

Title: The Optimal Audio Interface for an Agriculture Robot

Abstract:

As robots become more prevalent, one important question becomes what is the best way for robots to interact and communicate with humans. Visual and tangible interfaces are very common in robotic systems; however, audio feedback is a relatively new and developing interface, especially in autonomous robots and intelligent systems. We study the scenario in which an agricultural robot needs to communicate a failure case for a human operator to diagnose and respond to. Agricultural scouting robots often carry much equipment and sensors for analysis and do not have the space or the budget for costly visual communication interfaces. Before commercialization, these robots also need to have a simple yet effective communication method so consumers with minimal robotics experience can operate them. Our goal is to develop various audio communication techniques and characterize the most effective and natural interface. We propose 2 methods: a learning-based method and an audio signal analysis method, and we study them with various voice and audio signals. We first develop a metric to gauge human perception and computational efficacy of each method, then test these methods on the TerraSentia agricultural robot, and finally analyze the results.