movement of the first contact between the first contact point and the second contact point.***

162. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [2.b] and Claim 2 as a whole.

163. As discussed at Element [1.o.viii], in Blumenberg, the "link information" (***portion of the second webpage***) is "a snippet of the content" made ***viewable*** in a first virtual layer. EX1004 (Blumenberg), [0040], [0048]. It would have been apparent or obvious to a POSITA that Blumenberg's "snippet of content" involves an image rather than a fully interactive version of the page. Bhumkar expressly teaches this design option as well with respect to his webpage "preview." EX1005 (Bhumkar), [0016-0017] (explaining that a webpage preview can be provided as an "image" or, alternatively, "an interactive browsing view" of the page), [0047] ("Rather than displaying the target web page…it is an image of the target web page that is displayed[.]"), [0056-0057] ("Displaying the image of the target web page to the user…"), [0071] ("[I]n this instance the preview window is a fully functioning web page, not merely an image of such a page."); *see also supra*, Element [1.o.viii] (explaining that it would have been a matter of simple substitution to employ Bhumkar's webpage "preview" in place of Blumenberg's "snippet of content").

164. As I explained above at Element [2.a], ***in response to determining that there is a contact movement of the first contact between a first contact point and a second contact point*** on the displayed first webpage, Blumenberg's browser ***performs the operation*** of updating its determination of the selected link to account for the change in contact position and, if warranted, updating the displayed link

information content to reflect a change in the selected link. EX1004 (Blumenberg), [0052]. Notably, this ***contact movement*** occurs on the first webpage—e.g., between different links on the first webpage—not on the link information (***portion of the second webpage displayed in a view***). Indeed, Blumenberg intentionally positions the link information "away" from the user's point of contact on the first webpage. *See id*., [0054] ("[T]he link information 510 may be displayed away from the contact area 506…"). Moreover, as I explained above at Element [1.o.viii], the link information previewing the second webpage is displayed in a different virtual layer than the first webpage. *Id*., [0040] ("The [link] information [of the second webpage] may be displayed over the content [of the first webpage], e.g., as an opaque or semi-transparent overlay."). Accordingly, a POSITA would have understood that Blumenberg's link information (***portion of the second webpage***) ***is not configured to perform the operation*** I discussed above at Element [2.a], which is ***responsive to contact movement*** on the first webpage.

165. Even if ***contact movement*** were inadvertently applied on Blumenberg's link information (***portion of the second webpage***), it would have been apparent or obvious to a POSITA that doing so would not trigger ***the operation*** I discussed above at Element [2.a]. While Blumenberg discloses that the link information may respond to a tap gesture, (EX1004, [0051]), Blumenberg makes no express or implied disclosure of the link information responding to movement gestures. Additionally,

Blumenberg echoes the common practice of configuring GUI elements to respond only to a specific set of gestures (e.g., to reduce the possibility for inadvertent contacts to trigger undesired outcomes). *Id*., [0034] ("[I]nadvertent contact with an icon may not select a corresponding symbol. For example, a swipe gesture that sweeps over an icon may not select a corresponding symbol if the gesture corresponding to selection is a tap gesture."). Therefore, a POSITA looking to implement Blumenberg's teachings would have been motivated to ***configure*** the link information (***portion of the second webpage***) such that it would ***not*** trigger ***the operation*** I discussed above at Element [2.a] ***in responsive to contact movement***.

3. Claim 3

(i) *Element [3] The electronic device of claim 1, wherein the electronic device is configured such that the first feedback that is perceptible by touch is output prior to the display of the menu.*

166. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [3] and Claim 3 as a whole.

167. For one, and as discussed at Section VIII.D.1.i and Element [1.o.vii], this combination incorporates Bhumkar's teaching to ***display*** a ***menu*** of options associated with a webpage preview in the context of Blumenberg's "link information." It was also explained above that a POSITA would have been motivated to introduce Bhumkar's ***menu*** options after Blumenberg's activation threshold. *Supra*, Section VIII.D.1.i (discussing a "Fourth" motivation rationale).

Additionally, and as discussed at Section VIII.D.1.ii and Element [1.o.vi], this combination further incorporates Griffin's teaching to ***output feedback that is perceptible by touch*** in response to determining that the user's contact on the touch screen has reached a given touch threshold. It was also explained above that a POSITA would have been motivated to implement Griffin's tactile ***feedback*** to signal Blumenberg's activation threshold. *Supra*, Section VIII.D.1.ii (discussing a "Fourth" motivation rationale). The evident consequence of integrating these two aspects of the Blumenberg-Bhumkar-Griffin combination is that the tactile feedback (***feedback that is perceptible by touch***) occurs ***prior to the display of the menu***.

168. The Blumenberg-Bhumkar-Griffin combination contemplates outputting tactile feedback as a signal that the device is changing to a different state because the touch contact duration has reached the activation threshold (Section VIII.D.1.ii). The Blumenberg-Bhumkar-Griffin combination further contemplates displaying the menu as part of the change between different states (VIII.D.1.i). Accordingly, one would naturally pursue an arrangement where the signal (***feedback***) of the change to occur at least slightly before (***prior to***) a result of the change (***menu***). In other words, given the desire to use Griffin's ***feedback*** as a signal to the user regarding the change in functionality triggered by Blumenberg's activation threshold—including the display of Bhumkar's ***menu*** options—it would have been obvious to a POSITA as a matter of common sense and ordinary creativity

(in view of the problem to be solved) that the ***feedback*** output should occur ***prior to*** displaying the ***menu***. Because the ***feedback*** confirms/signals a change in state of the device in view of the user's touch-and-hold gesture and the ***menu*** is part of the functionality invoked by the change in state, it would have been exceedingly obvious, and even axiomatic, to provide the former before the latter.

169. Moreover, and as an independent basis of obviousness, the POSITA would have understood that the tactile feedback and the menu display would occur around the same time because they are tied to the same event—the touch contact duration surpassing the activation threshold. *See supra*, Sections VIII.D.1.i and VIII.D.1.ii. In this context, there are only three options regarding the menial design choice of the relative temporal ordering. The feedback occurring after the menu display, the ***feedback*** occurring ***prior to*** the ***menu*** display, or the feedback occurring at the same time as the menu display. A POSITA would have immediately ascertained all three options and found them all equally predictable and obvious.

4. Claim 21

(i) ***Element [21.pre] The electronic device of claim 1, wherein the electronic device is configured such that: Element [21.a] the user interface of the network browser is configured for displaying: scrolling of the second web page via the user interface of the network browser application in response to detection of longitudinal contact movement, opening of one or more hyperlinks of the second web page in response to detection of a selection thereof, and opening of one or more manually entered web addresses in response to detection of a manual entry thereof; and***

170. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [21.pre], [21.a] and Claim 21 as a whole. For example, and as discussed at Elements [1.a], [1.b], and [1.g], Blumenberg describes a device with a touch screen ***display*** and a ***network browser application*** that provides a ***user interface*** for interacting with webpages and other online content. EX1004 (Blumenberg), [0025], [0030-0031], [0034-0036], Figure 1. As discussed at Element [1.n.vi], Blumenberg's ***browser application*** is designed to navigate from a first webpage to a ***second webpage*** upon selection and activation of a hyperlink. *Id*., [0045-0050], Figures 5A-5D. It would have been apparent or obvious to a POSITA that Blumenberg's browser is likewise configured to ***open one or more hyperlinks of the second web page in response to detection of a selection thereof***, just as it is configured to do so on the prior first webpage.

171. It would have been no less obvious to the POSITA that Blumenberg's browser is further operable to perform the claimed functionality of ***scrolling the second web page in response to detection of longitudinal contact movement*** and ***opening of one or more manually entered web addresses in response to detection of a manual entry thereof***. Scrolling a webpage in response to a longitudinal drag/slide gesture and opening a webpage according to a manually entered address were conventional functions for web browsers executed on commercially available touch screen devices by 2011. The '581 patent reinforces this point by referencing prior art patent publications assigned to Petitioner Apple that describe the claimed functionality for scrolling and manually entering web addresses—e.g., US 2008/0094368 [EX1043] and US 2008/0168405 [EX1044]. *See* EX1001 ('581 patent), 97:12-21, 97:59-67. A POSITA would have expected a web browser like Blumenberg's to have such rudimentary functions. For one, the browser would be virtually unusable for navigating to and through webpages without them. Moreover, Blumenberg describes the underlying user interface elements to perform these functions, including a virtual keyboard suitable (e.g., for entering web addresses) and program modules for detecting contact movement (e.g., to facilitate scrolling via longitudinal slide/drag gestures). EX1004 (Blumenberg), [0025], [0029], [0034].

(ii) ***Element [21.b] the at least portion of the second web page is displayed in a view that is different from the user interface of the network browser application in that the view is configured for not displaying: the scrolling of the second web page via the user interface of the network browser application in response to detection of the longitudinal contact movement, the opening of the one or more hyperlinks of the second web page in response to detection of the selection thereof, and the opening of the one or more manually entered hyperlinks in response to detection of the manual entry thereof.***

172. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [21.b] and Claim 21 as a whole. For example, as discussed at Element [2.b] and Element [1.o.viii], in Blumenberg, the "link information" (***portion of the second webpage***) is "a snippet of the content" made ***viewable*** in a first virtual layer. EX1004 (Blumenberg), [0040], [0048]. It would have been apparent or obvious to a POSITA that Blumenberg's "snippet of content" involves an image rather than a fully interactive version of the page. Bhumkar expressly teaches this design option as well with respect to his webpage "preview." EX1005 (Bhumkar), [0016-0017] (explaining that a webpage preview can be provided as an "image" or, alternatively, "an interactive browsing view" of the page), [0047] ("Rather than displaying the target web page…it is an image of the target web page that is displayed[.]"), [0056-0057] ("Displaying the image of the target web page to the user…"), [0071] ("[I]n this instance the preview window is a fully functioning web page, not merely an image of such a page."); *see also supra*, Element [1.o.viii] (explaining that it would

have been a matter of simple substitution to employ Bhumkar's webpage "preview" in place of Blumenberg's "snippet of content").

