# A Wearable for Individuals on the Autism Spectrum with Tactile Sensitivity

Introduction

Autism Spectrum Disorders (ASDs) refer to a group of neurodevelopmental disabilities that affect an individual's social interaction, communication, interests and behaviour (Ousley and Cermak, 2014). Sensory processing difficulties is one of the most common issues observed in individuals with ASD (American Psychiatric Association, 2013). As many as 90% of ASD individuals may have experienced atypical sensory responses in audition, vision, touch, taste and smell (Leekam et al., 2007). ASD individuals who are hypo-sensitive may fail to notice sensory stimuli which typically developing (TD) people can easily detect, resulting in behavioural outcomes such as having difficulty paying attention. Conversely, those who are hyper-sensitive are likely to experience distress to sensory stimuli (Deng, Rattadilok, Xiong, 2021).

Problem Context

Figure 1 illustrates the developed prototype which have been tested in-situ with ASD children (Deng and Rattadilok, 2022). The prototype combines Apple off-the-shelf devices with low-cost sensors to support the users. Apple's Core ML is used to integrate machine learning models to this prototype i.e., Gradient Boosting Decision Tree (GBDT), Random Forest (RF), and fuzzy logic models to predict the user's level of attention, stress and make sensory management recommendations, respectively.
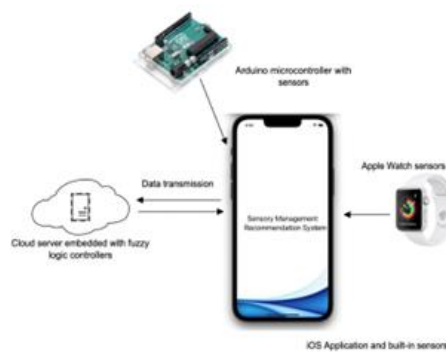
Figure 1: Existing Prototype.

Figure 2 illustrates the connection of low-cost sensors to the Arduino UNO Rev 3 in this prototype. Bluetooth communication is used between the mobile application and these cheap sensors (i.e., DHT11, photoresistor and SEEED Grove Galvanic Skin Response sensor).
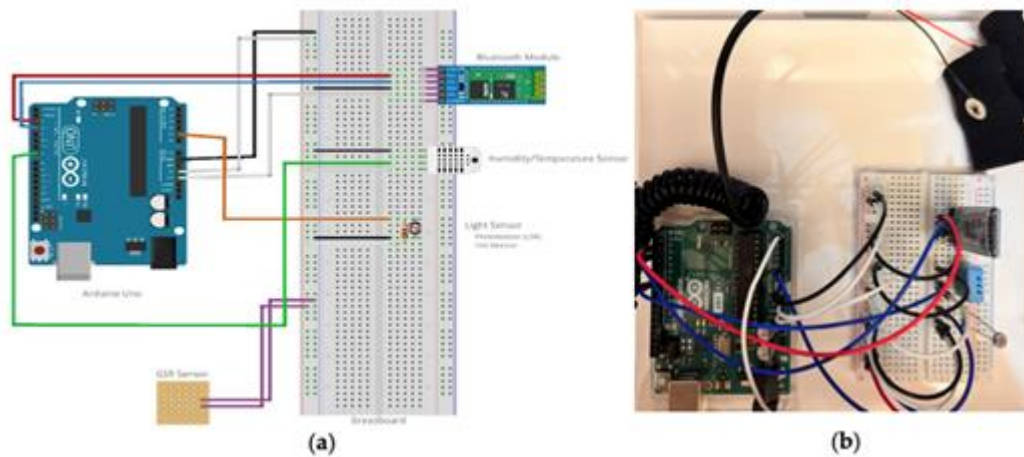
Figure 2: Existing Arduino Connection.

The aims of this PhD are to address three existing limiting factors of the existing prototype:

- User's mobility
- Users with tactile sensitivity
- Public's stigma associated with the disability

Person Descriptions

Depending on the candidate's background, they may choose to tackle the problem by:

- Design and develop a discrete wearable or apparel to work with off-the-shelf smart watch and smart phone, or
- Design and develop a system which can cope better with missing data stream.

Supervisory Team

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