Handset Input Interface Methods and Technologies: 2007 - 2011
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The companies, technologies, market dynamics and economics driving the evolution of input interfaces used for data entry, navigation and Command & Control on mobile phones

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Executive Summary

With the 12-key numeric keypad appearing on 95% of all handsets shipped, it is easy to take input interface technologies on the mobile phone for granted. However, it is the handset’s physical input interfaces through which users accomplish their fundamental data entry and Command & Control tasks such as entering characters to construct text messages or navigating through the device’s menu system and launching applications. Keypads, keyboards, touch-screens, joypads, joysticks and jog dials are the main interfaces delivering this capability today. But as the handset feature-set continues to expand, and the number and variety of applications on a phone grows, the mechanisms for interacting and controlling them are put under ever-greater strain: the need for application-specific controls and shortcuts is increased while the user demand for ease of use has never been greater.

This report examines the current state of input interface technologies on mobile phones and provides a view of how input technologies and methods will evolve over the coming years, up to 2011. We examine interfaces falling under three categories: interfaces for data entry, Command & Control and control surfaces. We discuss the benefits which improved interfacing deliver to the main value-chain players - operators, manufactures and end users – and profile the various technology vendors providing innovative interface solutions for mobile phones.

For mobile operators, there are immediate revenue benefits gained from improved interface technologies: any feature which eases data entry will encourage their subscribers to send more SMS, email or IM messages; and features which augment navigation and speed access to personal information and applications will encourage subscribers to initiate more voice calls and consume more content services. For handset manufacturers, input interfaces allow them to differentiate on the two metrics which rank highly on consumers’ handset purchase decision: cosmetics and usability. The Blackberry’s success is partly a result of the suitability of its main input interface (the mini-keyboard) for the corporate demographic. The popularity of LG’s Chocolate is purely a result of its stylishly smooth form factor, made possible through the use of the innovative input interfaces based on capacitance detection technology.

The report examines all interfaces for entering data. Keypads and the keypad component market are discussed, as are voice and handwriting recognition systems, as well as more esoteric systems such as chording and alternative keyboards including the virtual keyboard from Lumio and the FasTap keypad from Digit Wireless. The raft of devices incorporating a mini-QWERTY keyboard which have launched in 2006 (including the Motorola Q, Nokia E61, Samsung SGH-i320 and HTC’s Excalibur) are also discussed, along with the evolution being made to predictive text by Tegic and RIM to address mistype errors on crowded mini-keyboards.

While several interfaces exist offering superior data entry speeds compared with MultiTap or predictive text using a keypad, ARCchart finds that most of these interfaces are unfamiliar to users and suffer a learning-curve barrier which we believe will hinder take-up. It is also clear that text entry using the keypad has been
optimised more towards languages based on the Latin alphabet, and is not ideally suited for logographic languages like Chinese and Japanese. The report examines the interface challenges based on language differences and discusses the different regional evolutions in input interfaces we expect to see as a result.

Control & Control is typically provided by a 5-way joystick or joypad, and the report explores the range of interfaces fulfilling handset navigation functions. While voice recognition provides basic voice activated dialling, more sophisticated speaker-independent systems are gradually appearing on handsets delivering interaction and navigation capability. A new generation of navigation technologies are explored; some niche and some mass market including motion detection, haptics and navigation using fingerprint sensors. While motion sensing and haptics have compelling gaming applications, they can also be exploited for navigation. Fingerprint sensors are now present on some 6 million handsets, with AuthenTec being the leading technology supplier. These sensors are primarily integrated for biometric security, but some handset models from LGE, Lenovo, Pantech, Samsung and Fujitsu also exploit the sensors for 5-way navigation.

