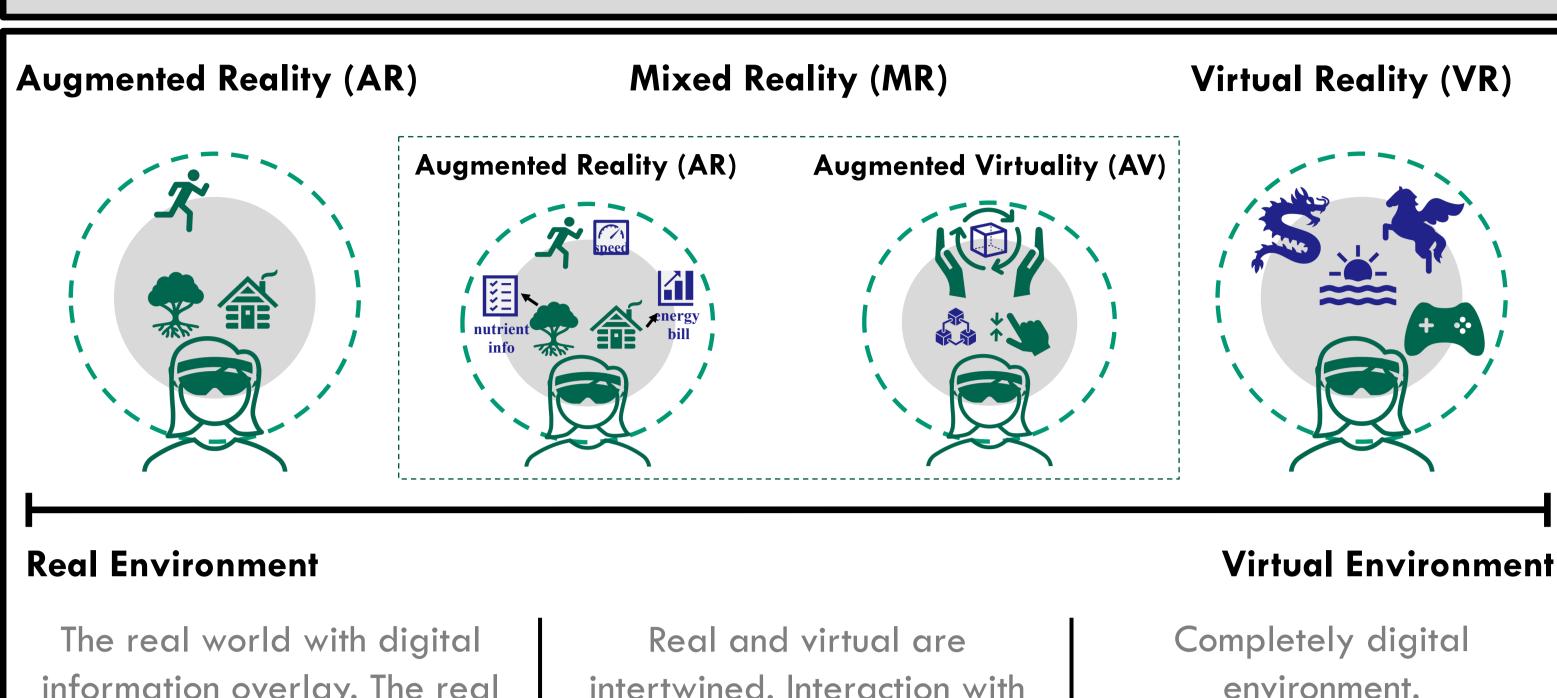
Towards Secure and Immersive Mixed

Reality

Yasra Chandio University of Massachusetts Amherst



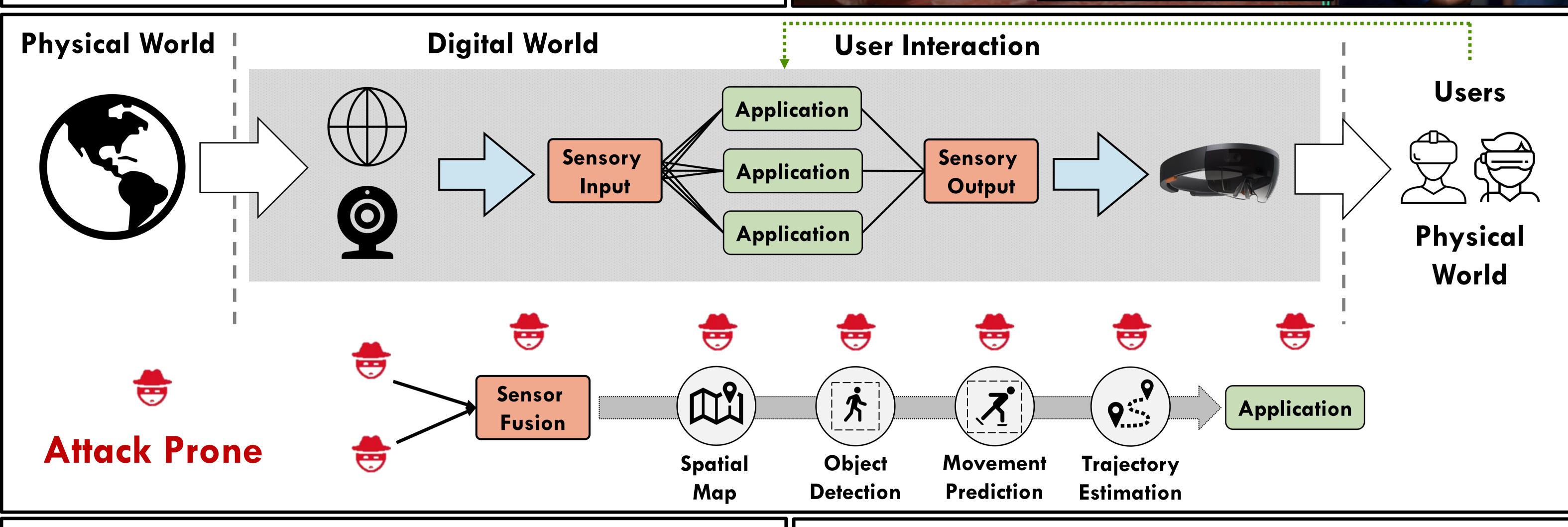