173. Accordingly, it would have been apparent or obvious to a POSITA that the webpage preview/link information (***portion of the second webpage***) is ***different*** from the ***user interface of the network browser application*** that I discussed above at Element [21.a], which facilitates conventional web browsing functions like ***scrolling*** and ***opening hyperlinks***. In short, the POSITA would have gleaned from Blumenberg and Bhumkar's teachings that the GUI element presenting the link information/preview of the second webpage is ***not configured*** to facilitate the same browser functions available when the browser navigates to the second webpage.

5. Claim 29

(i) ***Element [29] The electronic device of claim 1, wherein the electronic device is configured such that the at least portion of the second web page is displayed in the at least one first virtual display layer where, in response to detection of a selection of the at least portion of the second web page, the second web page is enlarged.***

174. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [29] and Claim 29 as a whole. As discussed, this combination provides an ***electronic device configured such that the at least portion of the second web page is displayed in the at least one first virtual display layer***. *Supra*, Element [1.o.viii]; The additional claimed functionality of ***enlarging the second webpage in response***

to detection of a selection of the at least a portion of the second webpage would likewise have been obvious to a POSITA.

175. As a first example, a POSITA would have been motivated to further integrate Bhumkar's teaching of functionality to provide an ***enlarged*** view of the ***second webpage***—e.g., "a full-screen mode." EX1005 (Bhumkar), [0073]. As Bhumkar teaches, this functionality improves the usability of the web browser by giving the user an option "to enhance the consumption of the information displayed in the current preview" because "the content…may be more easily consumed in the full screen." *Id*.

176. While Bhumkar discloses an example where this full-screen mode is triggered by selection of a menu icon, it would have been at least as effective and equally obvious to provide the full-screen mode ***in response to selection of the at least a portion of the second webpage*** (e.g., Bhumkar's preview window/Blumenberg's link information including a snippet of webpage content). Using a displayed object, such as the portion of the second webpage in this combination, as a selectable element was well known in the art of graphical user interfaces by 2011. From a POSITA's perspective, employing this well-known feature as a predictable alternative to Bhumkar's menu icon would have been no more than the application of known design option to achieve a predictable result. Additionally, the POSITA would have viewed this predictable alternative as

advantageous in the context of Blumenberg's mobile device, e.g., because the larger displayed ***portion of the second webpage*** would be easier for the user to ***select*** than a comparably small menu icon.

177. As a second example (independent of the first), a POSITA would have understood that navigating to the second webpage, as Blumenberg teaches, produces an ***enlarged*** view of ***the second webpage*** as compared to the lesser portion of the second webpage (e.g., a snippet of content) included in the "link information." EX1004 (Blumenberg), [0044], [0048]; *see also supra*, Element [1.g]. In Blumenberg's disclosed embodiment, after the activation threshold, the user must execute a confirmatory tap on the link information (***portion of the second webpage***) to activate the link and navigate to the second webpage. *Id*., [0051] ("[T]he user must break contact and tap the link information…to activate the selected link"). In this way, Blumenberg's disclosed navigation to the second webpage occurs ***in response to selection of the at least a portion of the second webpage*** (e.g., the "link information").

6. Claim 30

(i) ***Element [30] The electronic device of claim 1, wherein the electronic device is configured such that the at least portion of the second web page is displayed in the at least one first virtual display layer where, in response to detection of a selection of the at least portion of the second web page, the at least one first virtual display layer is enlarged.***

178. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [30] and Claim 30 as a whole including for all the reasons discussed above at Element [29], which recites exceedingly similar claim language. The only difference is that Element [29] requires ***enlarging the second webpage***, while Element [30] requires ***enlarging the first virtual display layer*** of the second webpage, a trivial and obvious distinction. As shown, for example, in Blumenberg's Figure 5F (annotated below), the link information including the snippet of content (***portion of the second webpage***) is the only element in ***the first virtual display layer***. In this context, it would have been apparent or obvious to a POSITA that the ***layer*** and the ***second webpage portion*** are coextensive and that both are ***enlarged*** upon the ***selection*** that triggers the full-screen mode (as taught by Bhumkar). *Supra*, Element [29] ("first example").

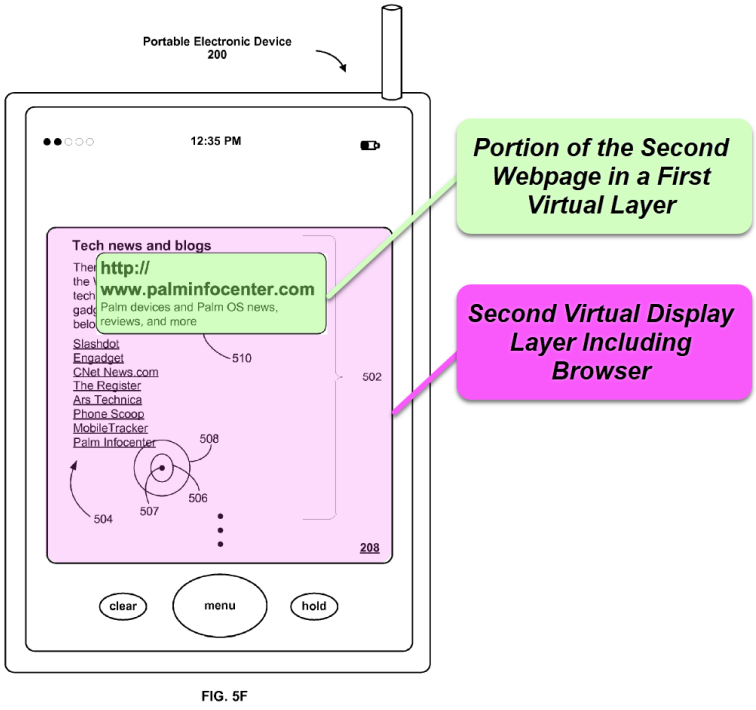


FIG. 5F

EX1004 (Blumenberg), Figure 5F (annotated)

7. Claim 31

(i) ***Element [31] The electronic device of claim 1, wherein the electronic device is configured such that the at least portion of the second web page is displayed in the at least one first virtual display layer where, in response to detection of a selection of the at least portion of the second web page, the at least portion of the second web page is displayed via the user interface of the network browser application.***

179. The Blumenberg-Bhumkar-Griffin combination renders obvious Element [31] and Claim 31 as a whole for at least same reasons discussed above at Element [29] (discussing a "second example" featuring Blumenberg's teaching of a ***browser*** that navigates to and ***displays*** the ***second webpage***).

8. Claim 41

(i) *Element [41.pre] The electronic device of claim 40, wherein the electronic device is configured such that at least one of:...Element [41.a] said touch-sensitive interaction surface and the display are components of a touch screen…*

180. The Blumenberg-Bhumkar-Griffin combination renders obvious Elements [41.pre], [41.a] and Claim 41 as a whole for at least same reasons discussed above at Elements [1.a], [1.b] (explaining that Blumenberg's ***touch-sensitive interaction surface and display are components of a touch screen***).

9. Claims 42-44, 54, 62-65

181. Claims 42-44, 54, 62-65 are substantially similar to claims 1-3, 21, 29-31, respectively. These two set of claims recite a similar series of steps, the former as an "electronic device" with "one or more programs including instructions" to perform the steps, the latter as a "method" comprised of those steps. Accordingly, the Blumenberg-Bhumkar-Griffin combination satisfies claims 42-44, 54, 62-65 for the same reasons discussed above regarding claims 1-3, 21, 29-31. The tables below identify the corresponding elements between these two claim sets using the identifiers from the listing of claims at the outset of this Declaration.

Claim 42	
[42.pre]	N/A
[42.a]	*See* Elements [1.pre], [1.a], [1.b], [1.c], [1.d], [1.e], [1.f]
[42.b]	*See* Element [1.g]

[42.c]	*See* Element [1.h]
[42.d]	*See* Element [1.i]
[42.e]	*See* Element [1.j]
[42.f]	*See* Element [1.k]
[42.g]	*See* Element [1.l]
[42.h]	*See* Elements [1.m.i], [1.m.ii], [1.m.iii]
[42.i]	*See* Elements [1.n.i], [1.n.ii], [1.n.iii], [1.n.iv], [1.n.v], [1.n.vi]
[42.j]	*See* Elements [1.o.i], [1.o.ii], [1.o.iii], [1.o.iv], [1.o.v], [1.o.vi], [1.o.vii], [1.o.viii]

Claim 43	
[43.pre]	N/A
[43.a]	*See* Element [2.a]
[43.b]	*See* Element [2.b]

Claim 44	
[44]	*See* Element [3]

Claim 54	
[54.pre]	N/A
[54.a]	*See* Element [21.a]
[54.b]	*See* Element [21.b]

Claim 62	
[62]	*See* Element [29]

Claim 63	
[63]	*See* Element [30]

Claim 64	
[64]	*See* Element [31]

Claim 65	
[65]	*See* Element [31]

IX. CONCLUSION

182. I declare that all statements made in this Declaration of my own knowledge are true and that all statements made on information and belief are believed to be true. I further declare that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both (under Section 1001 of Title 18 of the United States Code).

Executed this 27th day of June, 2024.



Andrew Cockburn

APPENDIX A

Andy Cockburn
B.Sc.(Hons) Ph.D.

