NUIs for New Worlds: New Interaction Forms and Interfaces for Mobile Applications in Developing Countries

Kasper Løvborg Jensen
Polytechnic of Namibia
Windhoek, Namibia
leafcastle@acm.org

Gary Marsden
University of Cape Town
Cape Town, South Africa
gaz@acm.org

Edward Cutrell
Microsoft Research India
Bangalore, India
cutrell@microsoft.com

Matt Jones
Swansea University
Swansea, Wales
always@acm.org

Ann Morrison
Aalborg University
Aalborg, Denmark
ann.morrison@acm.org

Abstract

Mobile phones constitute the most ubiquitous computing platform in the developing world, and for the past decade it has been focus of many research efforts within Human Computer Interaction for Development (HCI4D). HCI4D has matured through a series of previous HCI related conferences and workshops and a growing body of work have established it as subfield of its own[1][2][4][5][6].

We believe it is now time to focus on more specific topics within this subfield and this workshop is dedicated to one such topic; namely how the next wave of more sophisticated mobile handsets will enable new interaction forms and interfaces, and how this can be use to create more natural ways of interacting with mobile ICTs.

The aim of this workshop is to discuss the current (and near-future) technologies and create a research agenda for how we can design, implement and evaluate new and more natural interaction forms and interfaces for mobile devices. The ultimate goal is to lower the technical and literacy barriers and get relevant

information, applications and services out to the next billion users.

Keywords
HCI4D; Mobile interaction design; interaction forms; interaction paradigms; interface design; ICT4D

ACM Classification Keywords
H.5.m [Information interfaces and presentation (e.g., HCI)]: Miscellaneous

General Terms
Design, Experimentation, Human Factors, Theory

Introduction
With the ubiquity of mobile phones, even in the poorest regions of developing countries, it is clear that now, and in the near future, these platforms will be the most influential platforms for ICT solutions in developing countries. Understandably, a good proportion of the work in HCI4D and ICT4D has focused on the technologically lowest common denominators to reach as many people as possible. Yet, there is also a need to look ahead to a near future that promises the widespread usage of increasingly sophisticated mobile devices. This trend is exemplified by the affordability of the so-called "low end smartphones" such as the IDEOS Android handset, which at the time of writing retails for ~US$60 in Kenya. Besides the increased processing power, memory and storage capability these devices feature a range of built-in sensors which opens new means of interaction.

HCI research efforts in the developed world have spawned a new wave of mobile interaction forms and user interfaces based on embedded sensor and signal processing technology that will soon be *economically* available to people in developing regions. This has included context-awareness such as location, orientation and proximity; image recognition, augmented reality and geo-tagged information; and speech and language systems. Yet there is currently a limited research focus on how these can be made *appropriately* available to improve mobile ICT solutions in the developing world.

This workshop aims at identifying and discussing these new possibilities and matching them with existing unsolved problems. In doing so, we will create a roadmap for HCI research on how to proceed so that technological advances will also have a sustainable impact in the developing world.

HCI Challenges
When designing and implementing mobile solutions for developing countries, the interaction designers must consider a wide range of challenges beyond the technical issues [3][2], such as:

- Illiteracy or semi-illiteracy among users.

- Low computer literacy, i.e. no or highly limited knowledge prior knowledge of computer interfaces and established metaphors and paradigms like folders, drop down menus.

- Language barriers and dialects.

- Physical impairment of users.

- Social and cultural differences resulting in different mental models and patterns.

- Economic constraints.

By creating more natural ways of interacting with mobile computers, we can lower the technical threshold and overcome semi-illiteracy for people in these places, and thus make new ICT solutions available to people for development in healthcare, education, conservation of indigenous knowledge, mobile banking, etc.

These questions are timely. By focusing *now* on how the next wave of technology can address these challenges as it is becoming cheaper and increasingly available for developing regions, we will be better equipped to design, implement and deploy useful and usable applications and services *when* the technology reaches the intended users.

Topics

The workshop will bring together researchers and practitioners within HCI working on novel interaction and interfaces with those focusing on mobile innovations for developing countries. We aim to gather participants working in a broad range of developing countries. The topics and questions to be addressed in the workshop include:

- Emerging technologies for mobile handsets that will gain widespread usage in developing countries in the near future.
- New interaction forms making use of interface gestures, gestures, speech recognition and synthesis, image recognition, augmented reality, location, orientation, proximity, geo-tagged information, and multimodal approaches.
- Interaction techniques that acknowledge proximity of devices allowing the creation of ad-hoc services to support isolated communities.

- New interaction metaphors and appropriation of previously proposed frameworks such as 'magic wands' and data lenses.
- Methodologies and techniques for designing and evaluating novel interfaces appropriated for developing world contexts.
- New or improved applications and services for development that can be enabled through new interaction forms and interfaces within e.g. healthcare, education, payment and microfinance, indigenous knowledge conservation and environmental awareness.

Aims

The aims and objectives of the workshop are to:

- Identify main problems in the developing world where mobile ICT can have a sustainable impact, but where new interaction forms and interfaces are needed to overcome HCI challenges.

- Identify a list of emerging technologies for mobile handsets that are likely to gain widespread usage in developing countries in the near future and map them to existing and new interaction forms and paradigms that breaks with the classic mobile phone interface.

- Create an HCI research agenda for how we can utilize current and next wave mobile handsets to design, implement and evaluate new ways for people in developing countries to interact with their mobile devices and ensure that they will not only get the information, applications and services they need, but that they will also be able to use them.

- Ultimately our long term goal is to create a set of 'solutions' that non-HCI experts working in developing world contexts can use to further their work and the wider development agenda.

References

[1]   Dearden, A., Light, A., Dray, S., Thomas, J., Best, M. L., Buckhalter, C., Greenblatt, D., Krishnan, G. and Sambasivan, N.User centered design and international development. *Ext. Abstracts CHI 2007,* ACM Press (2007)*,* 2825–2828.

[2]   Ho, M. R., Smyth, T. N., Kam, M. and Dearden, A. Human-Computer Interaction for Development: The Past, Present and Future. *Information Technologies and International Development 5*, 4 (2009), 1-18.

[3]   Jones, M., and Marsden, G. *Mobile Interaction Design.* Wiley. Chichester, UK, 2006.

[4]   Kam, M., Dray, S., Toyama, K., Marsden, G., Parikh, T. and Cutrell, E. Computing technology in international development: who, what, where, when, why and how *Ext. Abstracts CHI 2010,* ACM Press (2010).

[5]   Maunder, A., Marsden, G., Gruijters, D., and Blake, E. Designing interactive systems for the developing world: Reflections on user centered design. *Proc. ICTD 2007, (2007),* 321–328.

[6]   Thomas, J., Dearden, A., Dray, S., Light, A., Best, M., Arkin, N., Maunder, A., Kam, M., Chetty, M., Sambasivan, N., Buckhalter, C. and Krishnan . Hci for community and international development. *Ext. Abstracts CHI 2008,* ACM Press (2008).