This report introduces the term ‘Control Surface’ referring to any surface that allows the position of a finger or pointing device (e.g. stylus) to be detected. Touch-screens based on resistive technology (widely deployed on PDA phones) are currently the most common type of control surface. However, we expect control surfaces based on capacitance detection technology to grow and be applied to other parts of the handset, not just the screen. Control surface technology vendors Eleksen, Synaptics and Quantum are discussed and we explore the potential for these surfaces to act as soft interfaces, where buttons, keypads, keyboards and various navigation elements are rendered graphically on-screen to provide interfaces, which can change dynamically depending on context and the application. The report presents a concept handset produced by design firm The Alloy which has no physical interface controls, leveraging instead interfaces rendered on-screen for all data entry and command & control interactions.

There will be a growing opportunity for improved interface technologies to be exploited by handset OEMs to provide greater device differentiation, and by operators to enhance existing revenue channels as well as create new ones. Haptics and motion detection can provide an enhanced experience on handsets targeted at gamers, and matching each of an individual’s ten fingerprints with a shortcut to a number or web service provides a rich personalisation experience with compelling revenue opportunities for operators and advertisers. However, operators and OEMs must not underestimate the ultra-conservative nature of users when introducing a new input interface. The report provides several examples of superior interface mechanisms on handheld devices which have failed simply because of users apathy.

The report provides a forecast up to 2011 for the seven main input interface technologies: keypads, keyboards, 5-way input, control surfaces (screen), control surfaces (other), voice dialling and fingerprint sensors. Overall, deployment of the various input interfaces across the device portfolios of the Tier-1 vendors are similar; although Sony Ericsson has more touch-screen models, and Sony Ericsson and Motorola are greater users of voice dialling, with the feature appearing in 90% and 73% of their models respectively. The 12-key keypad is by far the most implemented data entry interface. ARCchart estimates that about 94% of handset models shipped in 2006 have this feature, but this will drop to 80% over the next five years. Traditional 5-way navigation interfaces such as joypads and joysticks experience the greatest erosion of all the interface technologies, impacted by the emergence of two alternative technologies: capacitance detection control surfaces and fingerprint sensors. By 2011, we estimate that about 72% of handset models will have a traditional 5-way interface, compared to 96% of models today.
# Table of Contents

## A. INTRODUCTION ...................................................................................................................... 1

- Some definitions ............................................................................................................... 2
- Types of interaction ........................................................................................................... 3
  - Data entry ..................................................................................................................... 3
  - Command & Control ...................................................................................................... 4
  - Control surfaces ............................................................................................................. 5

### A.2 | History of interfacing technologies 5

- Input on the desktop ........................................................................................................... 5
  - The keyboard ................................................................................................................ 5
  - The mouse ..................................................................................................................... 6
- The rise and fall of the PDA ................................................................................................. 7
- Early handwriting recognition .............................................................................................. 9
  - The Apple Newton .......................................................................................................... 10
  - Microsoft and pen computing ......................................................................................... 11
  - Reduced stroke alphabets .............................................................................................. 11
- Voice control .................................................................................................................... 13
- Chording ............................................................................................................................ 14

### A.3 | Mobile phone input interface technologies 15

- Traditional keypads .......................................................................................................... 15
  - MultiTap ......................................................................................................................... 16
- micro-QWERTY keyboards ................................................................................................. 16
- Pen Interfaces ..................................................................................................................... 17

### A.4 | Report scope 18

- Overview .......................................................................................................................... 18
# B. THE IMPORTANCE OF INPUT

**B.1 | The current state of play: messaging is King**
- The need for annotation
  
**B.2 | Increasing use of data-centric applications**
- Case Study – RIM’s Blackberry
  - Summary
- Case Study – The Nokia 3650
  - The power of the tech journalist
  - Summary

**B.3 | Increased opportunities for value-chain players**
- Value for the user
- Value for the network operator
- Value for the handset vendor

**B.4 | Changing role of the handset**

**B.5 | Style and fashion**

# C. DATA INPUT INTERFACE TECHNOLOGIES

**C.1 | Regional issues**
- Character sets
  - Latin alphabets
  - Cyrillic
  - Logographic languages
  - Pinyin
  - BoPoMoFo/ Zhuyin
- Outlook
  - Advances in predictive text

