

A Haptic Device based on An Approximate Plane

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Introduction

With spreading 3D and AR(Argument Reality) technology, haptic interfaces have been developed.



PHANTOM2



Cyber Touch(R/L)



Falcon

Purpose

Conventional Haptic devices

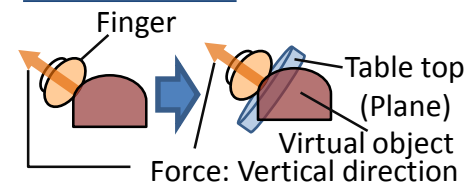
can not perform sense of force and sense of touch at the same time.

Our new haptic device (HaAP)

can represent both sense of force and sense of touch by using the approximate plane.

Our Approach

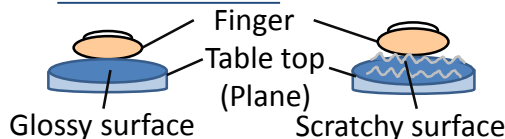
Sense of force



• The plane is approximate to a contact plane of finger.

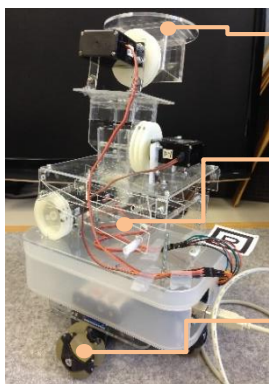
• People can feel feed back of force by touching the plane because finger gets feedback of force from vertical direction.

Sense of touch



• People can feel difference of feedbacks of a sense of touch by changing different material of surface of the plane.

Outline of the HaAP

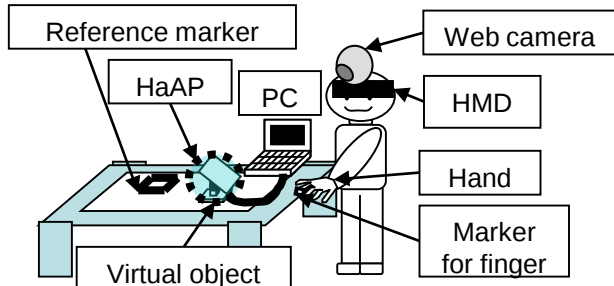


• Table top can tilt in three direction.

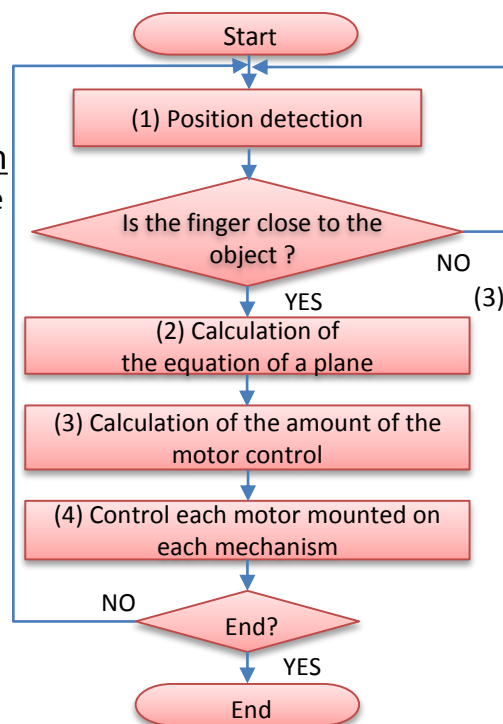
• Pantograph mechanism can move up and down the table top.

• Omni wheel moves the table top in all direction.

System Overview



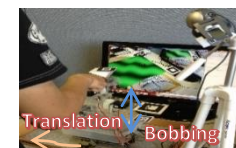
Process to feed back



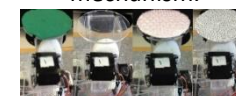
(1) Position detection



(3) Calculation of the amount of the motor control



(4) Control each motor mounted on each mechanism.



Different surface of the material is on the table top.

Evaluation Experiments and Results

Ten people evaluated for following items after they used HaAP and Falcon(conventional haptic device).

No.	Question
Q1	When you touched, you feel the partial shape on the surface.
Q2	When you touched, you recognize the type of material on the surface of the object.
Q3	When you touched, you can easily recognize the difference of the material.

Evaluation value

1 :Strongly disagree. 2 :Disagree. 3 :Neutral. 4 : Agree. 5 : Strongly agree.

No.	Average score		A standard deviation.	
	HaAP	FALCON	HaAP	FALCON
Q1	4.0	3.6	0.60	0.97
Q2	4.4	4.2	0.47	0.83
Q3	4.0	3.8	0.95	0.93

Conclusion

• HaAP can represent both sense of force and sense of touch.