memotion
Final Report

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Design Brief

Individuals with visual impairments lack various social interactions due to their disability, which may consequently result in a gap in communication between peers. This may further cause the lost opportunity to create relationships, connect and relate with individuals in society.

Proposed Solution

We aim to create an innovative and affordable product that assists the visually impaired in creating meaningful social interactions. The product is an assistive and wearable solution that measures the micro-expressions of an individual to track their emotions in real-time. For example, in a one-to-one conversation with a friend when there is silence, a person who is visually impaired is unable to detect the subtle emotions of their peer such as whether the user is sad or whether they are neutral. Our device will calculate the expression using micro-expressions and inform the missed emotion to the user . Due to the time constraint and the extensive processing time in detecting micro-expressions, our product will detect obvious facial expressions that are visible to the naked eye.

The four facial expressions detected by our product are the following:

- Neutral
- Surprised
  - Wide eyes
  - Open mouth
  - High Eyebrows
- Angry
  - Furrowed eyebrows
  - Pursed lips
- Happy
  - Teeth
  - Squinted Eyes

To record the facial detection, the user will click the "capture" button, located on the side of the device. The information collected when the button is clicked will be translated from text-to-speech and sent to the user through headphones. To ensure our data is accurate, a batch of expressions will be collected over the timeframe and it will find the average emotion based on its frequency. The expression that was detected the most will be communicated to the user through audio feedback via headphones.

Intermediate questions
Quantitative Questions
- How comfortable is the user's peer by the product's presence?
- Does the experience of the product assist users in socializing?

Qualitative Questions
- How accurate is the expression prediction?
- How long does the product take to evaluate expression?

Empirical question

How fast can our device relay an accurate expression of the other individual and what are its effects on the quality of conversation?

Answer to Empirical question

The information collected from the questionnaire and the experiment was recorded in an Excel spreadsheet, which allowed us to summarize measurements and make further calculations to understand the correlations.

There existed little consistency in the results due to the insufficient number of subjects (7) and unideal test subjects. We tested six males and one female, which made the results gender imbalanced. Four out of seven participants wore glasses, which means they might have a visual impairment. Since their impairment is corrected using glasses, their lifestyle is not parallel to an individual who cannot see. In other words, they do not share the same struggles as someone who is truly visually impaired, therefore the collected data is not truly authentic. In terms of accuracy of the facial expressions, the application was 40% accurate. Our device is not reliable, since its not detecting the actual facial expression the user is intending to do. When it comes to processing time, it was performing fairly well with times always less than 1 second.

With regards to our qualitative questions, we had an uneven number of participants, however four out of our seven subjects said they would feel comfortable in holding a conversation with a visually impaired person using our wearable device. In a larger scale, we estimate that the majority of the population would feel comfortable in having a conversation while knowing the camera is returning their facial expression to the user. When we asked if they think the device would help the visually impaired, only one user said it would not. The others said it would if the device was more accurate.

Conclusion

Conclusively, the objective of our product is to create an assistive, affordable and innovative solution to fill the gap in social interactions for the visually impaired. We aim to bridge the opportunity for the visually impaired to create relationships and connect with individuals in society.

Some improvements for future iterations is the addition of a subtlety element to the product. Our device is made to capture genuine emotions to help the visually impaired relate with their peers, and although this

was accomplished in our solution to an extent, we realized that people may act differently when they know that they are being watched. For this reason, by continuing to iterate the external casing of the device and finding smaller internal components, we can evolve the product to something more ordinary, like a necklace. This way, the product will be more subtle and will act like an accessory piece for the user.

Works Cited

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