

# Monthly Report (Yamamoto Lab.)

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Research theme: **Haptic Feedback Controller with Palm Pressurization**

## — Research Plan —

Term \ Month	2	3	4	5	6	7	8	9	10	11	12	1
Literature review												
Design PlayStation Controller												
Test PlayStation Controller												
Frequency Response Analysis												
Design Pilot Controller												
Test Pilot Controller												
Theoretical Analysis												
Analyze data and compare												
Write Thesis												

## — Work Contents —

### 1 Introduction

This report is the continuation of the first two reports about the project "Haptic Feedback Controller with Palm Pressurization". The last report has stated the tracking behavior of a simple P- and PID-controlled device for a sine reference of various frequencies. Furthermore, it has suggested an experimentally identified equivalent spring damping coefficient which can be used to model the setup analytically.

This report is first introducing a thorough literature research into the haptic teleoperated field of study. Then it will discuss the results of the tested controller and give advice on how to choose system and setup parameters for future and related work.

### 2 Project Introduction

#### Haptics

The Oxford Dictionaries defines haptics as

"Relating to the sense of touch, in particular relating to the perception and manipulation of objects using the senses of touch and proprioception." [?] It dates the term back to the late 19th century and states its origin from the greek words *haptikos* meaning 'able to touch or grasp' and *haptēin* 'fasten'.

In engineering, the research in the haptic field has started to emerge in late nineteen-eighties [?]. Before that, man-machine interaction was mainly limited to keyboard and mouse input, which is rather unidirectional and passive and it soon has become clear that this requires a more skilled user for all kinds of operations. This directly leads to limitations in performance. Haptics can overcome this unidirectional interaction by providing tactile or kinesthetic information. This can overcome the users limitations and improve performances of high-precision tasks or high-force tasks

drastically.

[?] states, that even though the research in the haptic domain in the past ten years has significantly increased, further investigations are necessary for the "quest for realism", especially in medical telesurgical applications where realism is key to performance. Other application domains include space operations, manufacturing, physical rehabilitation, arts or simply entertainment related devices.

[?] states the critical elements for stability of haptic setups, mainly focusing on haptic simulations. It also motivates exploration of alternative control techniques due to the unpredictability of the human operator and the environment model.

### **3 Discussion**

### **4 Conclusion**

### **5 Outlook**

## References

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