MammiBelli: Sharing Baby Activity Levels Between Expectant Mothers and Their Intimate Social Groups

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ABSTRACT
MammiBelli is a baby activity sharing system that takes the form of a flexible maternity band equipped with an LCD display to depict kicks, contractions, and other movements made by the fetus as well as hand touches made by the parents along with a counter for each of those three participants. The first iteration of the prototype is illustrated in this video.

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms
Design Human Factors

Keywords
Motherhood, pregnancy, babies, awareness, sharing

INTRODUCTION
When a woman becomes pregnant, her life begins to change dramatically. No longer does her focus remain solely on her partner, immediate family and friends. Instead, it begins to include the wellbeing of her new child. The excitement and chaotic emotion caused by this sudden shift can cause an increased demand on expectant mothers to interact and communicate their needs and queries with close family members and friends. Many expectant mothers desire to share information about their pregnancy with family and friends in their intimate social group. This includes details about baby growth and activity (e.g., kicks). In order to address this need, we have designed an initial version of a prototype system for mothers to share baby activity information with their partner, family, and close friends through a wearable device equipped with sensors and a touch screen to display fetal movements and session information relating to kick counts and touches made to the belly. This video illustrates MammiBelli in action.

RESEARCH FINDINGS
Research has shown the importance for family members and friends to share information about each other’s lives [2,3]. This includes sharing an awareness of one’s activities, locations, and well being where the amount and type of information varies depending on the relationship [2]. The sharing of awareness information helps make people feel close to one another [2,3]. When women become pregnant, one thing that family members and close friends like to know about is the status of the mother-to-be’s pregnancy and the unborn baby’s health.

Several companies and researchers have looked at the design of systems to help parents monitor, track, and share baby information. One strategy involves using technologies such as laptops and iPhones to Smart baby monitors [1]. Since many parents are afraid of missing important events of their child's development, sensors are implemented in the smart baby monitors so that when the parents are motivated to document, they can do so swiftly [1].
The kickTrak foetal kick and contraction counter is described as “a safe, reliable, non-invasive, hand-held, record-keeping device to help you keep a reliable diary of your baby's movements... over the last ten sessions” [4]. In order to record the number of kicks and contractions, the user must manually press a button and the device will count how many times the user has pressed the button [4]. While the system is certainly beneficial, it is likely that manual data entry can be cumbersome.

MAMMIBELLI DESIGN
We were greatly inspired by our interviews with pregnant and new mothers and wanted to create a device that would allow pregnant women to more easily share the physical aspects of their pregnancy with those in their intimate social circle.

Maternity Waist Band and Embedded Display
The physical device consists of a seamless maternity waist band that pregnant women wear on their belly for the purposes of counting the number of kicks, contractions, and other types of movements made by the fetus as well as the amount of hand touches made by the expectant mother and her partner.

Embedded within the band are 6 bend sensors created from duct tape, carbon paper, conductive thread and conductive fabric that detect baby movement and a LCD display that shows the user interface (Figure 1). We have prototyped the display by embedding a tablet computer in the waist band connected to an Arduino board in the back of the band using a maternity belt, however, we would expect future versions of the device to use a flexible LCD that can contour and conform to the shape of the woman’s belly.

Interface Design
As can be seen in Figure 2, the central area of the interface shows graphical representations of feet in locations where the sensors have detected baby movement. It also displays hand images in places where someone has touched the display, in which we would like to implement temperature sensors on the front of the touch screen LCD in the future. The components that display data can be found in the four corners (Figure 2) in order to make the movements and hand touches the central focus of the interface. The session number, month and week of the mother’s pregnancy term, the session duration, and the previous session are located at the top-center of the interface. It also includes a bar that moves along the right-hand side to indicate how long the session duration is in comparison to the previous session’s length. The top-left hand corner displays the kick, contraction, and movement counter, with the current session’s count located at the centre while the previous session’s count is located at the top of the ring.

Similarly to the previous session’s bar, the ring will fill with colour for the purposes of comparing the amount of movements made in the current session with the previous session’s count. The top-right hand corner will display the date, time, battery power, and the “Stop/Start Session” icon for the expectant mother to touch, and it is the only corner that will facilitate touch for that purpose.

The two icons at the bottom of the interface serve as the touch counters for the spouse and the expectant mothers, with the blue counter icon representing the amount of touching made on the belly by the father and the pink icon representing the expectant mother. We have limited the interface to track just mothers’ and fathers’ touches to promote increased intimacy between just these individuals.

CONCLUSION
The goal of MammiBelli is to enhance the intimate experience of creating an emotional connection with the unborn child by allowing those who are present with the expectant mother to know where the baby’s movements are located. Since expectant mothers tend to feel their belly, thus establishing a bond with their unborn child, we wish to explore how that bond grows through quantifying the amount of physical contact that not only the mothers make but also by those who are around her.

REFERENCES