Crowd Sourcing Voice Based Direction Alerts

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***Abstract*—This paper was originally submitted to Xinova as a response to a Request for Invention (RFI) on new event monitoring methods. In this paper, a method to use voice-based direction alerts is proposed.**

In more detail, a solution is proposed that will enable directing people to safety taking into account the environment conditions including noise, congestion of people and reduced faculties due to stress.

I. Background

ON the occasion of an alert in mass events that needs attendees to clear the scene, authorities have two interdependent problems: how to catch the participants' attention and how to make sure people don't get hurt while escaping the venue. Security forces have limited visibility in case many people run as people's attention is limited due to stress and the security personnel is not scattered in all places. Signs and voice alerts may also be a problem due to background noise and distance from the loudspeakers\signs. Further, instructions may not be interpreted correctly by the audience – for example, "please go through gate 6" may be problematic as some will not know where gate 6 is and the route to gate 6 may be congested.

Hence there is a need for a solution that will enable directing people to safety taking into account the environment conditions including noise, congestion of people and reduced faculties due to stress.

II. Summary of the invention

This idea suggests the following:

1. Taking control of participant's mobile phones speakers.
2. Using groups of phones that are in proximity to generate alert signal in unison so the signal will be strong enough heard by people in the vicinity.
3. Creating a complex signal that changes over time, in order to create a vector from the sound – namely, that the sound pattern will signal in a certain direction through a wave pattern flowing in the required direction.
4. The number of sound vectors and the people selected to generate them will be managed by a central computer to take into account the distribution of people (so several vectors may be needed), people getting out of the venue (and hence can't be part of the crowd sourced sound), the number of exists (to generate different voice vectors).

III. How This Invention is Made and Used

This idea has two phases – preparation and usage.

Preparation

In the preparation phase the system manages the available resources – participants whose phone it can control. Possible options would be people who downloaded a specific App associated with the venue or a brute control taking of the phone (there are known methods to turn on a phone activate its functions). The system can easily detect the location of mobile phones by the communication they make with the mobile network or by Wifi connection. Or with co-operation of the towers from the self-reporting of the phones. Hence all turned on mobile phones in the venue can be detected. If the system knows of attending people (like people who checked-in via their phone) it can with high probability know they are in the venue even if the mobile phone is turned off (and in this case may use brute force to turn it on). Using the phones broadcasting signals (mobile or Wifi) the location of the phones can be triangulated. Additional micro receivers, and micro-towers can be distributed in the venue for better triangulation.

Hence, in any given point in time the system tracks the location of most of the mobile phones in the venue (it's safe to assume that the majority of people will not turn the phone off). At any time it can broadcast to those phones.

Usage

In case of emergency, the authority will want to catch peoples' attention as well as direct them to the nearest exit to safety.

In system will follow the following steps in this phase:

1. Divide the crowd into escape routes based on where we want them to move to.
2. For each escape route divide all designated participants (those who have been associated with this escape route) into sub routes – this will be the case when we would like to evade a stampede and allow movement to the same exit via several routes.
3. For each sub-route, select a group of people who are positioned along the axis for which the group needs to move.
4. Divide the group into several sub groups along the axis of movement.

5. Take control of those people phones, turn on the speaker and put it on maximum voice.

6. Play an alert tone using a pattern – first on sub group 1, then on sub-group 2 and continues until you get to the last sub-group. Then repeat it, so a vectored sound pattern is generated in the direction of needed movement.

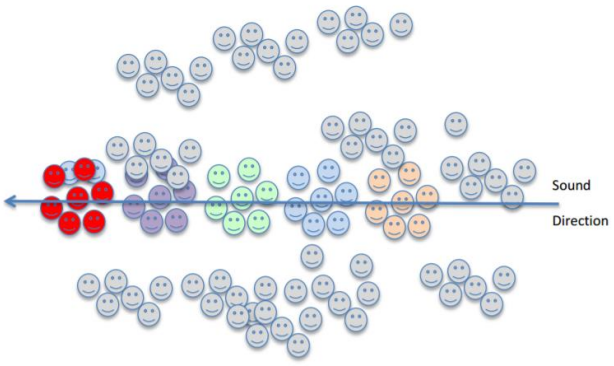

Fig. 1. Crowd route

7. Throughout the process the system needs to monitor the movement of the people:

a. As people get out of the venue, they are disqualified from being part of the crowd-sourced sound, and hence new people need to join as the last new sub-group. For example, if sub-group 1 just got out of the venue, then the people in proximity to the last sub-group will now compose a new sub-group.

b.As people distributions may change, new sound vectors may need to be created to account for groups who have no guiding sound to track, namely are too distanced from the current running vectors.

IV. Conclusion

In summary, this disclosed idea has several benefits:

a. It allows the creation of ad-hoc alert system based on the organic distribution of people. The more people attend the venue the more resources the system has to create a sound.

b. It has low infrastructure need.

c. It can adjust to the changing conditions without need to plan in advance where to put the speaker's system.

d. It creates a better guiding system taking circumventing the background noise and distance from the sound system.).

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