Towards a portable worker oriented solution for 5G and mixed reality supported maintenance

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5G TROISDORF
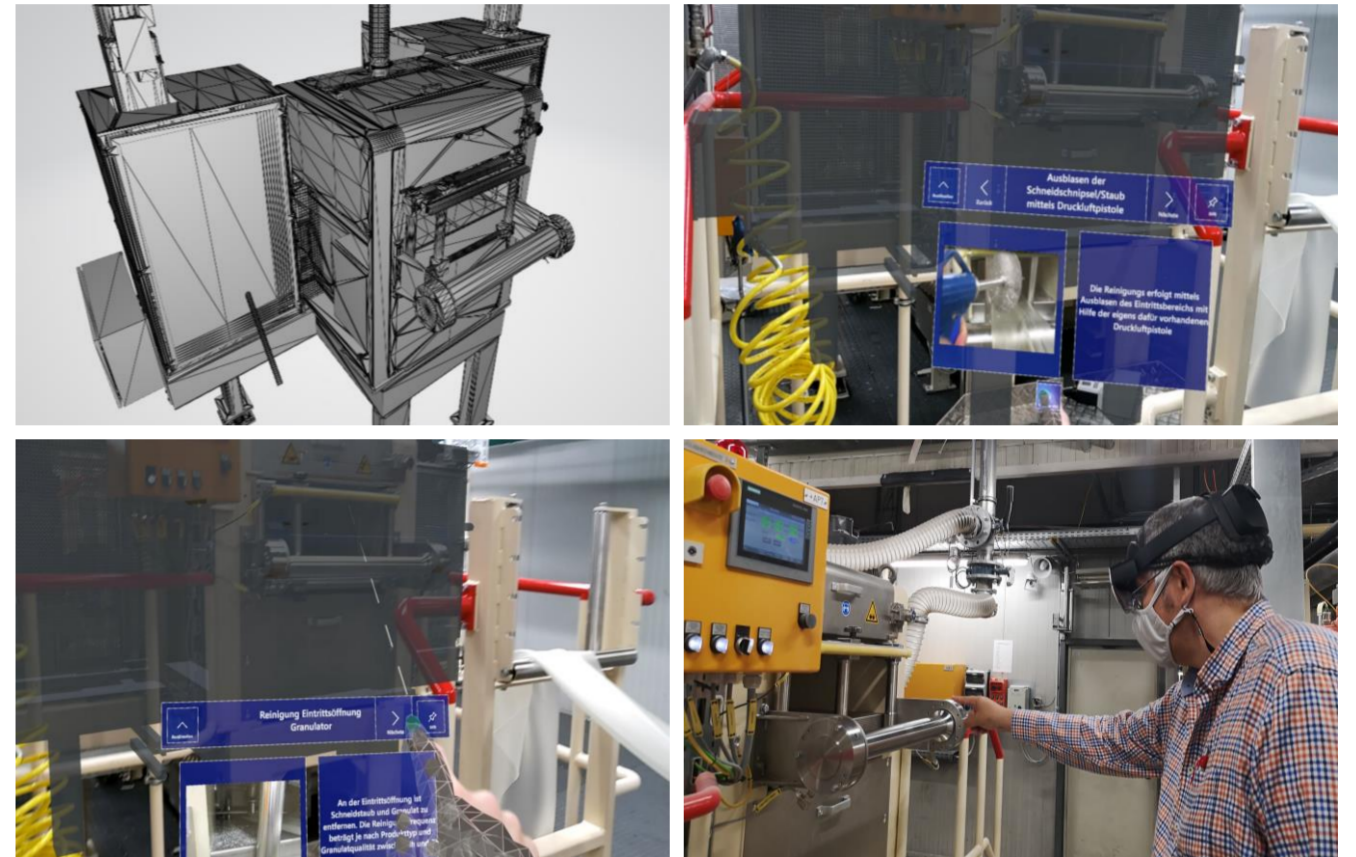IndustrieStadtpark
https://www.5gtroisdorf.de

Motivation

Complex machinery needs regular maintenance. Workers need to be trained for this by experts. Experts also perform maintenance inspections and are called out too frequently.

