

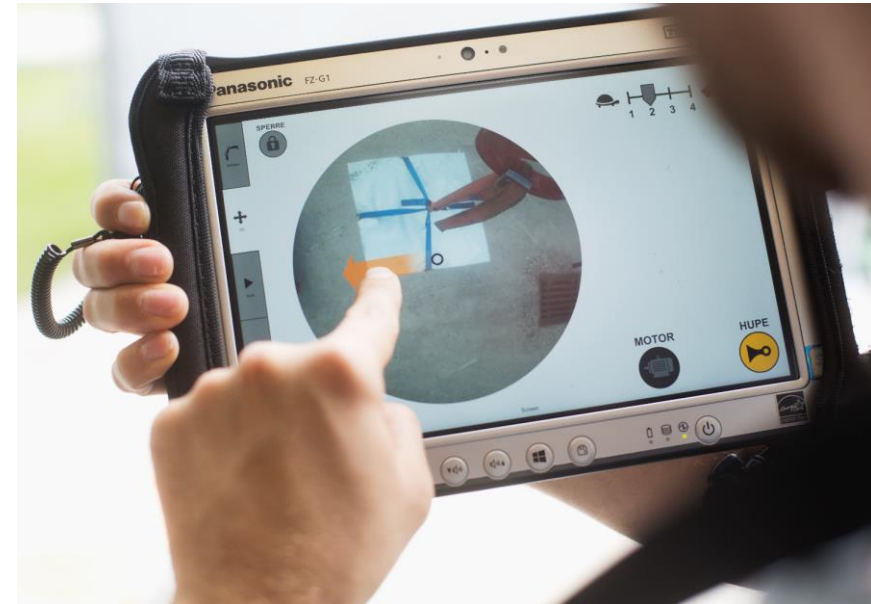
# Evaluation of Remote Crane Operation with an Intuitive Tablet Interface and Boom Tip Control

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SMC 2020



Images: Daniel Delang / TUM

# Application on Loader Crane

## Realization

### Operational Interface

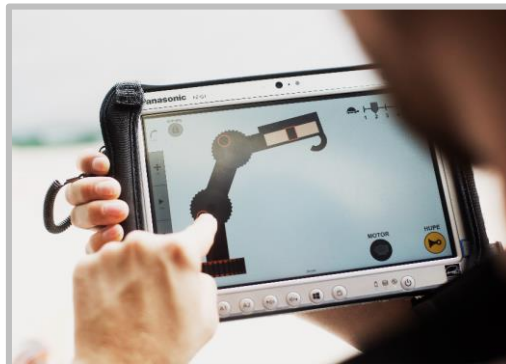
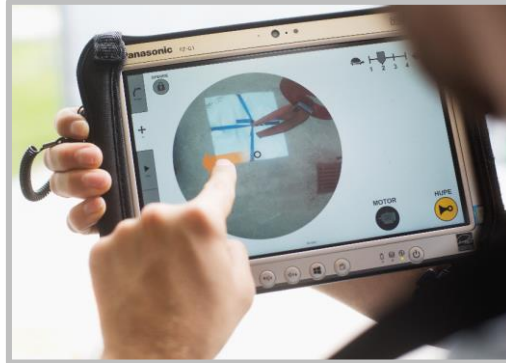
- App Design according to UWP Guidelines  
→ Intuitivity
- Controlling a stationary loader Crane

### Additional Modes

- Manual: single joint control
- Mounting/Demounting of Crane

### Total Cost: 2000 € (excl. Crane)

- Tablet, camera, CAN controller



Process safety?  
HMI Usability?

Image source: Daniel Delang / TUM

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# Study design

56 test persons in 2 groups (experts vs. novices)

