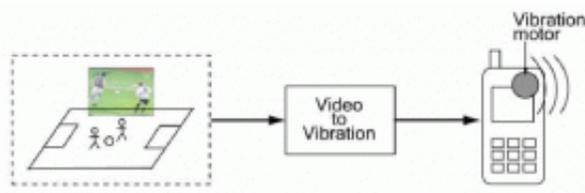


Experience soccer games through your cell phone vibration

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The cell phone is synchronized with a soccer ball in the field, so that the phone vibrates whenever the ball is kicked. Different kinds of vibrations let users know the ball's location in the field and which team has possession. Image credit: Shafiq ur Réhman, et al. ©2008 IEEE.

(PhysOrg.com) -- *Buzz buzz...*it's a goal for the home team! By synchronizing a cell phone's vibrations with the ball in the field, researchers have designed a method that allows cell phone users to experience soccer games in a new way.

Currently, to keep track of a game, soccer fans have the option of reading textual information of the game's key events in near-real-time, or listening to audio of the text transferred to voice. However, these options require a user's full concentration and, as in the audio case, can be distracting to others. On the other hand, using vibrations to inform users where on the field the ball is being kicked, as well as which team has possession, could provide a discreet and easy way for users to follow a game while, say, walking down the street.

The technology is being developed by a team of researchers consisting of Shafiq ur Réhman, Li Liu, and Haibo Li, all from Umeå University in Umeå, Sweden, along with Jiong Sun from Ericsson Research in Stockholm. The group's study on their experiments and user tests will appear in an upcoming issue of *IEEE Transactions on Multimedia*.

“Vibration could offer a ‘private’ channel and very efficient information encoding (even lower than SMS [short message service, or text messaging]),” Réhman told *PhysOrg.com*.

In their method, a cell phone is synchronized with the ball in the real field, most likely through manual input. As the researchers note, the ball is the focus of most of the attention, which can be seen by TV cameras constantly following the ball. Every time the ball is kicked, the phone vibrates. Depending on where the ball is located on the field (which is divided into five segments), the phone vibrates at a specific frequency and duration.

For example, when the ball is kicked in midfield, the phone produces a light, short vibration. When a player scores a goal, the vibration is stronger and longer. Depending on which team has the ball, the vibration is also different. In a more advanced version, the researchers plan to have a goal event trigger a switch to streaming video so users can watch an instant replay. (Streaming an entire game would require a very large amount of power for mobile devices.)

“How to design ‘intuitive’ vibration patterns (a kind of ‘Braille codes’) to represent dynamic game information – that is the most challenging part of making the vibrotactile technique easy and informative for users,” said Réhman.

In user tests, the researchers found that participants could follow the game based on the vibrotactile method sufficiently easily and quickly for

the method to be interesting. After an initial experience with the technique, participants received brief training by watching a soccer game and experiencing synchronized vibrations. In post-training tests, participants demonstrated greater accuracy at following the games, although the average efficiency decreased because participants spent more time thinking about the signals after training.

Although rendering rich information, such as soccer games, by vibration on mobile phones is rather new for researchers and users, most participants responded positively to the vibrotactile concept of live game information. In the future, the researchers hope to integrate vibration with visual and audio information to integrate the three basic senses of touch, sight, and hearing, in order to give users a richer emotional experience.

Réhman added that, in the future, the technology will be commercialized by the Umeå-based spinoff company, Videoakt AB (www.videoakt.se/).

More information: Shafiq ur Réhman, Jiong Sun, Li Liu, and Haibo Li. “Turn Your Mobile Into the Ball: Rendering Live Football Game Using Vibration.” *IEEE Transactions on Multimedia*. To be published.

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