Curriculum Vitae

Full legal name	Andrew Jeremy Gavin Cockburn
University Address	Department of Computer Science and Software Engineering University of Canterbury Christchurch 8140 New Zealand
Telephone	+64 3 369 2119
Fax	+64 3 364 2569
Email	andy.cockburn@canterbury.ac.nz
URL	http://www.csse.canterbury.ac.nz/~andy
Consultancy Address	Cockburn Human Interface Consulting Ltd. 20 Gilmour Terrace, Lyttelton 8082 New Zealand
Telephone	+64 21 296 2307
Email	ajc168@snap.net.nz
Date of birth	23rd July 1966
Date	June 24, 2024

Brief Summary

International research reputation

- Over one hundred and ninety publications in international journals and conferences.
- Elected to the CHI Academy (2015), which is an honorary group of individuals who have made substantial contributions to the field of human-computer interaction.
- Recipient of the 2009 Chris Wallace award for the outstanding research contribution to Computer Science (2005-2007) in Australasia.
- Deputy Chair of the national panel for assessing Computer Science and Mathematics research quality (MIST PBRF panel, 2016-2019).
- Technical programme committee chair for ACM CHI 2020; Papers co-chair for ACM CHI 2014 and 2015.
- Editorial Board Member for: ACM Transactions on Computer-Human Interaction (2012-2021); Human-Computer Interaction Journal (2015-); Foundations and Trends in HCI (2015-2023); International Journal of Human-Computer Studies (2004-2013); Interacting with Computers (2003-2013).
- Best paper awards at CHI 2018, 2013, 2012, 2011 (awarded to the top 1% of submissions) and 13 Honourable Mention awards (top 5%) at ACM CHI.
- H-index impact factor of 56 (Google Scholar).

Excellent educator and public speaker

- Long track record of outstanding student evaluations.
- Nominated for the New Zealand National Tertiary Teaching Award, 2010. Recipient of a University of Canterbury Teaching Award (2004) and many nominations for student-elected 'lecturer of the year' award.

Experienced expert witness and consultant

- Testifying expert witness on behalf of industry leaders in various jurisdictions, including the Federal Court of Australia, US Federal Court, US Patent Trial and Appeal Board, and the US International Trade Commission.

Education

Degree	PhD (June 1993)
Discipline	Computer Science — Computer Supported Cooperative Work
Location	University of Stirling, Scotland
Thesis Title	Groupware Design: Principles, Prototypes, and Systems

Degree	BSc(Hons) (July 1988)
Discipline	Computer Science
Location	University of York, England

Employment History

Position	Professor (promoted through lecturer, senior lecturer, associate professor)
Location	University of Canterbury Christchurch New Zealand
Period	June 1993 — current

Research Student Supervision

PhD candidates

Stewart Dowding	2021–	Interaction Pace and User Preferences
Pang Suwanaposee	2020–	Cognitive Biases and the Subjective Experience of Interaction
Sarmad Soomro	2017–2021	Interaction with In-Vehicle Touchscreens
Joshua Leung	2013–2017	Understanding the Noticeability and Distraction of Interactive Highlighting Techniques
Philip Quinn	2012–2016	Economic Behaviour & Psychological Biases in Human-Computer Interaction
Tham Piumsomboon	2011–2015	Adaptive and Multimodal Interfaces for Collaborative Augmented Reality
Joey Scarr	2011–2014	Improving Interaction with Spatial User Interfaces
Stephen Fitchett	2010–2013	Understanding and Improving Personal File Retrieval
Susanne Tak	2008–2011	Improving Interfaces for Window/Task Switching
Jason Alexander	2006–2009	Improving Interfaces for Document Navigation
Joerg Hauber	2004–2008	Understanding Remote Collaboration in Video Collaborative Virtual Environments
Julian Looser	2003–2007	AR Magic Lenses: Addressing the Challenge of Focus and Context in Augmented Reality
Volkert Buchmann (A. sup.)	2004–2008	Haptic Feedback in Augmented Reality
Carl Cook (A. sup.)	2002–2006	Collaborative Software Engineering
Tim Wright	2000–2004	Collaborative and Multiple-Notation Programming Environments for Children
Michael JasonSmith	2000–2006	User Interfaces for Temporal Awareness

M.Sc. candidates

Ben McDonald	2010–2011	Multiuser interaction with large public displays
Dominic Winkler	2009–2011	Interaction Techniques for Cross Context Activities
Taher Amer	2005–2006	Evaluating SwiftPoint
Trond Nilsen	2004–2006	Hybrid Interfaces in Augmented Reality
Joshua Savage	2003–2004	The Calibration and Evaluation of Speed-Dependent Automatic Zooming Interfaces
Ben Schmidt	2001–2002	A Study of Bimanual Interaction
Elizabeth Ng (A. sup.)	1997–1998	Pen-based music input
Aaron Tay	1994–5	End-User Tailorability in Workflow Design

Honours candidates and Honours-level interns

Joel Harrison	2012	Improving Command Selection
Joshua Leung	2012	Improving File Access
Jerome Delamarche	2010	Multiple Trajectory Pointing Methods
Joey Scarr	2010	Improving Expertise Development in User Interfaces
Stephen Fitchett	2009	Improved Mobile Scrolling Interfaces
Philip Quinn	2007	Improving Command Interfaces
Keith Humm	2007	Improving Interfaces for Task Switching
Jason Alexander	2005	Improving Document Navigation with Space-Filling Thumbnails
Philip Brock	2005	An Investigation of Target Acquisition with Visually Expanding Targets in Constant Motor-Space
David Mitchell	2003	Evaluating Focus+Context Screens
Andrew Wallace	2003	Calibrating Speed-Dependent Automatic Zooming
Andrew Barrett	2002	Implementing RSVP as an Image Browser
Julian Looser	2002	3D Games as Motivation in Fitts' Law Experiments
Joshua Savage	2002	Implementing and Evaluating Speed-Coupled Scrolling
Amal Siresena	2002	Mobile Text Entry
Michael Moyle	2001	An Evaluation of Simple Gesture Based Controls
Lee Butts	2001	Mobile Phone Text Entry
Eddie Edwards	2001	Towards Scalable Interfaces Using Spatial Cues
Gene Thomas	1997	Smart Desktop
Olof Eilert	1997	User Interfaces for Object Oriented Literate Programming
Philip Weir	1996	Distortion Oriented Workspace Awareness
Carey Evans	1996	Assisting World Wide Web Navigation
Justin Macfarlane	1995	Mawd: A Collaborative Analysis Tool
Carl Cerecke	1995	TRAIL: An Email Based CSCW Toolkit
Andrew Bryant	1995	Leogo: An Equal Opportunity Programming Environment
Ian Bosely	1994	SPI: A Social Presence Indicator

Postgraduate Thesis Examinations

Katherine Fennedy	PhD	External Examiner	Singapore University of Tech. & Design	2021
Praveenkumar Kanithi	PhD	Chair	University of Canterbury	2020
Ori Gagoni	PhD	Chair	University of Canterbury	2019
Alaeddin Nassani	PhD	Chair	University of Canterbury	2019
Veera Mandalika	PhD	Chair	University of Canterbury	2018
Jessalyn Alvina	PhD	Examiner	Université Paris Sud	2017
Hyungon Kim	PhD	Chair	University of Canterbury	2017
Thomas Young	PhD	Chair	University of Canterbury	2017
Craig Sutherland	PhD	Examiner	University of Auckland	2016
David Thompson	PhD	Chair	University of Canterbury	2016
Philip Quinn	PhD	Supervisor	University of Canterbury	2016
Daniel Bradley	PhD	Examiner	University of Queensland	2016
David Altimera	PhD	Chair	University of Canterbury	2015
Jakub Zlotowsky	PhD	Chair	University of Canterbury	2015
Thammathip Piumsomboon	PhD	Supervisor	University of Canterbury	2015
Robert Schattschnieder	PhD	Chair	University of Canterbury	2014
Hazel Bradshaw	PhD	Chair	University of Canterbury	2014
Amur Al Manji	PhD	Examiner	University of Auckland	2014
Amir Shareghi Najar	PhD	Chair	University of Canterbury	2014
Joey Scarr	PhD	Supervisor	University of Canterbury	2014
Stephen Fitchett	PhD	Supervisor	University of Canterbury	2014
Amali Weeseringhe	PhD	Chair	University of Canterbury	2012
Sayan Ray	PhD	Chair	University of Canterbury	2012
Christina Dicke	PhD	Chair	University of Canterbury	2012
Minkyung Lee	PhD	Chair	University of Canterbury	2010
Jason Alexander	PhD	Supervisor	University of Canterbury	2009
Leah Findlater	PhD	Examiner	University of British Colombia	2009
Judy Bowen	PhD	Examiner	University of Waikato	2008
Joerg Hauber	PhD	Supervisor	University of Canterbury	2008
Julian Looser	PhD	Supervisor	University of Canterbury	2008
Michael JasonSmith	PhD	Supervisor	University of Canterbury	2006
Tim Wright	PhD	Supervisor	University of Canterbury	2005
Beryl Plimmer	PhD	Examiner	University of Waikato	2003
Gorden Paynter	PhD	Examiner	University of Waikato	2000
Gitesh K Raikundalia	PhD	Examiner	Bond University	1997
Ramon Craig Standing	PhD	Examiner	University of Western Australia	1997
Ying Leung	PhD	Examiner	Massey University	1995
Qi Min Ser	Masters	Examiner	University of Canterbury	2016
Taher Amer	Masters	Supervisor	University of Canterbury	2006
Trond Nilsen	Masters	Supervisor	University of Canterbury	2006
Akhil Mehra	Masters	Examiner	University of Auckland	2005
Aparna Krishnan	Masters	Examiner	University of Waikato	2003
Shaun Kaasten	Masters	Examiner	University of Calgary	2001
Boyd Ludlow	Masters	Examiner	University of Waikato	1999
Donald Cox	Masters	Examiner	University of Calgary	1998
Wallace Chigona	Masters	Examiner	Waikato University	1997
Simon Gianoutsos	Masters	Examiner	Waikato University	1997
Jing Deng	Masters	Examiner	Waikato University	1996 and 1997
Aaron Tay	Masters	Examiner	University of Canterbury	1996