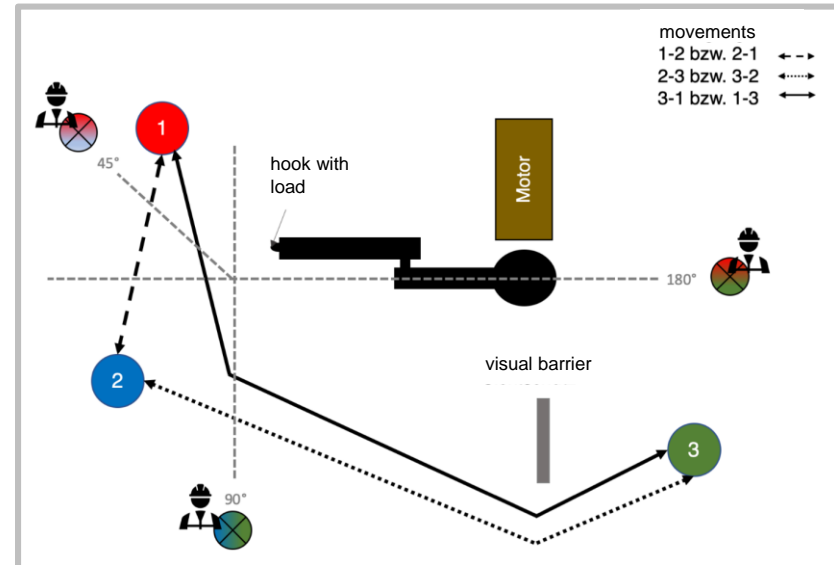
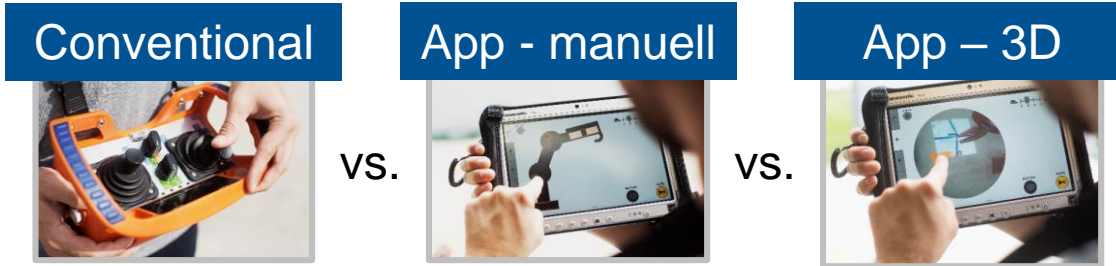
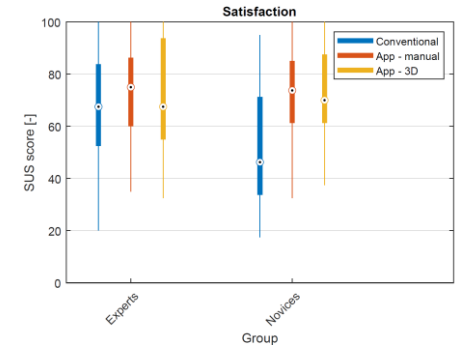
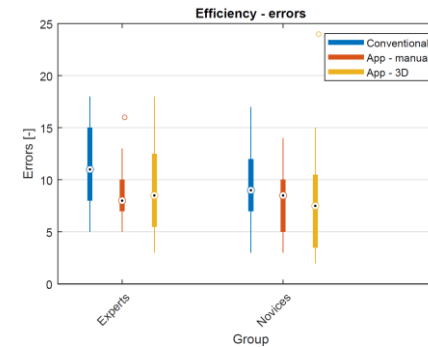
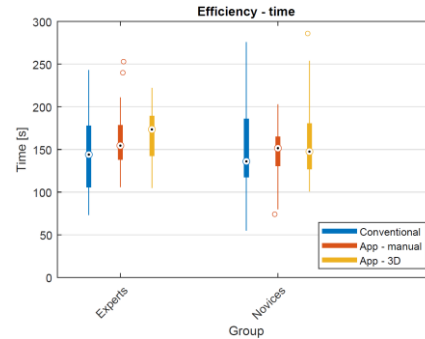
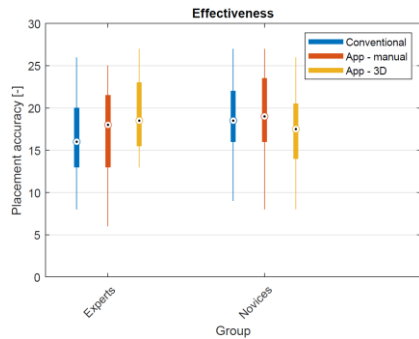


Image source: Daniel Delang / TUM

# Results (Summary)

## Effectiveness, Efficiency, Satisfaction



1. No significant main global effect of the group or the mode.
2. Conventional mode shows a significant difference ( $p = 0.046$ ) between experts and novices.

1. No significant main effect of previous experience.
2. Significant difference between the conventional mode and the 3D mode app mode.

1. Difference between conventional and manual mode is significant.
2. Difference between conventional and 3D mode is significant.

1. No global effect of previous experience.
2. Novices: Both app modes significantly better than conventional control.

### Key Findings:

1. IntuControl increases effectiveness and time efficiency among novices.
2. The more complicated the tasks are, the greater are the advantages of IntuControl.
3. IntuControl increases error efficiency and satisfaction among both experts and novices.

Effectiveness



Efficiency (time)



Efficiency (errors)



Satisfaction



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