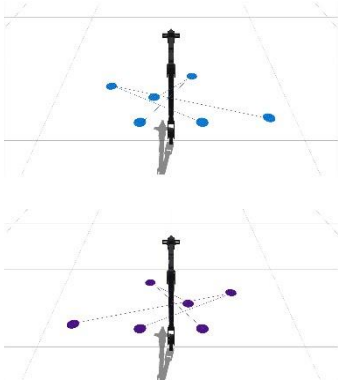# Stakeholder-oriented article

Does boom tip control levels skill deficiencies?

Project Title
AVATAR Advanced Virtual Aptitude and Training Application in Real Time

Author/s:
Felix A. Dreger
Gerhard Rinkenauer

Boom tip control: Mere comfort or skill booster?

Summary

Direct boom tip control is popular among the forestry industry, but the effects of the introduced automation feature need to be understood in terms of safety, mental load, and efficiency. We found in a controlled simulator study that it may cushion the effects of less skilled operators on control performance.

Introduction

The ever-growing introduction of automated systems to aid human performance does not keep away from the forestry industry. There is a close relationship of operator skill and productivity. In this regard, technical advances have the potential to compensate for operator skill deficiencies. The introduction of boom tip controls e.g., IBC, however, poses the question of what are the benefit of boom tip control and to what extent does it mitigate skill deficiencies? Therefore, we investigated conventional joint based control in comparison with IBC in terms of learning progress and operator relief.

Methodology in brief

Twenty-seven participants were invited to the laboratory and underwent a simulated boom control task. All participants were novices and trained their boom control skill within 432 movements in four consecutive sessions. Participants controlled the boom with joint-based or boom tip control. Goal was to hit circular targets in the centre that were laid out on the ground in accordance with forestry work methods.

Achieved and expected outcomes

We found that the direct boom tip control compensates performance deficiencies in inexperienced machine operators. Interestingly, the advantage of boom tip control in terms of movement time disappears as the training progresses. Both control modes i.e., joint based and boom tip control show similar performance in terms of movement times at the end of the learning process.

This study has shown that automation may mitigate bottom effects of skill deficiencies. In addition, we will investigate the effects of mental load while operating semi-automated booms in further analyses. Because the real environment and operator tasks in forestry are complex, future research needs to challenge how the new automation can be used to outperform conventional boom control set-ups. To answer the titles questions: BTC is rather comfort and not necessarily a capability enhancement.