Student glory

Pang Suwanaposee	PhD	2022	Google PhD Fellowship Award AUD$15,000.
Pang Suwanaposee	PhD	2021	CHI Honourable Mention award.
Joey Scarr	PhD	2016	John Makepeace Bennett Award for the Distinguished Computer Science PhD thesis in Australasia.
Philip Quinn	PhD	2015	US Patent Awarded (Google Assignee).
Philip Quinn	PhD	2014	US Patent Awarded (Google Assignee).
Stephen Fitchett	PhD	2014	CHI Honourable Mention award.
Philip Quinn	PhD	2013	Google Mountain View Internship.
Stephen Fitchett	PhD	2013	CHI Best Paper award.
Joey Scarr	PhD	2013	CHI Honourable Mention award.
Joey Scarr	PhD	2013	CHI ReplicCHI award.
Joey Scarr	PhD	2012	CHI Best Paper award.
Stephen Fitchett	PhD	2012	CHI Honourable Mention award.
Philip Quinn	PhD	2012	Google Mountainview Internship.
Joey Scarr	PhD	2012	Google Sydney Internship.
Stephen Fitchett	PhD	2011	Outstanding reference from Darren Edge, Microsoft Research Asia.
Joey Scarr	PhD	2012	$3K for 2nd place in University ‘PhD in 3’ competition.
Joey Scarr	PhD	2012	$1K for 1st place in College ‘PhD in 3’ competition.
Stephen Fitchett	PhD	2012	$1K for 3rd place in College ‘PhD in 3’ competition.
Philip Quinn	PhD	2011	Honourable Mention award ACM CHI’11.
Joey Scarr	PhD	2011	Google Sydney Internship.
Susanne Tak	PhD	2010	$5K Google Anita Borg Scholarship
Susanne Tak	PhD	2010	$3K from ACM for participation at CHI’s Doctoral Consortium
Jason Alexander	PhD	2010	PhD Thesis placed on “Dean’s list for excellence” (top 10%)
Susanne Tak	PhD	2009	$2K award for 1st place in College Research Poster competition
Jason Alexander	PhD	2008	$1K award for 2nd place in College Research Poster competition
Jason Alexander	PhD	2008	Michael Sweeney award for best student paper, Graphics Interface ’08.
Mark Hancock	PhD	2007	Best paper nomination at ACM CHI’07.
Josh Savage and Andrew Wallace	M.Sc. Hons	2005	Best paper nomination at ACM CHI’05.
Mike Moyle	Hons	2005	NZ Hi-Tech Young Achiever of the Year Award

Publications

Edited Volumes

EV1 J McGrenere and A Cockburn (Eds.) Proceedings of ACM CHI 2020 Conference on Human Factors in Computing Systems.

EV2 J McGrenere and A Cockburn (Eds.) Extended Abstracts of ACM CHI 2020 Conference on Human Factors in Computing Systems.

EV3 M Billinghurst and A Cockburn (Eds.) Proceedings of the Sixth Australasian User Interface Conference (AUIC2005). Volume 40 of the Conferences in Research and Practice in Information Technology, Australian Computer Society.

EV4 A Cockburn (Ed.) Proceedings of the Fifth Australasian User Interface Conference (AUIC2004). Volume 28 of the Conferences in Research and Practice in Information Technology, Australian Computer Society.

Papers in Refereed Journals and Collections

J1 A Cockburn, D Hills, Z Che, and C Gutwin. User Interface Evaluation Through Implicit-Association Tests. *Proceedings of the ACM on Human-Computer Interaction.* EICS, Article v8eics262. 2024.

J2 A Cockburn, A Goguey, C Gutwin, Z Chen, P Suwanaposee, and S Dowding. Automatically Adapting System Pace Towards User Pace – Empirical Studies. *International Journal of Human-Computer Studies.* 185:103228. May. 2024.

J3 S Dowding, C Gutwin, and A Cockburn. User Speech Rates and Preferences for System Speech Rates. *International Journal of Human-Computer Studies.* 184:103222. April. 2024.

J4 P Suwanaposee, C Gutwin, and A Cockburn. The Influence of Audio Effects and Attention on the Perceived Duration of Interaction. *International Journal of Human-Computer Studies.* 159:102756. March. 2022.

J5 J Leung and A Cockburn. Design Framework for Interactive Highlighting Techniques. *Foundations and Trends in Human-Computer Interaction.* 14(2-3):96-271. 2021.

J6 AF Mairena, C Gutwin, and A Cockburn. Which Emphasis Technique to Use? Perception of Emphasis Techniques with Varying Distractors, Backgrounds, and Visualization Types. *Information Visualization.* 21(2):95-129. 2022.

J7 A Cockburn, P Dragicevic, L Besançon and C Gutwin. Threats of a Replication Crisis in Empirical Computer Science. *Communications of the ACM.* 63(8):70-79. August 2020.

J8 M Claypool, A Cockburn and C Gutwin. The Impact of Motion and Delay on Selecting Game Targets with a Mouse. *ACM Transactions on Multimedia Computing, Communications, and Applications.* 16(2s):73, 1-14. June 2020.

J9 P Quinn and A Cockburn. Loss Aversion and Preference in Interaction. *Human-Computer Interaction Journal.* 35(2):143-190. 2020. (Online from 2018).

J10 A Cockburn, D Masson, C Gutwin, P Palanque, A Goguey, M Yung, C Gris and C Trask. Design and Evaluation of Braced Touch for Touchscreen Input Stabilisation. *International Journal of Human-Computer Studies.* 122:21-37. 2018.

J11 B Lafreniere, C Gutwin, and A Cockburn. Investigating the Post-Training Persistence of Expert Interaction Techniques. *ACM Transactions on Human-Computer Interaction.* 24(4): Article 29 (46 pages). 2017.

J12 A Cockburn, P Quinn and C Gutwin The Effects of Interaction Sequencing on User Experience and Preference. *International Journal of Human-Computer Studies.* 108:89-104. 2017.

J13 J Aceituno, S Malacria, P Quinn, N Roussel, A Cockburn and G Casiez. The Design, Use, and Performance of Edge-Scrolling Techniques. *International Journal of Human-Computer Studies.* 97:58-76. 2017.

J14 J Scarr, C Gutwin, A Cockburn and A Bunt. StencilMaps and EphemeralMaps: Spatially Stable Interfaces that Highlight Command Subsets. *Behaviour and Information Technology.* 34(11):1092-1106. 2015.

J15 S Fitchett and A Cockburn. An Empirical Characterisation of File Retrieval. *International Journal of Human-Computer Studies.* 74:1-13. 2015.

J16 A Cockburn, C Gutwin, J Scarr and S Malacria. Supporting Novice to Expert Transitions in User Interfaces. *ACM Computing Surveys.* 47(2):31:1-36. 2014.

J17 J Scarr, A Cockburn and C Gutwin. Supporting and Exploiting Spatial Memory in User Interfaces. *Foundations and Trends in Human-Computer Interaction.* 6(1):1-84. 2013.

J18 P Quinn, A Cockburn and J Delamarche. Examining the Costs of Multiple Trajectory Pointing Techniques. *International Journal of Human-Computer Studies.* 71(4):492-509. 2013.

J19 S Tak and A Cockburn. Enhanced Spatial Stability with Hilbert and Moore Treemaps. *Transactions on Visualization and Computer Graphics*. 19(1):141-148. 2013.

J20 A Cockburn, D Ahlstrom and C Gutwin. Understanding Performance in Touch Selections: Tap, Drag, and Radial Pointing Drag with Finger, Stylus and Mouse. *International Journal of Human-Computer Studies*. 70(3):218-233. 2012.

J21 J Hauber, A Cockburn, M Billinghurst and H Regenbrecht. The Impact of Collaborative Style on the Perception of 2D and 3D Videoconferencing Interfaces. *Open Software Engineering Journal*. 6:1-20. 2012.

J22 A Cockburn, P Quinn, C Gutwin, G Ramos and J Looser. Air Pointing: Design and Evaluation of Spatial Target Acquisition with and without Visual Feedback. *International Journal of Human-Computer Studies*. 69:401-414. 2011.

J23 E Tanvir, A Bunt, A Cockburn and P Irani. Improving Cascading Menu Selections with Adaptive Activation Areas. *International Journal of Human-Computer Studies*. 69:769-785. 2011.

J24 A Cockburn and C Gutwin. A Model of Novice and Expert Navigation Performance in Constrained Input Interfaces. *ACM Transactions on Computer-Human Interaction*. ACM Press. 7(3):1-38. 2010.

J25 A Cockburn and C Gutwin. A Predictive Model of Human Performance with Scrolling and Hierarchical Lists. *Human-Computer Interaction Journal*. Taylor and Francis. 24(3): 273-314. 2009.

J26 A Cockburn, A Karlson and B Bederson. A Review of Overview+Detail, Zooming, and Focus+Context Interfaces. *ACM Computing Surveys.* ACM Press. 41(1): 1-31. 2008.

J27 J Alexander, A Cockburn and R Lobb. AppMonitor: A Tool for Recording User Actions in Unmodified Windows Applications. *Behavior Research Methods*. Psychonomic Society. 40(2): 413-421. 2008.

J28 G Casiez, D Vogel, R Balakrishnan and A Cockburn. The Impact of Control-Display Gain on User Performance in Pointing Tasks. *Human-Computer Interaction Journal*. Taylor and Francis. 23(3): 215-250. 2008.

J29 S Jones, M Jones, G Marsden, D Patel and A Cockburn. An Evaluation Of Integrated Zooming and Scrolling On Small Screens *International Journal of Human-Computer Studies*. 63(3): 271–303. Elsevier Science. 2005.

J30 A Cockburn and S Brewster. Multimodal Feedback for the Acquisition of Small Targets *Ergonomics*. Taylor & Francis. 48(9): 1129–1150. 2005.

J31 M Moyle and A Cockburn. A Flick in the Right Direction: A Case Study of Gestural Input *Behaviour and Information Technology*. 24(4): 275–288. Taylor & Francis. 2005.