**C.2 | The keypad**
- Keypad and keyboard component manufacturers

**C.3 | Solving the challenges of keypad data input**
- MultiTap
  - The future of MultiTap
List of Figures

Figure 1 - A typical 12-key phone keypad........................................................................................................... 2
Figure 2 - Popular phone handset form factors.................................................................................................... 2
Figure 3 - Two soft keys mounted directly below the screen .............................................................................. 4
Figure 4 - The Maltron Keyboard combines a DVORAK layout with a bowl shape............................................. 6
Figure 5 - The Kinesis Keyboard is bowl-shaped but with a standard QWERTY layout .................................... 6
Figure 6 - The PF-3000, the first PDA.............................................................................................................. 7
Figure 7 - The Psion Organiser........................................................................................................................... 8
Figure 8 – The Psion Series 5, featuring a fold-out keyboard capable of supporting touch typing.................... 9
Figure 9 – The Casio PF-8000............................................................................................................................. 10
Figure 10 - The Apple Newton.......................................................................................................................... 10
Figure 11 - The Palm Pilot ................................................................................................................................. 12
Figure 12 - The Graffiti reduced-stroke alphabet .............................................................................................. 12
Figure 13 - The HalfKeyboard from Matias ........................................................................................................ 14
Figure 14 – The AgendaA PDA featuring a chording keyboard in addition to "ABC" buttons .......................... 14
Figure 15 - The traditional 12-button keypad ..................................................................................................... 15
Figure 16 - The Nokia 6800 features an innovative folding keyboard ............................................................... 16
Figure 17 - The JAM from iMate offers a pen-driven interface......................................................................... 17
Figure 18 - Breakdown of handset messages composition by input technology - 2006................................. 20
Figure 19 - Blackberry 5810 (early model) ......................................................................................................... 22
Figure 20 - Micro-QWERTY keyboard on the Blackberry 7100g.................................................................... 22
Figure 21 - The Nokia E61 supports the Blackberry push email client............................................................ 23
Figure 22 – The Nokia 3650’s a distinctive keypad................................................................. 24

Figure 23 - Nokia 3660; similar to the 3650 but different keypad................................................. 26

Figure 24 - The LG Chocolate Phone features buttons based on a capacitance control surface for style...... 29

Figure 25 - The Sony Ericsson W850i with dedicated media buttons.............................................. 30

Figure 26 - The Nokia 7380 ........................................................................................................ 31

Figure 27 – Nokia’s AEON concept design handset with no physical keys, only control surfaces........... 31

Figure 29 – Handwriting recognition on the Sony Ericsson K558 .................................................. 36

Figure 30 - The traditional 12-button keypad ................................................................................... 37

Figure 31 - Schematic of a handset button ....................................................................................... 38

Figure 32 - The Motorola RAZR, with flat keypad ........................................................................ 38

Figure 33 - Selection of keypad designs from Silitech ..................................................................... 39

Figure 34 - Keypad supplier market share: 2006 ........................................................................... 39

Figure 50 – Zi’s Qix uses predictive text to search for handset applications and content ...................... 44

Figure 51 - Decuma handwriting recognition ................................................................................... 45

Figure 35 - Email-centric handsets with slab form factor: Blackberry 8700, Motorola Q, Nokia E61, Samsung SGH-i320 and HTC’s Excalibur ................................................................. 48

Figure 36 – Mini-keyboard slider and swiveler: O2’s XDA IIs and T-Mobile’s MDA IV......................... 49

Figure 37 - The Nokia Communicator: part phone, part laptop ......................................................... 49

Figure 38 - The Sony Ericsson P910 and P990 ............................................................................. 50

Figure 39 - A micro-QWERTY keyboard on the Blackberry 7100 .................................................... 51

Figure 40 - The Ogo, a micro-QWERTY keyboard for a data-centric device ...................................... 52

Figure 41 - UIQ soft keyboard ......................................................................................................... 53

Figure 42 - SR keyboard on a Pocket PC handset using Spb’s Full Screen Keyboard application ............ 54

Figure 43 – A mock-up showing how the VKB Keyboard could be integrated into a handset ............... 55

