



Introduction to Digital Haptic Actuator

Acturonix

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www.acturonix.com

1. What is DHA ?

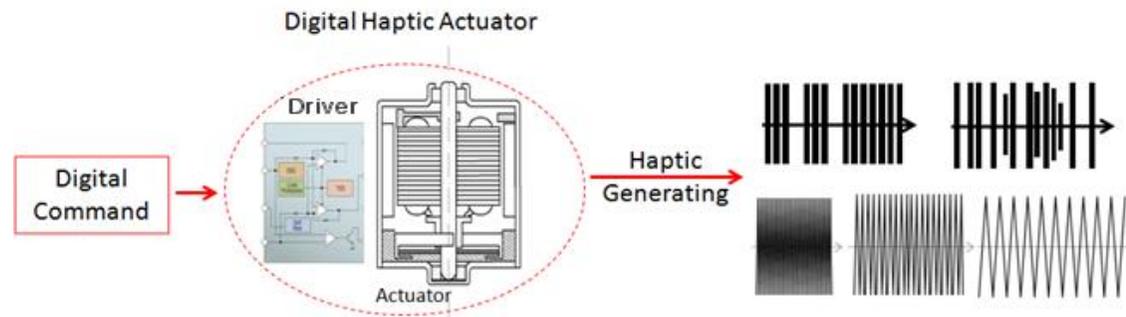
“DHA” means **Digital Haptic Actuator**, is a new innovative haptic actuator.

It can generate real impact like drum beats.

Also it can generate vibration but more vivid than vibration motor(ERM or LRA).

DHA is not resonant actuator, not Linear actuator. There is no physical spring in DHA.

DHA is motor based technology and patented.



Unique Advantages

- Able to generate both impact (shock) and vibration haptics
- Digitally controllable haptic impact in numbers, timing and frequency
- Independently controllable haptic vibration in magnitude and frequency
- Wide range of vibration frequency
- Various form-factors: the same as motors

- **DHA can provide gamers with a more lively sense of reality, fun, and immersion with abundant haptic feedback such as,**

- (1) Shooting Game - When pulling a trigger, generating impact shock like real gun-firing
 - Generating impact shocks responding to timing and occurrence of triggering or hitting
- (2) Fighting Game - When hitting or beaten, generating impact shocks responding to that
 - Various expressions for attack and beaten situations with impacts and variable vibration.
- (3) Car Racing Game - Generating various haptics responding to events like car crash, explosion
 - Proper haptic expressions with appropriate vibration frequency with shock

etc....

- **Providing optimal haptic feedback for various information and contents in the infotainment system such as,**

- (1) To provide different sense according to the situation of danger and indicate urgency
 - Different haptic feedback according to lane deviation, center line crossing, for maintenance etc.
 - For Anti-drowsiness or wake-up from drowsiness
- (2) To be able to Haptic UI for the disabled
 - By configuring haptic patterns, it's possible to provide information to the disable people
- (3) To provides a more vivid and realistic experience for enjoying contents such as games, music, movies, etc.
- (4) Button touch feedback with localized feeling, without residual vibration.

etc....

Various haptic sense

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DHA's unique performance

<https://www.acturonix.com/14>

Unique tech. of Sound to haptics

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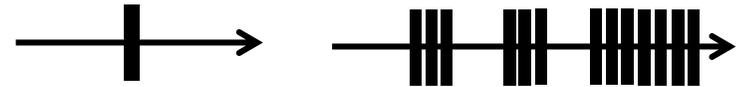
Examples of haptic pattern for
car safety

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➤ **Innovative actuator DHA showing a real impact feedback as well as rumbling vibration**

➤ **The single/multiple impact feedbacks**

- Real impact touch of sense, similar to a drumbeat
- Single, multiple and continual impacts
- Impact durability : Min. 30Million times continuously impact



➤ **The vibration**

- More vivid vibration than that of ERM (eccentric rotating mass)
- Inertial vibration
- Operating range 0~500 ips
- Human friendly touch sense at 40~100 Hz



➤ **Programmable haptics**

- Combination of impacts and vibrations with various magnitude and frequency
- Haptic pattern design for programmable feedback
Haptic UI system building

