ABSTRACT

Advances in technology and rise in use of the internet has expedited growth of Human Computer Interaction (HCI) as a discipline. Many HCI products are now being used in different types of domains for different kinds of purposes on different kinds of technological platforms. From a business perspective, User Experience (UX) in HCI products has become an important factor in the success of the HCI products. Usability tests and User experience tests are two formal methods of tests used at various stages of designing HCI products. While usability tests capture ease of use, efficiency and effectiveness (ISO, 2000), UX tests have been used in a broader sense of measuring affective engagements that users undergo while interacting with HCI products. While usability tests attempt to measure the cognitive aspects of HCI, UX tests include measures of affective responses of users as well. The affective responses elicited by the human in human computer interaction, particularly plays a greater role in HCI systems where decisions have to be made. As more and more online HCI systems are facilitating decisions, hence, there has been an increased focus on the UX testing methods of late.

Behavioral observations and self-reported measures have been used in the past for both usability tests and UX tests. The behavioral observations and self-reported measures have their limitations; hence this research has investigated the possible use of physiological measures in UX testing. Physiological measurement tools like Electroencephalography (EEG), Eye Tracker (ET) and Galvanic Skin Response (GSR) are more easily available now, have better technology for increased accuracy, have become easier to use and have become increasingly more economically affordable. On the other hand, the cost of poor UX has drastically increased and hence measurement of UX in HCI systems have become more important in HCI design process. This thesis looks at the context of easy availability of physiological measurement tools and increased value of UX testing as an opportunity to argue for the use of physiological tools in UX testing and hence has explored the usefulness of these physiological tools namely EEG, Eye Tracker and GSR in the UX testing process.

Total of seven experiments have been conducted to ascertain the feasibility of different aspects of UX testing using physiological tools. The overall purpose of conducting seven experiments was
to understand the various features of data obtained from the three physiological tools, namely, EEG, GSR and eye tracker, which can be used to understand the affective states of users during UX testing. First three experiments were conducted to extract the physiological features of EEG and GSR for measurement of human emotions. Next two experiments were conducted to identify eye tracker and GSR features useful for UX testing. The sixth experiment was conducted to develop a combined measure of all the three physiological tools together for a UX testing context. The seventh experiment was conducted with HCI designers to ascertain the usefulness of the UX markers in an HCI design context.

It was found that physiological markers can dig deeper into users’ affective states and provide better UX testing data than observation-based data. Further, it was also found that such physiological markers are more useful in UX testing setup. This thesis, in light of the observations, therefore recommends the use of physiological markers as developed and tested in this thesis for use during the UX testing for a better understanding of the emotional response of the users which often do not surface out during the behavioural observations or self-reported felt emotions during UX testing.