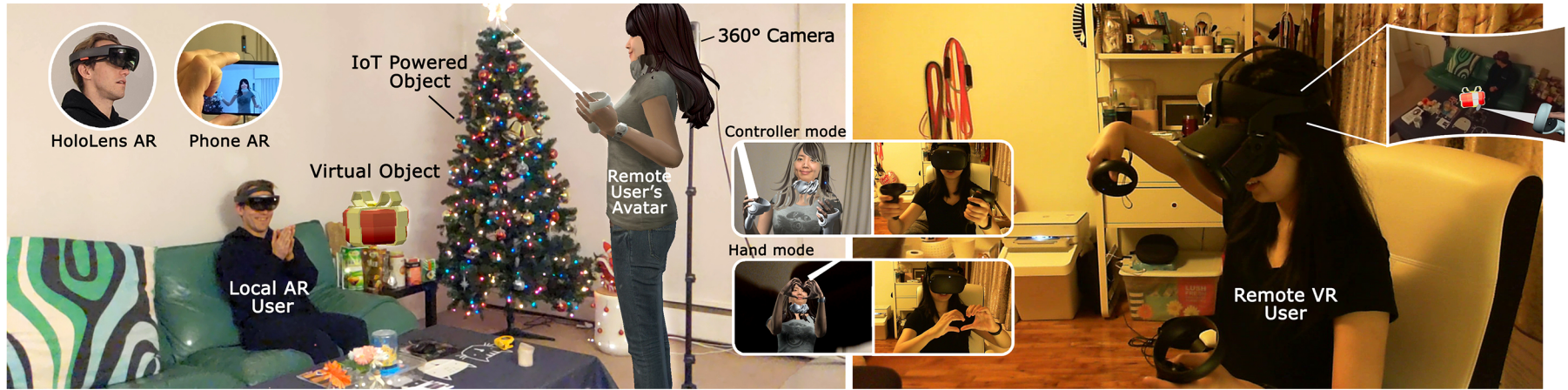# XRmas: Extended Reality Multi-Agency Spaces
for a Magical Remote Christmas

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XRmas is a AVT system that creates a multi-agency space for the remote user in a Chrismas context.

Augmented Virtual Teleportation (AVT) system is a type of XR system that the local user uses augmented reality to see a representation of the remote user, and the remote user uses virtual reality to see the local space and local user.

AVT systems serves for hybrid meetings and brings remote users to the local space with the local user, which is useful in scenarios like remote surgery, room curation, remote instruction.
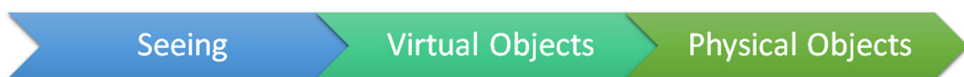
We identify two directions that AVT systems could improve:

o Multi-Agency Space

One challenge of AVT system is to increase the remote user's agency in the local space.

The local user can easily access objects in the environment, but the remote user can't. This introduces asymeties and may hinder the collaboration.

We identify the remote user's agency in the local space as three levels:

Seeing → Virtual Objects → Physical Objects

First, seeing the local space, and being able to refering to things in the local space. Second, spawning or editing virtual objects in the space, e.g. 3D models, annotations. Current AVT systems mainly considered these two levels of agency, but selsom consider to provide the third level of agency, accessing physical objects in the local space, e.g. operating machines or move objects.

We propose **XRmas**, a prototype that allows the remote users to have mult-agency in the local space, including spawning/editing **virtual object that understands the local environment** (Figure a, b, c), and accessing **physical object** in the room (Fugure d).

o From "Imitating Reality" to "Creating Magic"

The second direction to improve is: from "imitating reality" to "creating magic". Previous explorations of AVT have made great strides in imitating the experience of face-to-face presence, but have yet to surpass it.

However, telepresence technology should not merely imitate reality, but should leverage its advantages and create experience that can't achive in reality. The significant feature of AR/VR as a medium is to create 'magic' in space - to create XR experience that does not exist in real life communication. E.g. bringing imaginary effects or characters to reality.

In a Christmas context, **XRmas** enables the remote user with "magic" power to share gifts, decorating the room and light up the Christmas tree in the local room. From the preliminary user trial, we found although the experience was still hampered by slight asymmetries, XRmas increased the feeling of **agency** and **belongings**, and the "magical" experience made the activity more **"memorable"**.

"[XRmas] felt more significant. [...] Because the way that I did it [turned on the tree], it was more interesting and more memorable than just physically turning on the lights. The magic powers! [...] I think that something as simple as just having an animation made it feel more like I was there." - from the participant