Phantom® Haptics

From Physical to Digital - Add the Sense of Touch to Your Digital World

What is a Haptic?

Haptics, derived from the Greek word haptikos, meaning "pertaining to the sense of touch," are used in modern electronics to describe tactile feedback provided to mimic the touching of objects in a virtual space.

Kinesthetic haptics, such as those implemented in devices like the Phantom Haptics, are bi-directional systems. When a user interacts with the haptic interface—applying an action—the system impedes the users action by applying a corresponding resistive force. This force feedback simulates attributes of a physical object in a virtual space, providing a realistic sense of touch.

Simulated properties include:

- Mechanical attributes: vibration, friction, gearing
- Physical attributes: viscosity, mass, gravity
- Motion constraints: defined range of movement to control object deformation at both macro and micro levels

Why Haptics?

When users can physically feel virtual objects, the quality of interaction becomes just as critical as the fidelity of the force feedback.

Incorporating haptics into systems has been shown to improve user engagement and retention, especially in fields such as product design, simulation-based training, and physical rehabilitation.

Compared to traditional, non-haptic methods, design cycles are accelerated by 30%, training time is reduced by 50%, and skill acquisition improves by 20%. By embedding haptic feedback early and thoughtfully, developers can create more immersive, effective, and user-friendly virtual environments. Enhance the realism and utility of applications such as CAD design, virtual training, medical simulation, and remote manipulation.

Scan to learn more

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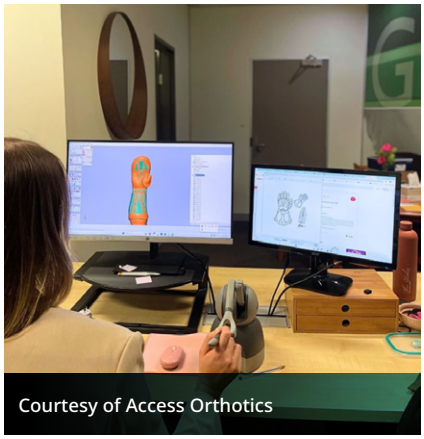
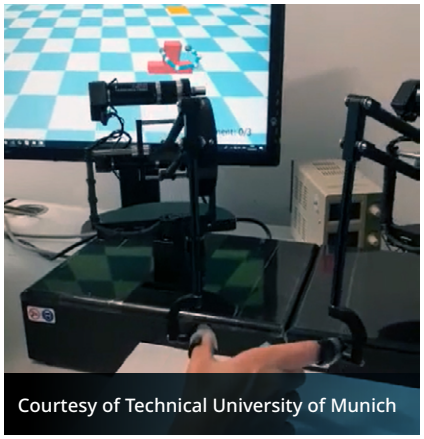
Why 3D Systems Phantom Haptics?

3D Systems Phantom haptics were the first in the field of Kinesthetic based haptics. Our Phantom haptic devices deliver exceptional true-to-life sensations with an unparalleled fluid feel and lower friction than any other haptic device on the market.

With wide range of haptic configurations, 3D Systems Phantom Haptics offer affordable haptic devices ideal for commercial, medical, and research applications, especially when compactness and portability matter.



Courtesy of Access Orthotics



Courtesy of Technical University of Munich

Geomagic® Freeform® is the industry's most comprehensive design software bridging the gap between artistry and digital manufacturing.

The Phantom Touch™ and Touch™ X are affordable options that pair perfectly with Geomagic Freeform for the perfect design interface, improve designs, and streamline workflows.

Unlock the full potential of Phantom haptics by combining the Premium®, Touch X, or Touch devices with the PhantomHaptics SDK. This powerful combination enables developers to build innovative applications that leverage direct object interaction and true 3D navigation, enhancing productivity and user experience.

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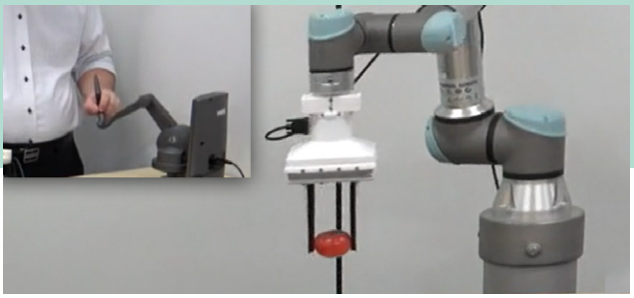
Application Examples

- 3D Modeling and Manufacturing
- Designs for Jewelry, Automotive, Toy, and Shoe
- Applications for rehabilitation and visually impaired
- Training, Simulations, and Skills Assessment
- Teleoperation and Robotic Control
- Medical Models
- Nano Manipulation

Dual Touch

Virteasy Dental provides **simulation software for healthcare training.** By combining 3D Systems' haptic technology with their plug-in, they offer immersive, hands-on training for dental procedures. Their cutting-edge platform significantly improves skill development, learning outcomes, and overall training effectiveness.