Figure 44 - VKB keyboard projector box .......................................................................................... 56

Figure 45 - A Fastap keypad ........................................................................................................... 58
Figure 46 - The LG 6190 has been deployed with a Fastap keyboard ............................................................. 59
Figure 47 - Contemporary handset design featuring Fastap ............................................................................. 60
Figure 48 – The Twiddler 2 chording interface ................................................................................................. 63
Figure 49 - Proof of concept handset design incorporating a Twiddler 2 chording interface ....................... 64
Figure 52 – The Nokia 7280: minimalist interfacing fitted into the ‘lipstick’ phone ............................................ 67
Figure 53 - Two soft keys mounted directly below the screen ........................................................................ 72
Figure 54 - Scroll-wheel on the Blackberry 8700 ........................................................................................... 73
Figure 55 - A jog dial ........................................................................................................................................ 74
Figure 56 - Scroll-wheel on the Samsung SGH-i300 ....................................................................................... 75
Figure 57 - Side-mounted scrolling control surface on the HTC Excalibur ..................................................... 76
Figure 58 - 5-way navigation control surface on the LG Chocolate (KG800) ................................................ 77
Figure 59 - Trackball on the HTC Artemis ....................................................................................................... 78
Figure 60 - MyOrigo offered a motion-sensing-driven interface ....................................................................... 89
Figure 61 - Sharp V603SH, using motion sensing to enhance games ............................................................... 89
Figure 62 - The Nintendo Wii .......................................................................................................................... 90
Figure 63 - The WX 310J and LG LP3800 handsets with built in fingerprint readers ................................... 91
Figure 64 - The layers making up a resistive touch-screen .............................................................................. 100
Figure 66 – Stylus-driven (left) and finger-driven (right) user interfaces compared ...................................... 105
Figure 67 - A soft keyboard in the Pocket PC SIP .......................................................................................... 107
Figure 68 – Soft keyboard on a Pocket PC handset using Spb’s Full Screen Keyboard application ............... 108
Figure 69 - The FITALY Keyboard, designed to be perfect .......................................................................... 109
Figure 70 - Changeable media player controls on Pocket PC ....................................................................... 109
Figure 71 - The Apple iPod is renowned for its control surface ................................................................. 111
Figure 72 - The clamshell version of the LG Chocolate Phone is equally stylish ........................................ 111
Figure 73 - The dual-function keypad and control surface on the Pantech PG-2800 ................................. 112
Figure 74 - The Polygon concept phone from The Alloy .............................................................................. 113
Figure 75 - The Polygon's changing application input interfaces .......................................................... 114

Figure 76 - Control surface buttons on the Samsung SPH-B3100 ......................................................... 116

Figure 77 - Eleksen control surface built into a jacket ........................................................................ 118

Figure 78 - The Tabbed Panel solves no problems, but has quickly become essential ......................... 120

Figure 79 - Proportion of handset models containing the main interface technologies: 2006 ............ 125

Figure 80 - Keypad and keyboard handset model forecast: 2006 - 2011 ............................................. 128

Figure 81 - 5-way and fingerprint sensor navigation handset model forecast: 2006 - 2011 ............... 128

Figure 82 - Control surface handset model forecast: 2006 - 2011 ....................................................... 129

Figure 83 - Voice dialling handset model forecast: 2006 - 2011 .......................................................... 129
List of Tables

Table 1 - The ASCII character set ........................................................................................................ 34

Table 2 - Main keypad suppliers to Tier-1 handset OEMs .................................................................. 40

Table 3 - Handwriting recognition support by the leading smartphone operating systems ................... 65

Table 4 - Input speeds (words per minute) of text entry technologies compared .................................. 69

Table 5 - Voice Command & Control functions available by date .......................................................... 87

Table 6 - Handset models using AuthenTec's TrueNav ........................................................................ 93

Table 7 - Factors driving and opposing take-up of each input interface ................................................ 126

Table 8 - The impact the deployment of each interface has on other interfaces ................................. 127