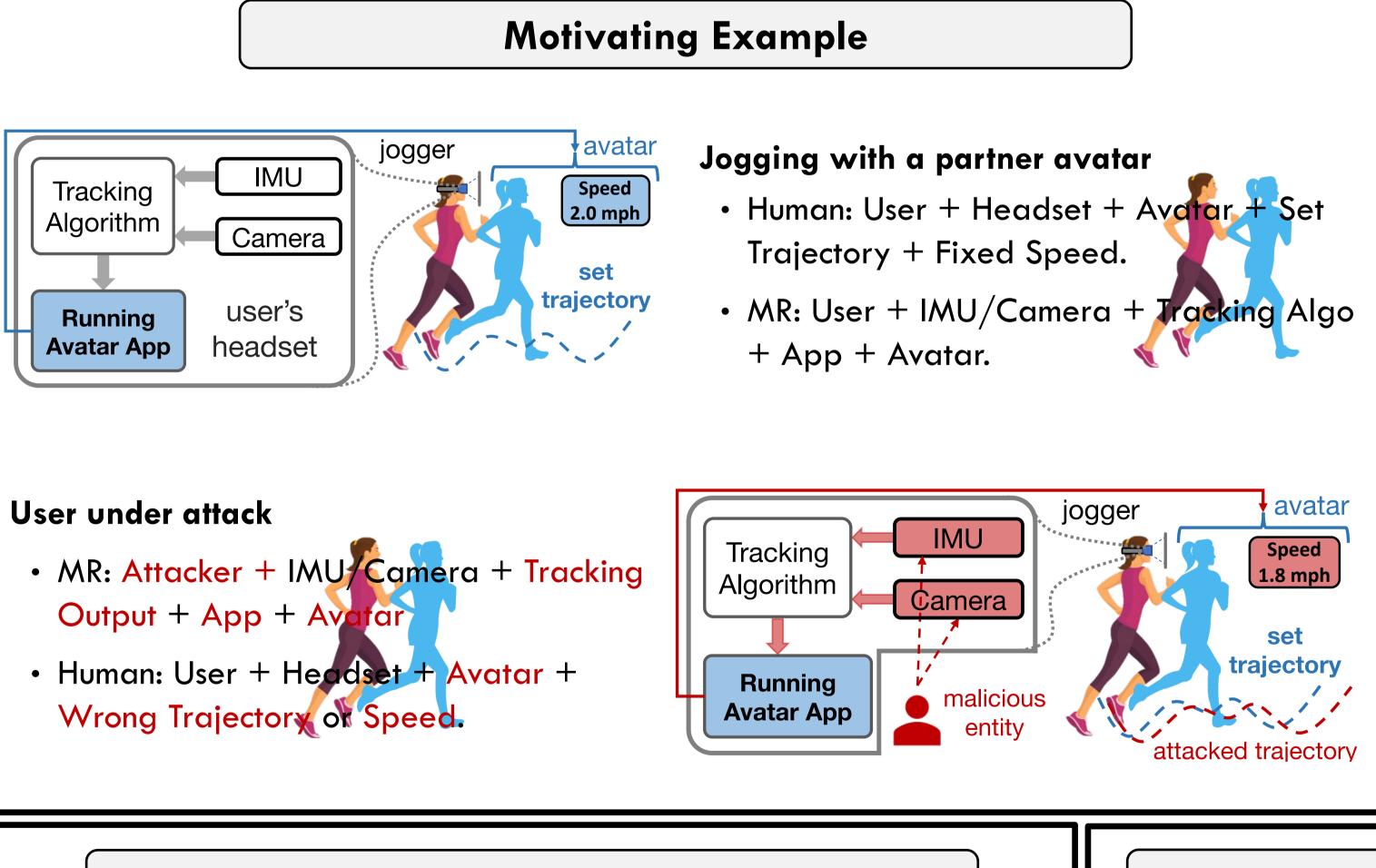
information overlay. The real world remains central to the experience, enhanced by virtual details.