Touch X

MotionLib **streamlines complex industrial tasks** with precision and ease by integrating 3D Systems' Touch X with their software so technicians can intuitively train robots and record exact movements for highly demanding applications such as cleaning melting furnaces, handling fragile materials, and executing repetitive tasks in logistics environments.

Dual Touch X

Haag-Streit's gamified **VR applications simulate, control, and monitor every aspect of training scenarios.** Using 3D Systems' Touch X, courses keep users engaged and motivated through personalized goals and guided learning experiences.

Premium 1.5

Virtalis LTD, in partnership with Prof. Sarah Baillie, co-developed a **veterinary training tool** that lets students conduct virtual exams before working with real animals. These simulators use 3D Systems' Premium 1.5 haptic technology for a realistic, hands-on experience.

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Phantom® Haptics

Choose between the Touch, Touch X, and 4 Premium options. Whether it is healthcare, academia, product design, or interactive simulation, leading OEMs choose our Phantom haptics to bring the “wow” factor by letting users feel, interact with, and manipulate 3D digital content like never before.




Device Specification		Touch	Touch X	Premium			
				3DOF	HF High Force	6DOF	HF/6DOF
Phantom SDK, Unreal, Unity, compatibility		Yes					
Optional end effectors		Customizable					
Interface		USB 2.0/3.0 port or a powered USB Hub that supports USB 2.0/3.0					
Servoloop rate		1KHz	Up to 4KHz	Up to 8KHz			
Range of motion		Hand Movement pivoting at the wrist		Hand Movement pivoting at the elbow			
Footprint		168 W x 203 D mm	143 W x 184 D mm	330 W x 254 D mm			
Work Volume	*Translation (mm)*	~ 432 W x 348 H x 165 D	~ 356 W x 229 H x 180 D	711 W x 686 H x 229 D			
	Rotation	124°, 103°, 118°	120°, 102°, 92°	180°, 167°, 103°			
	Roll, Pitch, Yaw	290°, 144°, 300°	260°, 30°, 290°	available option		297°, 260°, 335°	
Work Space		~ 160 W x 120 H x 70 D mm		381 W x 267 H x 191 D mm			
Nominal position resolution	*Translation*	0.055 mm	0.023 mm	0.03 mm	0.007 mm	0.03 mm	0.007 mm
	Rotation *Roll, Pitch, Yaw*	±5% linearity potentiometers	14 bit-Magnetic Absolute Position	available option		0.0080°, 0.0023°, 0.0023°	
Maximum exertable force and torque at orthogonal arms	*Translation*	3.3 N	7.9 N	8.5 N	37.5 N	8.5 N	37.5 N
	Rotation *Roll, Pitch, Yaw*	N.A.		N.A.		170, 515, 515 mNm	
Continuous exertable force and torque* at orthogonal arms	*Translation*	0.88 N	1.75 N	1.4 N	6.2 N	1.4 N	6.2 N
	Rotation *Roll, Pitch, Yaw*	N.A.		N.A.		170, 515, 515 mNm	
Backdrive friction		~0.26 N	~0.06 N	0.04 N	0.2 N	0.04 N	0.2 N
Inertia (at tip)		45g	35g	~75g	~150g	~75g	~150g
Stiffness	*X, Y, Z*	1.26, 2.31, 1.02 N/mm	1.86, 2.35, 1.48 N/mm	20 lbf in^{-1} / 3.5 N/mm^{-1}			
Force feedback		X, Y, Z		X, Y, Z		X, Y, Z; Roll, Pitch, Yaw	
Position sensing/input		X, Y, Z; Roll, Pitch, Yaw		X, Y, Z (Roll, Pitch, Yaw available)		X, Y, Z; Roll, Pitch, Yaw	
Power		18V DC 2.22A 40W	24V DC 3.75A 90W	24V DC 9.2A 221W			
Weight		6 lbs 5 oz	3 lbs 15 oz	35 lbs			

** 24 hrs*

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Ready to learn more?
Scan the code to get started: