The Human Led Display

Project description

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I. BACKGROUND

A single display consists of millions of pixels. At each given moment, each of these pixels emit a color, depending on their physical location. Only by combining all these pixels, a sensible image is formed.

Ordinary monitors put these pixels close together, as users of, for example, computer screens usually sit close by. For usage such as billboards and other large scale screens, individual pixels can be placed relatively far away from each other. The distance between pixels here, is covered by the fact that users only watch the screens from a distance. This suggests; the larger the screen, the further away from each other pixels are allowed to be.

Now suppose you are at a stadium concert, at which every spectator is given a wristband. This wristband on its own is seemingly simple and shows nothing more than some LED’s. At the concert however, all spectators come together, all wearing such a wristband. If every wristband would emit a color, as if it were a pixel in a huge screen, a completely new element would be added to the show. Show directors would get a new way to allow the audience to become part of the show instead of just being a spectator.

A wristband has to know its physical location (which might change during a concert as people walk around) to be able to know which color to emit. Also a considerable video stream has to be transmitted.

II. THE COMPANY

Vention designs and builds high-tech electronic products and prototypes. Vention takes good ideas through the development process to end up with a design that can be produced, certified and taken to market. Whether it’s about developing a completely new product, or improving an existing concept, the final result is always tailored to the exact wishes of the customer.

Specialized in electronics, software and mechanics, innovative solutions are created to solve technical challenges. Taking care of the overall process, for clients, Vention remains the single point of contact from problem analysis to product certification and everything in between.

Although ideas usually come from clients, everybody working at Vention has ideas of their own, for example the human led display. Having done multiple projects before with wireless technology, plenty of experience is present to bring development of such a product to a success.

III. ASSIGNMENT

Because of the scale needed (up to 100,000 nodes in a system), it is necessary to make use of some form of one-sided ranging. This would mean, clock synchronizing all nodes in the system, several sending antennas (transmitting all data) and all wristbands only listening and do processing to determine their own pixel color. Processing would include determining its own position, decoding the video stream, selecting the correct pixel and emitting the correct color, all with a frequency high enough for the system to be used as a video screen.

The assignment would mainly focus on designing and developing software. Vention already has a set of hardware devices that can be used during development.

The assignment is to both develop a system architecture and to prove its feasibility with a working prototype system.

IV. RESEARCH QUESTIONS

1) What can be done to make one-sided ranging accurate enough (with an error of maximal 50cm from its actual position) to determine which pixel a wristband represents?
2) To what extend is it possible to combine the data stream with the positioning protocol?
3) How could one design for scalability?
   a) How can support be added for dynamically losing and adding wristbands?
   b) How would one deal with the limited medium access?
   c) How could one reduce latency to a minimum (<200ms from video stream to all wristbands)
4) How could one optimize processing on the wristband to allow for cheap microprocessors on the wristband to reduce costs?

V. INTELLECTUAL PROPERTY

As this thesis project would be part of a product development process at Vention, all intellectual property gathered during the research will belong to Vention.

VI. CONTACTS

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