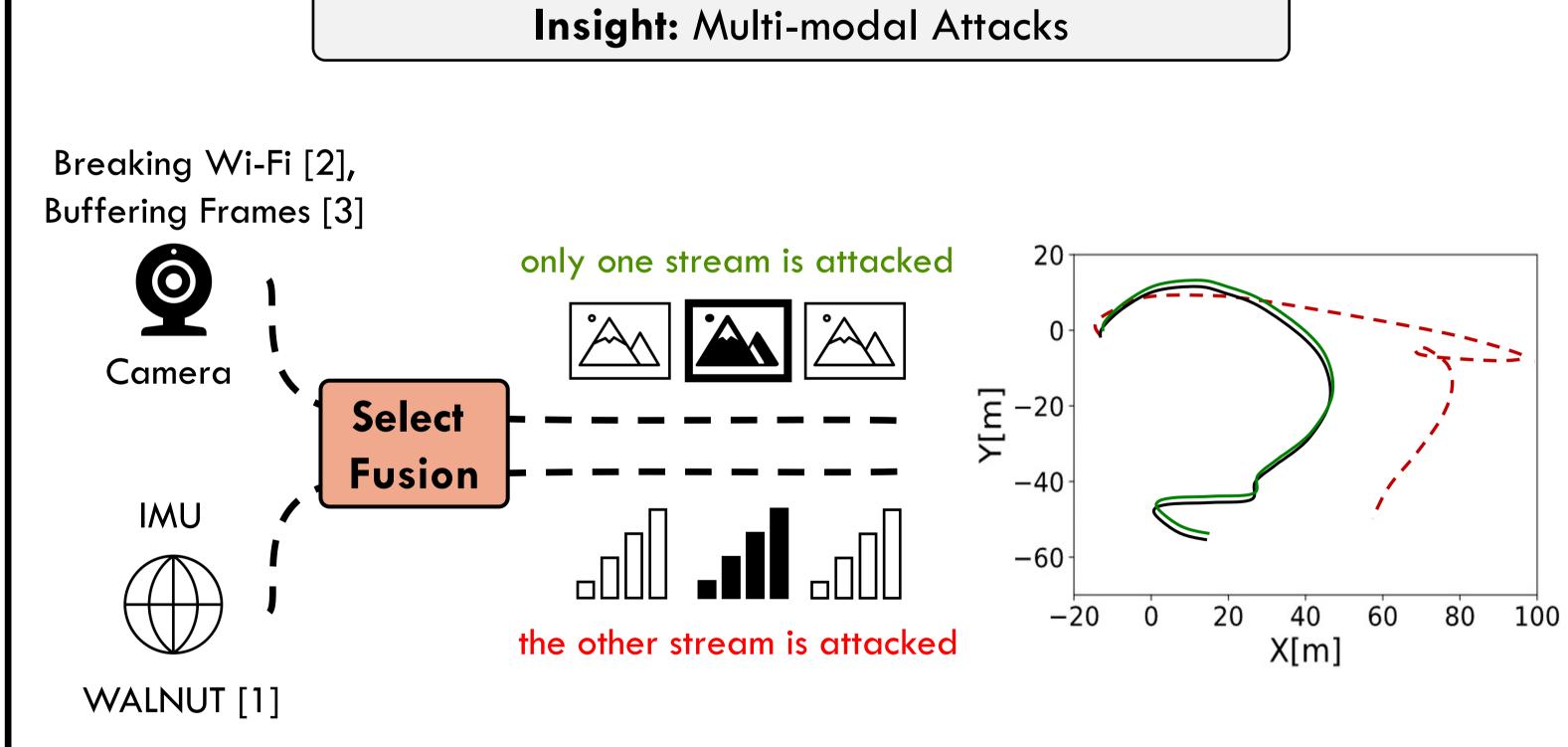
intertwined. Interaction with and manipulation of both the physical and virtual environment.

environment. Fully enclosed, synthetic experience with no sense of the real world.