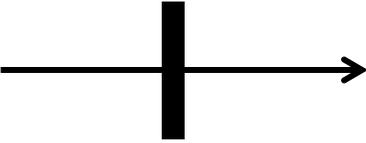
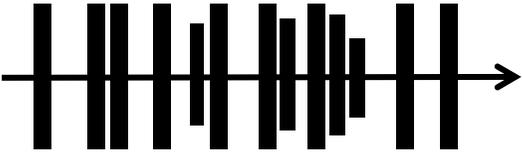


➤ **Easy Connection and Control**

- Magnitude, frequency and generating number controllable by frequency & duty of high/low signals.
- Three lead wires (V+, GND, pulse signal) connection
- No need special drive IC



→ Generating Digital Impacts (Shock) Haptic

Input	Output Impact (Shock)
High/low signal with duty	Single impact 
	Double impacts 
	Continuous impacts 

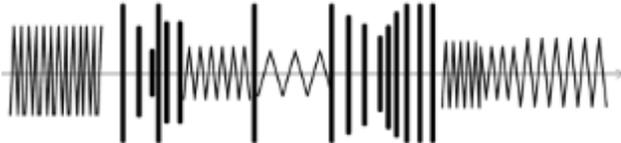
Advantages

- Real impact (not frequency combination effect) with controlled timing, numbers, frequency and magnitude.
- Various impact haptic feedbacks (clear impact like beatbox, available of user designed patterns, haptic Morse code combination, gunfire impact, gunshot impact, etc.)

→ Digitally Controlled Vibration with Wide Range of Frequency

Input	Vibration Output
High/Low signal with Duty	<p>Different frequency with same magnitude</p> 
	<p>Different magnitude with same frequency</p> 
	<p>Easily controlled in the wide range of frequency (0 ~ 500ips)</p>  <p>- Strong vibration from 40Hz to 100Hz (Human-friendly vibration range)</p>

→ Fluent Haptic by Combining both Impact and Vibration

Various Input	Optimal output
High/Low signal with Duty	

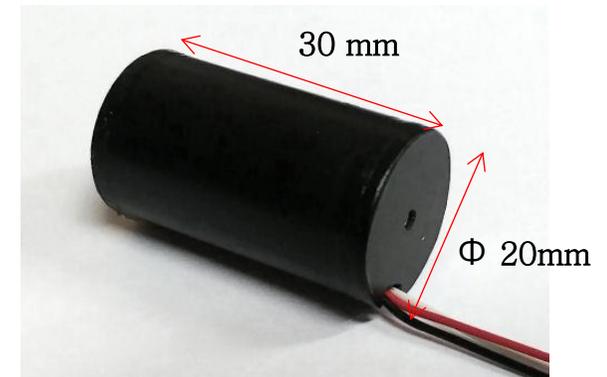
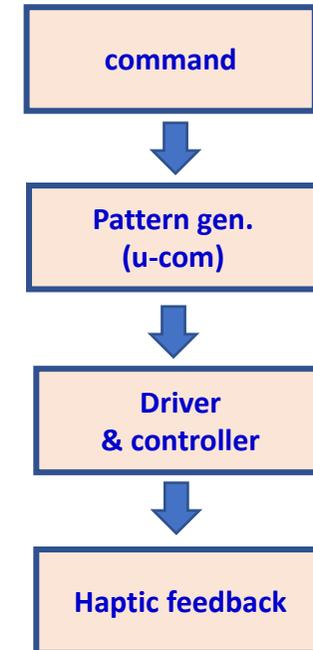
- Easily showing various senses of touch
 - Feeling of touching a mechanical button
 - Feeling of collision
 - Feeling of a soft touch
 - Feeling of bouncing balls and so on ..

6. Target Market

<p>Console/Cloud/Mobile Game controllers</p>			
<p>Vehicle Infotainment System</p>			
<p>AR/VR Suits controllers</p>			

7. Demon-Sample Spec. for Game controller

items	Preliminary spec.	notes
Motor structure	Brushless DC Motor	
	Built-in driver	
Rated voltage	5V	12V available
Peak current	430mA	Depends on speed
resistance	11.6 Ω	
size	$\Phi 20 \times 30$ mm	Size changing available
Impact speed	0~500 ips	ips = impacts per second



We are welcome to custom design for customer !

Thank You !!!

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