These experts are scarce. They need to travel frequently, which not only causes stress, but also has economic and logistic dimensions. Thus, every trip that has not been made saves time and money.
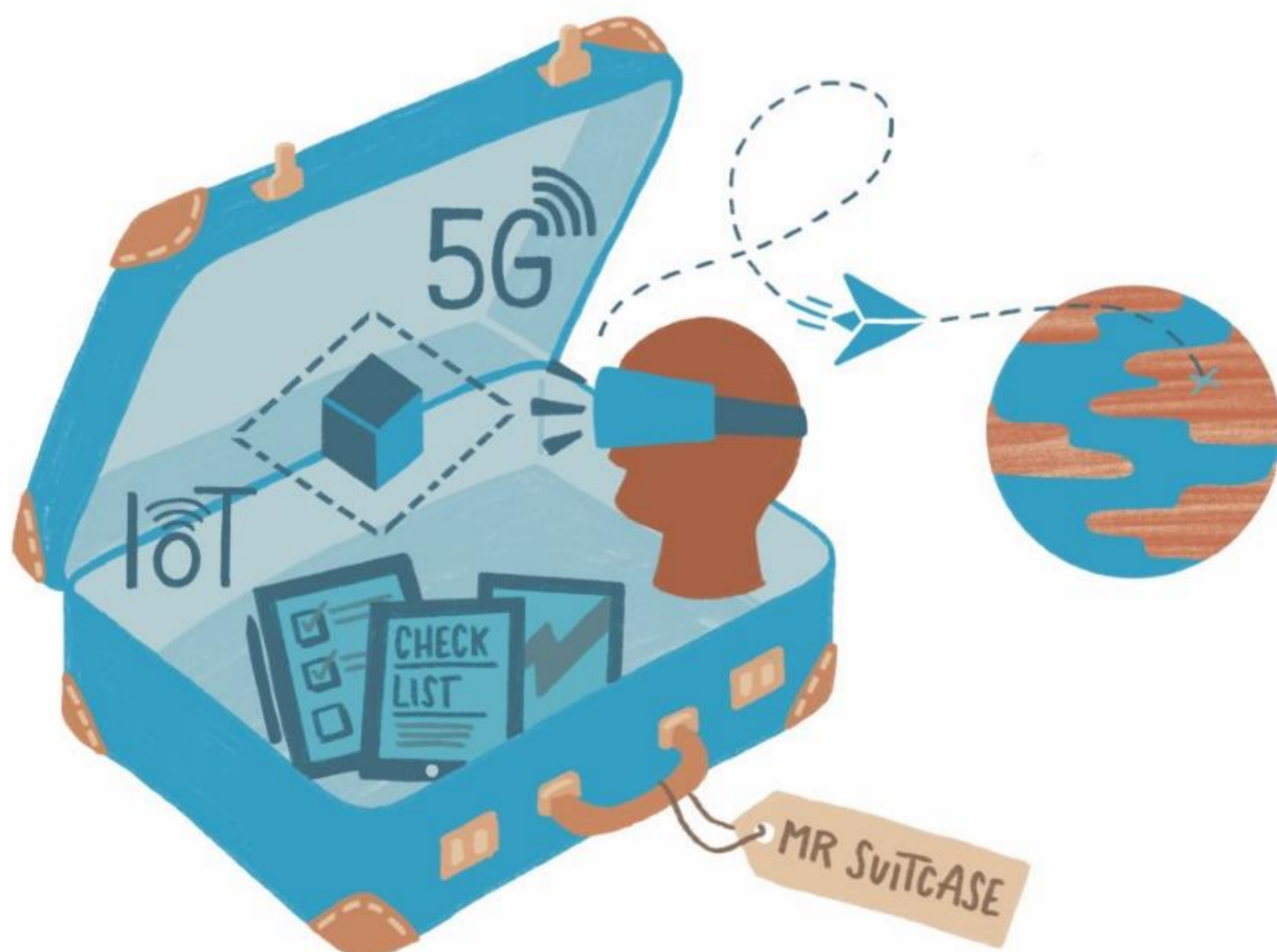
With the advent of high-speed, low-latency 5G mobile networking, coupled with the CAD-data of the machines, we propose a Mixed Reality suitcase filled with different interaction devices that allows experts to assist workers remotely and also support their local training.

Use Cases

First prototype focuses on the regular maintenance of industrial granulators during the following cases:

- Training of workers

- Checklist for maintenance steps

- Guidance to placement of maintenance sensors

- Local maintenance with sensor data

- Remote maintenance with sensor data and audio-visual communication

Challenges

- 5G network will not be available during the first year.

- Rendering the digital twins. Low processing power requires simplified models or remote rendering.

- Evaluating and deciding the best remote collaboration techniques and IoT data visualization.

- Data security.

- Work safety and security.

Mixed Reality Suitcase

Smart glasses: Hands free usage, sharing point of view with the expert

Tablet: Media consumption (Manuals, videos)

IoT: Machine inspection

Networking equipment: LTE or 5G connection

Contents and use cases are flexible and will be adjusted during our three annual iterations and evaluations, based on ISO 9241-210 [ISO19].

Worker stress and ELSA will be also considered.

[ISO19] Ergonomics of human-system interaction — Part 210: Human-centred design for interactive systems. Standard, International Organization for Standardization, Geneva, CH, July 2019.

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