[1] Trippel, Timothy, et al. "WALNUT: Waging doubt on the integrity of MEMS accelerometers with acoustic injection attacks." IEEE EuroS&P, 2017. [2] Vanhoef, Mathy. "Fragment and Forge: Breaking {Wi-Fi} Through Frame Aggregation and Fragmentation." USENIX Security, 2021. [3] Valente, Junia, et al. "Improving the security of visual challenges." ACM TCPS, 2019.

Challenged, Contributions, and Metrics **Evaluation Desired Attack Metrics Properties Contribution 1: Practical:**

Define the notion of 'frame'

to craft simple per-frame

manipulations.



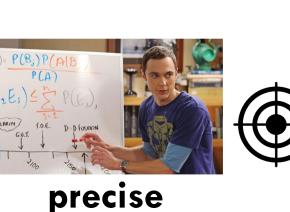












Contribution 3: Parameterize attacks to enable precise control.

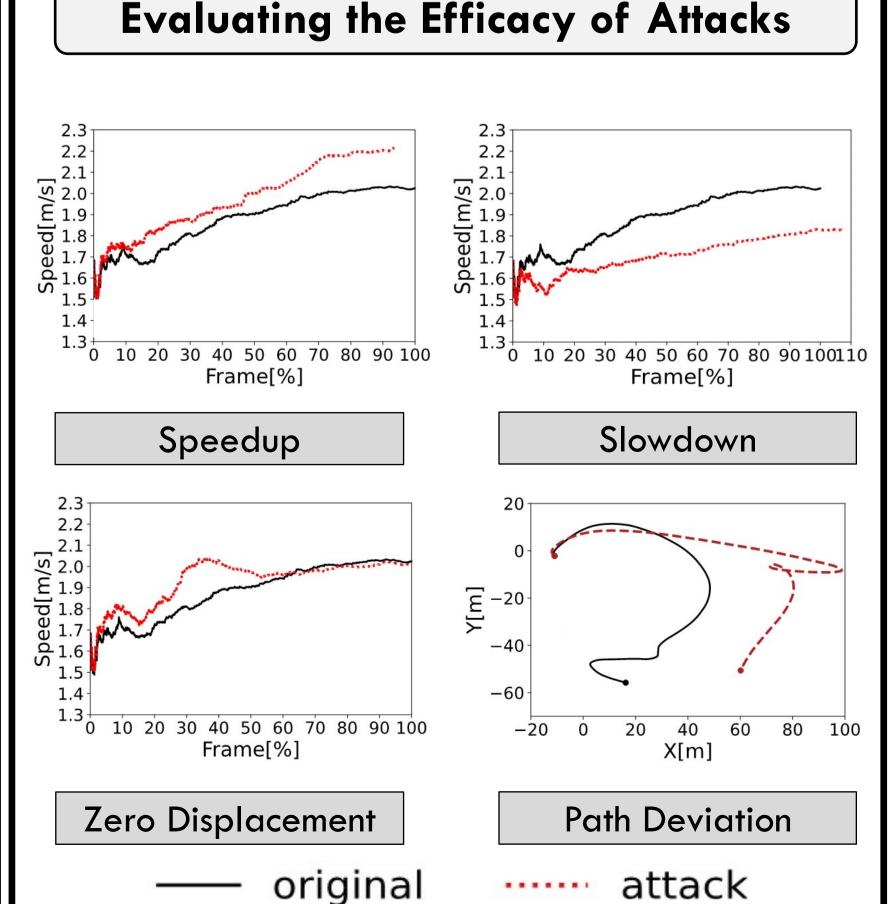
Stealthy: **Contribution 2:** The semantic Launch concurrent multioverlap does modal attacks. not change.

Precise: Desired and consistent deviation.

Simple and

effective

attacks.



HoloSet: A Mixed Reality Dataset Carrier Head-mounted device Action Indoors/Outdoors Environment hiking trail walk 3 8518 Movement type Macro/Micro 15150 1540 Walk, jog + play games that exercise User actions 1003 8251 fine motor skills and hand-eye coordination 5132 Multiple levels in 4 buildings + city Scene setup 37051 center, urban scenes, and hiking trails + campus center micro movements inside a room 5664 student center 17419 Hardware setur Microsoft Hololens 2 28926 2631 Data types RGB, depth, and gray-scale (4×) camera images, IMU data 1726 operation Total distance 12568 micro Ground truth Hololens pose 29 78545

https://zenodo.org/record/7200131

Webpage

HoloSet