J32 A Cockburn. Web Browsers *Berkshire Encyclopedia of Human-Computer Interaction*. Bainbridge, WS (Editor). Volume 1: 80–83. Berkshire Publishing. 2004.

J33 A Cockburn and B McKenzie. Evaluating Spatial Memory in Two and Three Dimensions *International Journal of Human-Computer Studies*. 61(3): 359–373. Elsevier Science. 2004.

J34 A Cockburn and M Smith. Hidden Messages: Evaluating the Efficiency of Code Elision in Program Navigation *Interacting with Computers: The Interdisciplinary Journal of Human-Computer Interaction*. 15(3): 387–407. 2003.

J35 A Cockburn, S Greenberg, S Jones, B McKenzie and M Moyle. Improving Web Page Revisitation: Analysis, Design, and Evaluation *Information Technology and Society: Special Issue on Web Navigation, editors B Shneiderman, J Lazar, M Ivory*. 3(1): 159–183. 2003.

J36 A Cockburn, B McKenzie and M JasonSmith. Pushing Back: Evaluating a New Behaviour for the Back and Forward Buttons in Web Browsers *International Journal of Human-Computer Studies*. 57(5):397–414. Elsevier Science. 2002.

J37 T Bell, A Cockburn, B McKenzie and J Vargo. Digital Lectures: If You Make Them, Will Students Use Them? Constraints on Effective Delivery of Flexible Learning Systems *International Multimedia Electronic Journal of Computer-Enhanced Learning*. 3(2). Association for the Advancement of Computing in Education. 2001 This paper was one of 25 (from 115 full papers) selected from the proceedings of ED-MEDIA 2001 for adaptation and inclusion in the journal.

J38 A Cockburn. Supporting Tailorable Program Visualisations with Literate Programming and Fisheye Views. *Information and Software Technology*. 43(13):745–758. Elsevier Science. 2001.

J39 A Cockburn, T Bell and B McKenzie. Death to the Office of the Nineties: An HCI Perspective on Some Problems in Modern Office Information Systems *Journal of Research and Practice in Information Technology, Special Issue on Human-Computer Interaction (HCI).*, 33(1):68–82. Australian Computer Society. 2001.

J40 A Cockburn and B McKenzie. What Do Web Users Do? An Empirical Analysis of Web Use. *International Journal of Human-Computer Studies*, 54(6):903–922. Academic Press. 2001.

J41 A Cockburn and S Greenberg. Issues of Page Representation and Organisation in Web Browser's Revisitation Tools. *Australian Journal of Information Systems*, 7(2):120–127. 2000.

J42 A Cockburn and P Weir. An Investigation of Groupware Support for Collaborative Awareness Through Distortion-Oriented Views. *International Journal of Human Computer Interaction*, 11(3):231–255. Lawrence Erlbaum Associates. 1999.

J43 A Cockburn and S Greenberg. The Design and Evolution of TurboTurtle, a Collaborative Microworld for Exploring Newtonian Physics. *International Journal of Human-Computer Studies*, 48(6):777-801. Academic Press. 1998.

J44 A Cockburn and A Bryant. Leogo: An Equal Opportunity User Interface for Programming. *Journal of Visual Languages and Computing*, 8(5–6):601–619. Academic Press. 1997.

J45 A Cockburn and S Jones. Which way now? Analysing and Easing Inadequacies in WWW Navigation. *International Journal of Human-Computer Studies*, 45(1):105–129. Academic Press. 1996.

J46 A Cockburn and S Jones. Four Principles for Groupware Design. *Interacting with Computers: The Interdisciplinary Journal of Human-Computer Interaction*, 7(2):195–210. Elsevier. 1995.

J47 HW Thimbleby, SP Marsh, SR Jones, and AG Cockburn. Trust in CSCW. In S Scrivener, editor, *Computer-Supported Cooperative Work*, pages 253–271. Ashgate Publishing, 1994.

J48 H Thimbleby, A Cockburn, and S Jones. Hypercard: An Object-Oriented Disappointment. In P Gray and R Took, editors, *Building Interactive Systems: Architectures and Tools*, pages 35–55. Springer-Verlag, 1992.

Papers in Refereed Conference Proceedings

C1 K Kargut, C Gutwin, A Cockburn. Effects of Device Environment and Information Layout on Spatial Memory and Performance in VR Selection Tasks. *Proceedings of ACM CHI 2024.* Hawai'i. *2024.*

C2 P Suwanaposee, C Gutwin, Z Chen, A Cockburn. 'Specially For You' – Examining the Barnum Effect's Influence on the Perceived Quality of System Recommendations. *Proceedings of ACM CHI 2023.* Hamburg, Germany. *2023.*

C3 A Cockburn, P Quinn, C Gutwin, Z Chen, P Suwanaposee. Probability Weighting in Interactive Decisions: Evidence for Overuse of Bad Assistance, Underuse of Good Assistance. *Proceedings of ACM CHI 2022.* New Orleans, USA. *2022.*

C4 K Lam, C Gutwin, M Klarkowski, and A Cockburn. More Errors vs. Longer Commands: The Effects of Repetition and Reduced Expressiveness on Input Interpretation Error, Learning, and User Preference. *Proceedings of ACM CHI 2022.* New Orleans, USA. *2022.*

C5 A Goguey, C Gutwin, Z Chen, P Suwanaposee, and A Cockburn. Interaction Pace and User Preferences. *Proceedings of ACM CHI 2021.* Yokohama, Japan. *2021.* **Honourable mention award**

C6 K Lam, C Gutwin, M Klarkowski, and A Cockburn. The Effects of System Interpretation Errors on Learning New Input Mechanisms. *Proceedings of ACM CHI 2021.* Yokohama, Japan. *2021.* **Honourable mention award**

C7 S Liu, M Claypool, A Cockburn, R Eg, C Gutwin, and K Raaen. Datasets – Moving Target Selection with Delay. *Proceedings of the 12th ACM Multimedia Systems Conference (MMSys '21),* Istanbul, Turkey. *2021.*

C8 N Bandeira Romao Tome, M Klarkowski, C Phillips, RL Mandryk, A Cockburn, and C Gutwin. Risking Treasure: Testing Loss Aversion in an Adventure Game. *Proceedings of ACM CHI PLAY 2020 Symposium on Computer-Human Interaction in Play.* Ottawa, Canada. *2020.*

C9 P Schmid, S Malacria, A Cockburn and M Nancel. Interaction Interferences: Implications of Last-Instant System State Changes. *Proceedings of ACM UIST'2020 Symposium on User Interface Software and Technology.* Minneapolis, USA. *2020.*

C10 P Palanque, A Cockburn and C Gutwin. A Classification of Faults Covering the Human-Computer Interaction Loop. *Proceedings of SafeComp 2020: 39th International Conference on Computer Safety, Reliability and Security.* Lisbon, Portugal. *2020.*

C11 A Mairena, M Dechant, C Gutwin and A Cockburn. A Baseline Study of Emphasis Effects in Information Visualization. *Proceedings of Graphics Interface 2020.* Toronto, Canada. *2020.*

C12 C Gutwin, A Cockburn, M van der Kamp, J Storring and C Philips. Testing the Limits of the Spatial Approach: Comparing Retrieval and Revisitation Performance of Spatial and Paged Data Organizations for Large Item Sets. *Proceedings of Graphics Interface 2020.* Toronto, Canada. *2020.*

C13 A Cockburn, B Lewis, P Quinn and C Gutwin. Framing Effects Influence Interface Feature Decisions. *Proceedings of ACM CHI 2020.* Hawai'i. *2020.*

C14 B Lewis, G d'Eon, A Cockburn and D Vogel. KeyMap: Improving Keyboard Shortcut Vocabulary Using Norman's Mapping. *Proceedings of ACM CHI 2020.* Hawai'i. *2020.*

C15 A Goguey, S Malacria, A Cockburn, and C Gutwin. Reducing Error Aversion to Support Novice-to-Expert Transitions with FastTap. *Proceedings of the 31st Francophone Conference on Human-Computer Interaction – IHM 2019.* Grenoble, France. *2019.* **Best paper award**

C16 P Palanque, A Cockburn, L Désert-Legendre, C Gutwin and Y Déléris. Brace Touch: a Dependable, Turbulence-Tolerant, Multi-Touch Interaction Technique for Interactive Cockpits. *Proceedings of the 38th International Conference on Computer Safety, Reliability and Security - SafeComp 2019.* Turku, Finland. *2019.*

C17 C Martinie, P Palanque, E Bouzekri, A Cockburn, A Canny and E Barboni. Analysing and Demonstrating Tool-Supported Customizable Task Notations. *Proceedings of the 11th ACM SIGCHI Symposium on Engineering Interactive Computing Systems.* Valencia, Spain. *2019.*

C18 Q Roy, C Zakaria, W Kim, M Nancel, ST Perrault, A Misra and A Cockburn. A Comparative Study of Pointing Techniques for Eyewear Using a Simulated Pedestrian Environment. *Proceedings of the 17th IFIP TC.13 International Conference on Human-Computer Interaction.* Cyprus. *2019.*

C19 A Cockburn and C Gutwin. Anchoring Effects and Troublesome Asymmetric Transfer in Subjective Ratings. *Proceedings of ACM CHI 2019.* Glasgow, Scotland. *2019.*

C20 AF Mairena, C Gutwin, A Cockburn and LJ Elias The Effects of Feature Combination and Task Demands on Peripheral Notifications in Large Displays. *Proceedings of ACM CHI 2019.* Glasgow, Scotland. *2019.*

C21 M Claypool, A Cockburn and C Gutwin. Game Input with Delay – Moving Target Selection Parameters. *Proceedings of ACM Multimedia Systems Conference 2019.* Amhurst, MA. *2019.*

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C147 AJG Cockburn and HW Thimbleby. Automatic Conversational Context: Avoiding Dependency on User Effort in Groupware. In MJ Rees and R Iannella, editors, *Interface Technology: Advancing Human-Computer Communication. Proceedings of OZCHI 1992. CHISIG Annual Conference.* Bond University Australia, Queensland. November 26–27, pages 142–149, 1992.

