



**INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS**

Name of the Student : Keyur Sorathia

Roll Number : 10610504

Programme of Study : Ph.D.

Thesis Title: Gestural Interfaces for Maternal Health Care: A Case Study of Rural Assam, North – East India

Name of Thesis Supervisor(s) : Prof. Ravi Mokashi Punekar

Thesis Submitted to the Department/ Center : Design

Date of completion of Thesis Viva-Voce Exam : 28.04.16

Key words for description of Thesis Work : Gestural Interfaces, Body-gestures, Information Communication Technology for Development, Maternal Healthcare, Marginalized Users

SHORT ABSTRACT

An estimated 358,000 maternal deaths have occurred worldwide in 2008, out of which 99% of maternal deaths have occurred in developing countries. In this, India had contributed the highest with 63,000 maternal deaths during that year. It is further disturbing to note that the state of Assam is having highest Maternal Mortality Ratio (MMR) of 346 in the country. This is far above an average of 254. This demands an immediate need to intervene and find solutions to overcome maternal health challenges faced across the country. Information Communication Technologies (ICTs), often supported through mobile phone interventions demonstrate potential to become enabler of social development and overall growth. However it faces limitations of smaller screen sizes, in-appropriate technology platform, interaction modalities and poor usability for its successful acceptance among targeted user groups. One potential direction to overcome such problems is to use novel interaction mediums and modalities incorporating natural user interfaces adapted from human-human communication. Body-gestures are integral part of everyday communication that support naturalness in human communication. However, research on effective gesture based ICT interventions is still in infancy stage. Acceptance and effectiveness of such methods of interactions across low literate users of resource scarce regions has not been sufficiently explored. This research therefore, investigates the acceptance of gestural interfaces and effectiveness of body-gestures as interaction modality across low literate users of resource scarce regions. A case study with an aim to promote safe maternal health practices and educate pregnant women (PW) of rural Assam in India has been undertaken for this research.

This research outlines the outcome of four years of field based studies in the development and testing of an ICT enabled gesture based interactive system used in the domain of maternal healthcare amongst low literate PW in rural villages of Assam. The research studies are conducted amongst selected rural areas in Assam where user needs, problems, behaviors, information gaps, socio-cultural issues and technology literacy are studied, analyzed and interpreted. It resulted in highlighting the need of educating rural PW; the importance of role of Accredited Social Health Activists (ASHAs) and issues of gender prevalence in successful implementation of ICT systems. The study also presents three experiments aimed to generate authentic maternal healthcare contents, understand communication patterns to deliver sensitive maternal healthcare information and create user preferred body-gestures for generating suitable system design elements. The thesis demonstrates the design, development and deployment of the proposed gesture-based experiment called *Chetna*, a gesture enabled TV based audio-visual information system aimed to

educate rural PW. Further, it reports the findings from 4 months of pilot study conducted at two different locations in rural Assam. The results show acceptance of gestural interface among rural PW and indicative results of learnability of body-gestures as interaction modality. It also reports significant learning of few individual body-gestures over 3 subsequent system interactions. It portrays gesture expressivity, posture variation, computer supported co-operative healthcare, persona usage, icons design and layout and instructional navigation as important factors influencing the acceptance of gesture-based GUI and decrease in performance of gesture errors. Reflections of on-field realities in form of infrastructural limitations, socio-cultural challenges and foreign researchers are also presented and discussed in details. The research findings resulted in suggesting a set of design guidelines for gesture based ICT enabled systems including – (i) posture inclusive design for body-mediated gestures (ii) gestures with flexible range of motion and tolerance in speed (iii) gesture interactive tutorials (iv) utilization of familiar persona (v) clear, continuous and consistent instructions and (v) designing with cultural and contextual limitations. Finally, the thesis is concluded along with future research directions and a reflective note of the researcher.

