

# **School of Electrical, Computer and Energy Engineering**

## **PhD Final Oral Defense**

Mediated Social Interpersonal Communication:  
Evidence-based Understanding of Multimedia Solutions for Enriching Social Situational  
Awareness

by  
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### ***Abstract***

Social situational awareness, or the attentiveness to one's social surroundings, including the people, their interactions and their behaviors is a complex sensory-cognitive-motor task that requires one to be engaged thoroughly in understanding their social interactions. These interactions are formed out of the elements of human interpersonal communication including both verbal and non-verbal cues. While the verbal cues are instructive and delivered through speech, the non-verbal cues are mostly interpretive and requires the full attention of the participants to understand, comprehend and respond to them appropriately. Unfortunately certain situations are not conducive for a person to have complete access to their social surroundings, especially the non-verbal cues. For example, a person who is blind or visually impaired may find that the non-verbal cues like smiling, head nod, eye contact, body gestures and facial expressions of their interaction partners are not accessible due to their sensory deprivation. The same could be said of people who are remotely engaged in a conversation and physically separated to have a visual access to one's body and facial mannerisms. This dissertation describes novel multimedia technologies to aid situations where it is necessary to mediate social situational information between interacting participants.

As an example of the proposed system, an evidence-based model for understanding the accessibility problem faced by people who are blind or visually impaired is described in detail. From the derived model, a sleuth of sensing and delivery technologies that use state-of-the-art computer vision algorithms in combination with novel haptic interfaces are developed towards a) A Dyadic Interaction Assistant, capable of helping individuals who are blind to access important head and face based non-verbal communicative cues during one-on-one dyadic interactions, and b) A Group Interaction Assistant, capable of provide situational awareness about the interaction partners and their dynamics to a user who is blind, while also providing important social feedback about their own body

mannerisms. The goal is to increase the effective social situational information that one has access to, with the conjuncture that a good awareness of one's social surroundings gives them the ability to understand and empathize with their interaction partners better. Extending the work from an important social interaction assistive technology, the need for enriched social situational awareness in everyday professional situations are also discussed, including, a) enriched remote interactions between physically separated interaction partners, and b) enriched communication between medical professionals during critical care procedures, towards enhanced patient safety.

In the concluding remarks, this dissertation engages the readers into a science and technology policy discussion on the potential effect of a new technology like the social interaction assistant on the society. Discussing along the policy lines, social disability is highlighted as an important area that requires special attention from researchers and policy makers. Given that the proposed technology relies on wearable inconspicuous cameras, the discussion of privacy policies is extended to encompass newly evolving interpersonal interaction recorders, like the one presented in this dissertation.