C148 AJG Cockburn. Reflexive CSCW and Managing Commitments. In *IEE Colloquium on CSCW: Some Fundamental Issues.* London, March 15, number 065 in 1991, pages 9/1–9/5. IEE, 1991.

Patents and Patent Applications

P1 Andy Cockburn, Mark Billinghurst, Dinesh Mandalapu. User Interface Device. US Patent Application Number: PCT/IN2011/000897.

Other: Refereed Videos, Media Reports and Non-Refereed Publications

O1 L Besanon, Y Jansen, A Cockburn, and P Dragicevic. Definitely Maybe: Hedges And Boosters in the HCI Literature. OSF Preprints. https://osf.io/mjg7h/, 2021.

O2 National Science Challenges report. 'Meet the researchers: Andy Cockburn, Turbulent touch'. 22/03/2019.

O3 Marsden update. 'Young researchers experience international science.' (PhD student Stephen Fitchett). February 2012.

O4 Magazine article. New Zealand Listener. "Charge of the tech brigade". Mar 31, 2012.

O5 Newspaper article. The Press. "Conference acceptance a coup". Dec 22, 2011.

O6 Newspaper article. The Press. "Intuitive Innovations". Feb 22, 2011.

O7 UC Communications. 'UC/Microsoft internship opens up world for computer science student.' Mar 22, 2011.

O8 Marsden update. 'Highlights of the 2010 funding round.' November 2010.

O9 Magazine article. 'Profiling Excellence'. Royal Society of New Zealand. 'Thirty years of research in a single hit', March 2010.

O10 Newspaper article. Sydney Morning Herald. 'Computer mouse still rules, says expert', Jan 19, 2010. (Widely syndicated through AAP.)

`http://news.smh.com.au/breaking-news-national/computer-mouse-still-rules-says-expert-20100119-mhnp.html`

O11 Newspaper article. Dominion Post. 'Next-step mouse on its way', Feb 1, 2010.

O12 Radio Interview (Live). ABC Perth. 'Drive Time' program. January 19th, 2010.

O13 Newspaper article. The Press. 'Boost for Computer Activation Project', Nov. 5, 2009.

O14 Radio interview (Sweden). 'Highlights of the INTERACT Conference', Sept 3 2009. `http://www.sr.se/cgi-bin/p1/program/artikel.asp?ProgramID=406&nyheter=1&artikel=3075930`

O15 Newspaper article. Dominion Post. 'Kiwi mouse comes out of hiding', March 10, 2008. `http://www.stuff.co.nz/4433363a28.html`

O16 Newspaper article. Christchurch Press. 'Fast Kiwi mouse attracts interest from big players', March 5, 2008. `http://www.stuff.co.nz/4425499a28.html`

O17 Newspaper article. The Age (Australia). 'Kiwi mouse attracts interest', March 5, 2008. `http://http://www.theage.com.au/news/biztech/kiwi-mouse-attracts-interest/2008/03/10/1204998342852.html`

O18 Magazine article. Marsden Update. 'Document Navigation', December 2008.

O19 Interview. IEEE Spectrum. 'A New Spin on the Computer Mouse', October 2006. `http://www.spectrum.ieee.org/oct06/4668`

O20 Video. Faster Document Navigation with Space-Filling Thumbnails *Video in the Video Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI2006)* Montreal, Canada, April *2006*. http://www.cosc.canterbury.ac.nz/~andy/sft.mov

O21 Video. Tuning and Testing Scrolling Interfaces that Automatically Zoom *Video in the Refereed Video Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI2005)* Portland, Oregon, April *2005*. http://www.cosc.canterbury.ac.nz/~andy/tuning-n-testing.wmv

O22 Video. Around the World in Seconds with Speed-Dependent Automatic Zooming *Video and Demonstration at the ACM Conference on User Interface Software and Technology* Vancouver, Canada, November *2003*. http://www.cosc.canterbury.ac.nz/~andy/uist-sdaz.avi

O23 Radio Interview. BBC World Service. 'Go Digital' program. January 14th, 2003 http://news.bbc.co.uk/2/hi/technology/2677337.stm

O24 Nature Journal's Science Update. 'Browsers go back to the future' www.nature.com/nsu/021230/021230-3.html

O25 'The Register' in the UK. 'Kiwis redesign the Back button'. http://www.theregister.co.uk/content/6/28729.html

O26 Canadian Broadcast Corporation. Programmers try out alternative to browser's back button. http://cbc.ca/storyview/CBC/2002/12/30/back_button021230

O27 Slashdot. 'Redesigning The "Back" Button' slashdot.org/article.pl?sid=02/12/30/1727206&mode=thread&tid=95

O28 NZOOM's Technology Page. technology.nzoom.com/technology_subcategory/0,1610,113-116,00.html

O29 Newspaper Interview. Christchurch Press. 'Better Going Back', Feb 11, 2003.

O30 University Chronicle. "Taking the frusturation out of the web", Feb 20, 2003.

O31 S Greenberg, C Gutwin, and A Cockburn. Applying Distortion-Oriented Displays to Groupware. Video Programme of the ACM Conference on Computer Supported Cooperative Work. 1996.

O32 S Greenberg, C Gutwin, and A Cockburn. Sharing fisheye views in relaxed-WYSIWIS groupware applications. Technical Report 95/577/29, Department of Computer Science, University of Calgary, Calgary, CANADA., 1996.

O33 S Greenberg, C Gutwin, and A Cockburn. Using distortion-oriented displays to support workspace awareness. Technical Report 96/581/01, Department of Computer Science, University of Calgary, Calgary, CANADA., 1996.

O34 S Greenberg, C Gutwin, M Roseman, and A Cockburn. From awareness to teamrooms, groupweb and turboturtle: Eight snapshots of recent work in the grouplab project. Technical Report 95/580/32, Department of Computing Science, University of Calgary, Canada, December 1995.

O35 A Cockburn and S Greenberg. The design and evolution of turboturtle: A collaborative microworld for exploring newtonian physics. Technical Report tr-cosc.03.95, University of Canterbury, Christchurch. New Zealand, 1995.

O36 AJG Cockburn. Social awareness without mega-bits. In *Proceedings of Uniforum. Rotoroa, New Zealand.*, 1994.

O37 AJG Cockburn. *Groupware design: principles, prototypes, and systems*. PhD thesis, Department of Computing Science and Mathematics, University of Stirling, Scotland. FK9 4LA, 1993. Available from British Libraries, or as Technical Report 107 from the University of Stirling.

O38 SRA Jones and AJG Cockburn. Reducing requirements in computer supported writing tasks, 1993. Paper presented at: 6th UK conference on computers and writing. University of Wales. April 13-15.

O39 AJG Cockburn and S Greenberg. Making contact: getting the group communicating. Technical Report 93/498/03, Department of Computer Science, University of Calgary, Alberta T2N 1N4 Canada, 1993.

O40 AJG Cockburn and HW Thimbleby. Reducing user effort in collaboration support. Technical Report 93, University of Stirling, Stirling, Scotland, FK9 4LA, 1992.

O41 AJG Cockburn and HW Thimbleby. A reflexive perspective of CSCW. *ACM SIGCHI Bulletin*, 23(3):63–68, July 1991.

O42 AJG Cockburn. A user's guide to TELEFREEK: a communication and social awareness environment. Technical Report 105, Department of Computing Science and Mathematics, University of Stirling, Stirling, Scotland, FK9 4LA, 1993.

O43 AJG Cockburn. A user's guide to *mona*: an enhanced email system. Technical Report 97, Department of Computing Science and Mathematics, University of Stirling, Stirling, Scotland, FK9 4LA, 1992.

Grants and industry research/consulting

Project	Source	Date	Amount
Understanding the human experience of intelligent user interfaces	Marsden. (19-UOC-021)	2020-2023	$530,000
Travel expenses	Airbus & U. Paul Sabatier	2018	≈ $7,000
In-Vehicle Touchscreens	NZ Science for Innovation	2017	$200,000
Travel expenses	ACM CHI Steering Committee	2017	≈ $4,000
Travel expenses	Australian National University	2016	≈ $3,000
Travel expenses	Airbus & U. Paul Sabatier	2016	≈ $5,000
Travel expenses	ACM CHI Academy Award (Seoul)	2015	≈ $5,000
Benjamin Meaker Visiting Professorship	University of Bristol	2013	£7,000
Understanding and improving the novice to expert transition with user interfaces	Marsden. (10-UOC-020)	2011-2014	$496,000
Dynamic Multimodal Affordances	HP Innovations Award	2011-2012	US$40,000
Travel expenses	ACM UIST conference	June 2009	≈ $4,000
Postdoctoral Fellow	BuildIT	2011-2012	$116,000
Dynamic Multimodal Affordances	HP Innovations Award	2010-2011	US$40,000
Travel expenses	ACM UIST conference	June 2009	≈ $4,000
Scrolling device studies	Logitech Inc	2010	$10,000
Canadian GRAND project	Canadian Centres of Excellence	2010-2014	C$25,000,000
BuildIT Emerging Researcher Mentoring Fund	BuildIT	2010	$8,000
Pythodogogical	UC Teaching and Learning	2009-2010	$15,000
Dynamic Multimodal Affordances	HP Innovations Award	2009-2010	US$40,000
Travel expenses	ACM UIST conference	June 2009	≈ $4,000
Travel expenses	ACM CHI conference	Nov. 2008	≈ $4,000
Improving document navigation interfaces	Marsden. (07-UOC-013)	2007–2010	$400,000
Accessible AR on Everyday Devices	FRST (UOCX0704)	2007–2011	$1,875,000
Usability training	Jade Software	2007	≈ $2,000
Usability training	AMI	2007	≈ $2,000
Expenses	Logitech Inc., California	April 2007	≈ $5,000
Expenses	Logitech Inc., California	July 2006	≈ $2,000
Grant in aid	University of Toronto	July 2006	≈ $8,000
Grant in aid	University of Saskatoon	June 2006	≈ $6,000
Grant in aid	University of Calgary	May 2006	≈ $3,000
Grant in aid	IBM Almaden Research, California	April 2006	≈ $3,000
NOKIA Pocket (Assoc. with HIT Lab).	Nokia Research Center	2006.	≈$100,000.
Speed-Dependent Automatic Zooming	Computer Science	2003	$3,000
Evaluation of Speed-Coupled Scrolling	Computer Science	2002	$3,000
Multimedia Learning of Graphics (Assoc.)	UoC Teaching and Learning Ctte.	2002	$5,000
Fastap Evaluation	Digit Wireless LLC, MA, USA.	2002	$3,000
Supermedia—The MagicBook Project (Assoc.)	NZ NERF (UOCX0204)	2002	$333,000
Practical Flexible Delivery of Virtual Learning	UoC (U6360)	1999–2002	$40,000
Collaborative Programming for Children	Marsden, Royal Soc. (UOC805)	2000–2002	$135,000
Evaluation of Back/Forward in Web-browsers	Computer Science	2001	$3,000
Interfaces for WWW navigation.	Microsoft Research, USA.	1999	≈ $8,000
HCI and multi-media research lab	Computer Science	1999	$7,400
Video analysis and multi-media lab	UoC (2313728)	1996	$30,000
Collaborative video analysis	Computer Science	1996	$3,000
Collaborative microworlds	Computer Science	1995	$4,000
Asynchronous groupware toolkits	Computer Science	1994	$2,000

