Paving the road towards Collaborative Augmented Reality

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The world is facing a new reality, becoming an increasingly complex and connected ecosystem where problem resolution often requires a wide range of expertise that is not available from single individuals. To this end, collaboration is a key instrument of human progress, but remote scenarios are increasingly common and challenging to address. To support collaboration, researchers have been exploring Augmented Reality (AR) by overlaying responsive computer-generated information on top of real-world environments. This has proven to be a powerful tool for analysis, discussion, and resolution of complex activities, given the ability to enhance situation understanding.

This research analyzes the maturity of Collaborative AR research and identifies that while much has been advanced regarding the overall technologies, the field faces barriers to its evolution. At the onset of these limitations is a lack of a more systematic understanding of which aspects are core to how these systems support collaboration. Building on the experience gathered with industrial partners, to whom these aspects are central, the authors propose a collaboration-centered characterization of Collaborative AR systems going beyond the common approach of focusing on the technological apparatus. Instead, the authors argue that dimensions, such as the characteristics of the team, how it communicates, and how each individual interacts with the system are paramount to both define and understand how collaboration unfolds and to improve how research should be analyzed and reported.

The proposed taxonomy offers a broader and more systematic perspective over Collaborative AR and provides the grounds to establish a roadmap for future advances in bringing remote collaboration to a higher level of efficiency and user experience. In the long run, this should contribute to the development of an infrastructure for resilient knowledge transfer and provide an agile response to support problem solving.

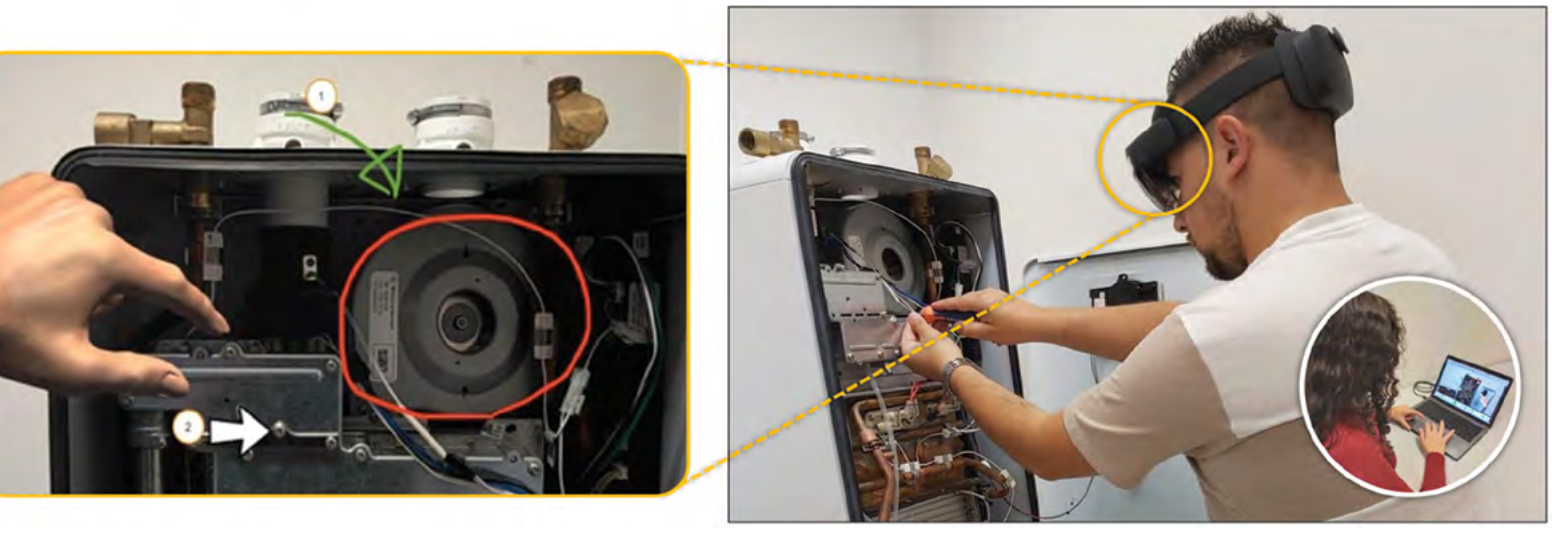

FIGURE 1
Scenario of remote collaboration supported by Augmented Reality (AR). The on-site technician can visualize the instructions suggested by the remote expert on top of the real-world environment while conducting a maintenance procedure in a hands-free setting.