Academic Service

EiC Cttee.	2024	Search committee for ACM ToCHI Editor in Chief.
Grant reviewer	2024	French National Research Agency (ANR).
Grant reviewer	2024	Israel Science Foundation (ISF).
External assessor	2019	Promotion to Full Professor: University of Toronto.
External assessor	2018	Promotion to Full Professor: University of Cambridge.
Rapportuer	2018	Habilitation, Dr Eric Lecolinet, Université Paris Sud, France.
Rapportuer	2018	Habilitation, Dr Marcos Serrano, University Toulouse III Paul Sabbatier, France.
External assessor	2017	Promotion application: University of Waterloo.
Chair	2018-2021	Technical program chair for ACM CHI 2020 Conference
Committee member	2016-2020	Steering Committee for the ACM CHI Conference
Rapportuer	2017	Habilitation, Dr Caroline Appert, University Paris-Sud, France.
Chair	2016-2018	CORE Chris Wallace Research Award Panel
Deputy Chair	2016-2018	PBRF Mathematical and Information Sciences Panel
Editorial	2015–	Editorial Board of Foundations and Trends in Human-Computer Interaction.
Editorial	2015–	Editorial Board of Human-Computer Interaction. Taylor and Francis.
Chair	2012–2015	Papers co-chair for ACM CHI 2014 and 2015 (over 2000 submissions).
Service Award.	2014.	ACM SIGCHI Recognition of Service Award.
Editorial	2012–	Editorial Board of ACM Transactions on Computer-Human Interaction. ACM.
Panel member	2011-2012	Member of the Mathematics, Information Sciences and Technology PBRF panel.
Panel member	2008–2009	BuildIT Postdoctoral Award.
Governance board	2008–2010	Elected member of the governance board of BuildIT.
Panel member	2009, 2011	Member of the Mathematics and Information Sciences Marsden panel.
Panel member	2008–2009	BuildIT Postdoctoral Award.
Panel member	2008–2010	BuildIT Emerging Reseacher Travel Fund.
Mentor	2009–2010	BuildIT mentor for early career researchers.
External assessor	2010	Docent application advisor, University of Tampere, Finland.
External assessor	2010	Promotion application for University of Auckland.
External assessor	2007, 2009	Promotion applications for INRIA, University Paris-Sud.
External assessor	2007	Postdoctoral applicants for Ryerson Univerity, Canada.
Editorial	2002–2013	Associate Editor for International Journal of Human-Computer Studies.
Editorial	2002–2013	Member Editorial Board for Interacting with Computers Journal.
Chair	2010–2011	Subcommittee Chair ACM CHI'11.
Senior Reviewing	2004–	Associate Chair (Papers) for ACM CHI'04, CHI'08, CHI'09.
Senior Reviewing	2009	Associate Chair (Papers) for ACM UIST 2009.
Senior Reviewing	2007	Short papers chair for INTERACT 2007
Chair	2004–2005	Papers chair for Australasian User Interface Conferences
Competition judge	2009	Student Research Competition at CHI 2009.
Journal Reviewing	1993–	Communications of the ACM, Human-Computer Interaction Journal, IEEE Transactions on Visualization and Computer Graphics, ACM Transactions on Computer-Human Interaction, Ergonomics, Information and Software Technology, Information Technology and Society, Interacting with Computers, Virtual Reality, Personal and Ubiquitous Computing, Journal of Computer-Mediated Communication, and International Journal of Human-Computer Studies.
Misc.	2003	Organised the 'Masterclass and Symposium on Interacting with and Through Next Generation Computer Systems', held at the University of Canterbury.
Organising committees	1996, 1998	OzCHI
Doctoral consortium	2008	CHI 2008
Other reviewing	Ongoing	Graphics Interface 2009, 2010, 2011; UIST Demos 2009; ACM CHI 2007, 2006, 2005, 2004, 2003, 2002. AICCS-07; ACM UIST 2007, 2006, 2005, 2003; InfoVis 2006; BEyond time and errors: novel evaLuation methods for Information Visualization (BELIV'06); ACM Advanced Visual Interfaces (AVI) 2006; IEEE Tencon'05; CHINZ'05; Interact'05; MobileHCI'05; ACM CSCW 2004; ACM UIST 2003; INTERACT 2003; Australasian User Interface Conference, 2000–2003; The Active Web, '99; ACM Conference on Data Communications 1994; ACM Conference on Human Factors in Computing Systems 1996; OZC 97; APCHI'96 & '98; ACM Hypertext '97; Graphics Interface '97; In '97; ACM Group '97.

Invited seminar presentations outside the University of Canterbury

Keynote address, ACM Interactive Surfaces and Spaces Conference, Wellington, NZ.	November, 2022.
Keynote address, INTERACT Conference, Mumbai.	September, 2017.
Dean's Colloquium, ANU, Australia.	August, 2016.
Engineering & Computer Science, ANU, Australia.	August, 2016.
Institute of Advanced Studies, University of Bristol, UK.	August, 2013.
Department of Computer Science, University of Glasgow, UK.	August, 2013.
Colloquium Polaris, INRIA, Lille, France.	July, 2013.
Department of Computer Science, University of Manitoba, Canada.	August, 2010.
Department of Computer Science, University of Manitoba, Canada.	August, 2010.
Department of Computer Science, University of British Colombia, Canada.	August, 2010.
Keynote address, Australasian Computer Science Week.	January, 2010.
Department of Computer Science, University of British Colombia, Canada.	July, 2009.
Department of Computer Science, University of Calgary, Canada.	July, 2008.
Department of Computer Science, Swansea University, UK.	September, 2008.
INRIA, Universite Paris-Sud, France.	September, 2006.
Department of Computer Science, Swansea University, UK.	August, 2006.
Logitech Inc., California.	July, 2006.
Department of Computer Science, Dalhousie University, Nova Scotia.	July, 2006.
Digital Graphics Project Lab, University of Toronto.	June, 2006.
Department of Computer Science, University of Saskatoon.	June, 2006.
Department of Computer Science, University of Calgary.	April, 2006.
IBM Almaden Research Centre.	March, 2006.
Digital Fusion Inc..	February, 2006.
Usability Professionals Association (UPA), Canterbury Innovation Incubator.	November, 2005.
Usability Professionals Association (UPA), Canterbury Innovation Incubator.	November, 2004.
Department of Computer Science, University of Calgary, Canada.	November, 2003.
Human-Computer Interaction Lab, Univ. of Maryland, College Park, USA.	October 2003.
Department of Computer Science, University of Glasgow.	September, 2003.
Department of Psychology, University of York.	September, 2003.
Interaction Centre, University College London.	September, 2003.
Department of Computer Science, University of Southampton.	September, 2003
New Zealand Computer Society, Christchurch.	June, 2003.
Department of Computer Science, University of Waikato.	December, 2002.
Allied Telesyn Research.	November, 2002.
Department of Computer Science, University of Calgary, Canada.	October, 2001.
Institute for Info. Tech., National Research Center, Ottawa, Canada.	October, 2001.
Grouplab, University of Calgary, Canada.	October, 2001.
Department of Computer Science, University of Saskatchewan, Canada.	October, 2001.
Department of Computer Science, University of Cape Town, South Africa.	September, 2001.
Department of Computer Science, Victoria University of Wellington.	July, 2000.
Inaugural ACM SIGCHI_NZ meeting. Massey University.	June 2000.
Department of Computer Science, University of Waikato.	May, 2000.
Department of Computer Science, University of Calgary.	March, 1999.
Center for LifeLong Learning and Design, University of Colorado, Boulder.	November, 1998.
Norsk Regencentral (Norwegian Research Centre), Oslo, Norway.	August, 1998.
Department of Computer Science, University of Calgary.	January, 1996.
Department of Computer Science, Massey University.	January, 1993.
Department of Computer Science, University of Waikato.	January, 1993.

Visiting academics

I have attracted many world leaders in Human-Computer Interaction to the department. Most of them have presented several seminars while at Canterbury, including numerous 'Science Prestige Lectures' and Ben Sheiderman's Royal Society Evening Lecture.

Prof. Joanna McGrenere	University of British Columbia, Vancouver, Canada.	One month, 2023.
Prof. Carl Gutwin	University of Saskatchewan, Saskatoon, Canada.	Two months, 2023.
Dr. Philip Quinn	Google Research, Mountain View, California.	One year, 2020-2021.
Prof. Carl Gutwin	University of Saskatchewan, Saskatoon, Canada.	Four weeks, 2020.
Prof. Carl Gutwin	University of Saskatchewan, Saskatoon, Canada.	Seven weeks, 2015-2016.
Prof. Wolfgang Stuerzlinger	University of Waterloo, Canada	Three months, 2011-2012
Prof. Kari-Jouko Raiha	University of Tampere, Finland	Nine months, 2009-2010
Dr. Saila Ovaska	University of Tampere, Finland	Nine months, 2009-2010
Dr. David Ahlstroem	Klagenfurt University, Austria.	Eighteen months, 2008-2010.
Prof. Carl Gutwin	University of Saskatchewan, Saskatoon, Canada.	Three months, 2008.
Prof. Karon MacLean	University of British Colombia, Canada.	Six months, 2007-2008.
Prof. Bob Kraut	Carnegie Mellon University.	Erskine Visitor. Three months, 2008.
Prof. Andrew Monk	University of York, UK.	Three months, 2008.
Dr. Gonzalo Ramos	University of Toronto, Canada.	One month, 2007.
Prof. Carl Gutwin	University of Saskatchewan, Saskatoon, Canada.	Erskine Fellow. Four months, 2007.
Prof. Alistair Sutcliffe	University of Manchester, UK.	One month, 2007.
Prof. Carl Gutwin	University of Saskatchewan, Saskatoon, Canada.	One week, 2005.
Prof. Ben Bederson	University of Maryland, Maryland, USA.	One week, 2004.
Prof. Ben Shneiderman	University of Maryland, Maryland, USA.	Erskine Fellow. One month, 2003.
Prof. Jenny Preece	University of Maryland, Baltimore County, Maryland.	Erskine Fellow. One month, 2003.
Prof. Stephen Brewster	University of Glasgow, UK.	Erskine Fellow. Six months, 2003.
Prof. Gerhard Fischer	University of Colorado, Boulder.	One year, 2002–2003.
Prof. Bob Spence	Imperial College London.	Erskine Fellow. One month, 2002.
Prof. Gerhard Fischer	University of Colorado, Boulder.	Erskine Fellow. One month, 2000.
Prof. Harold Thimbleby	Middlesex University, UK.	Erskine Fellow. One month, 1997.
Dr Allen Cypher	Apple Research, Cuppertino, California.	One week, 1996.
Dr Akihiko Machizawa	Communications Research Laboratory, Japan.	Three years, 1996–1998.
Professor Brian Wyvill	University of Calgary, Canada.	Erskine Fellow. Two months, 1996.
Professor Saul Greenberg	University of Calgary, Canada.	Erskine Fellow. Six months, 1995.
Carl Gutwin	University of Calgary, Canada.	Two months, 1995.
Dr Steve Jones	University of Abertay, Dundee.	Six months, 1995.

Expert Witness Consulting

Role	Expert witness for SBM Legal, counsel for New Zealand Te Whatu Ora Waitemata. (analysis, reports).
Case	Vinod Chand v Health New Zealand Te Whatu Ora Waitemata. *Employment relations authority (regarding text auto-correct functionality).*
Dates	May 2024 – June 2024.

Role	Expert witness for Fish & Richardson, counsel for Apple. (analysis, reports).
Case	Smith Interface Technologies v. Apple. *Patent Trial and Appeal Board.*
Dates	December 2023 –

Role	Expert witness for Finnegan, Henderson, Farabow, Garrett & Dunner, counsel for Samsung.
Role	Expert witness for Fish & Richardson, counsel for Apple. (analysis, reports, deposition).
Case	Masimo v. Apple. *Patent Trial and Appeal Board.* IPR2023-00664, IPR2024-00290
Dates	July 2023 –

Role	Expert witness for Finnegan, Henderson, Farabow, Garrett & Dunner, counsel for Samsung. (analysis).
Case	Smith Interface Technologies v. Samsung. *Eastern District of Texas.* 2:22-cv-00290-JRG
Dates	November 2022 – June 2023.

Role	Expert witness for Morrison Foerster, counsel for Apple. (analysis, reports, deposition).
Case	Firstface Co. Ltd. v. Apple Inc. *Northern District of California.* 3:18-cv-02245-JD.
Dates	June 2022 – March 2024.

Role	Expert witness for Finnegan, Henderson, Farabow, Garrett & Dunner, counsel for Samsung. (analysis).
Case	Village Green Technologies v. Samsung. *Eastern District of Texas.* 2:21-cv-00323-JRG-RSP
Dates	January 2022 – March 2022.

Role	Expert witness for Desmarais, counsel for IBM. (analysis, reports, deposition).
Case	Chewy, Inc. v. IBM. *Southern District of New York.* 1:21-cv-01319-JSR.
Dates	August 2021 – Jan 2023.

Role	Expert witness for Farella, Braun & Martel, counsel for Google. (analysis, reports, testimony at trial).
Case	Profectus Technology versus Google. *Western District of Texas.* 6:20-cv-101-ADA.
Dates	March 2021 – October 2021.

Role	Expert witness for Latham & Watkins and Allen & Overy, counsel for Facebook/Instagram/WhatsApp/Meta. (analysis, reports, deposition).
Case	Facebook/Meta Platforms *et al.* versus Wrinkl *Patent Trial and Appeal Board.* IPR2021-00882, -00883
Dates	February 2021 – November 2022.

Role	Expert witness for Morrison & Foerster, counsel for Renesas. (analysis).
Case	Neodron versus Renesas Electronics Corp. *Western District of Texas.* 6:20-CV-00529.
Dates	December 2020 – August 2021.
Role	Expert witness for DLA Piper, counsel for Samsung. (analysis, declaration).
Case	Neonode versus Samsung. *Western District of Texas.* 6:20-CV-00507.
Dates	September 2020 – July 2023.
Role	Expert witness for DLA Piper (counsel for Apple, Microsoft and ASUS), Morrison & Foerster (counsel for Amazon), Finnegan, Henderson, Farabow, Garrett & Dunner (counsel for LG), O'Melveny & Myers (counsel for Samsung), Vasquez Benisek & Lindgren (counsel for ASUS). (analysis).
Case	Neodron versus Apple, Microsoft, Amazon & others. *US International Trade Commission.* 337-TA-1193.
Dates	May 2020 – November 2020.
Role	Expert witness for Desmarais, counsel for IBM. (analysis, reports).
Case	IBM versus Zillow Group. *Central District of California.* 8:19-CV-01777.
Dates	October 2019 – May 2020.
Role	Expert witness for DLA Piper (counsel for Microsoft, HP, Lenovo), Morrison & Foerster (counsel for Amazon), Finnegan, Henderson, Farabow, Garrett & Dunner (counsel for Motorola and Lenovo), Alston & Bird (counsel for Dell), O'Melveny & Myers (counsel for Samsung). (analysis, reports, deposition).
Case	Neodron versus Microsoft, HP, Amazon, Samsung, Dell, Motorola, Lenovo. *US International Trade Commission.* 337-TA-1162.
Dates	August 2019 – December 2020.
Role	Expert witness for Jones Day, counsel for Google and Huawei. (analysis).
Case	American Patents versus Huawei.
Dates	April 2019 – July 2019
Role	Expert witness for Gilbert+Tobin, counsel for Aristocrat Technologies. (reports, testimony at trial).
Case	Aristocrat Technologies versus Commissioner of Patents. *Federal Court of Australia.* NSD 1343/2018.
Dates	September 2018 – June 2020
Role	Expert witness for Williams & Connolly and Alston & Bird, counsel for Google and ASUS Inc. (reports, deposition).
Case	Koninklijke Philips versus ASUS. *Northern District of California* 4:18-cv-01885-HSG.
Dates	March 2016 – March 2020
Role	Expert witness for Williams and Connolly, counsel for Google Inc. (reports, deposition).
Case	Google versus Philips. *Patent Trial and Appeal Board.* IPR2017-00386/387/388/389.
Dates	March 2016 – March 2020

Role	Expert witness for DLA Piper, counsel for Apple Inc. (reports, deposition, testimony at trial).
Case	Immersion versus Apple. *US International Trade Commission.* 337-TA-1004 and 337-TA-990 (consolidated).
Dates	June 2016 – May 2017

Role	Expert witness for DLA Piper, counsel for Apple Inc. (reports).
Case	Apple versus Immersion. *Patent Trial and Appeal Board.* IPR2016-01777.
Dates	June 2016 – May 2017

Role	Expert witness for Wilmer Cutler Pickering Hale and Dorr, counsel for Apple Inc. (analysis).
Case	Core Wireless Licensing S.a.r.l. v. Apple Inc. *Eastern District of Texas.* 6:14-cv-00751 and 6:14-cv-00752.
Dates	August 2015 – June 2016

Role	Expert witness for Weil, Gotshal & Manges, counsel for Apple Inc. (analysis).
Case	Motorola Mobility Inc. versus Apple Inc. *Southern District of Florida.* 10-CV-23580-RNS-TEB and 12-CV-20271-RNS-TEB.
Dates	October 2013 – March 2014

Role	Expert witness for Gibson, Dunn & Crutcher, counsel for Apple Inc. (reports, deposition, testimony at trial).
Case	Apple Inc. versus Samsung Electronics Co. Ltd. *Northern District of California.* 12-CV-0630-LHK.
Dates	June 2013 – June 2014

Role	Expert witness for Herbert Smith Freehills, counsel for Apple Inc. (reports, testimony at trial).
Case	Apple Inc. versus Samsung Electronics Co. Ltd. *Federal Court of Australia.* NSD 1243 of 2011.
Dates	September 2011 – May 2013

Other

- Member of the Association of Computing Machinery (ACM).
- Member of the ACM Special Interest Group of Computer-Human Interaction.