

A CONTROLLER THAT CAN TAKE DIFFERENT SHAPES



Reducing driver distraction

Driver distraction is always a top concern, especially when it comes to interacting with today's in-vehicle technology (IVT). In an effort to allow the driver to control an IVT center console without looking or talking, the HARMAN FX (Future Experience) team came up with the solution of a Shape-Shifting Rotary Controller.

Dynamically convey information

HARMAN's Shape-Shifting Controller is an in-vehicle rotary controller which can change its physical shape and diameter under the driver's fingers, even while the driver is manipulating the controller. It subtly conveys information via our human sense of proprioception. That is the sense which allows us to distinguish a banana from an orange without looking at the fruit. So, the driver can keep his eyes focused on the road. This system complements our vision and hearing based HMI systems by "load-balancing" our human senses.

How will the driver interact?

There are many use cases where a rotary controller is advantageous. For example, each IVT system mode, such as media or maps, could be associated with a different knob shape. This would make it easy for the driver to understand the currently selected state based on the knob shape. In general, the knob shape automatically adapts to its function and on the driver's specific intended interaction with the IVT. One example is when searching for a contacts in a long scrolling list would cause the knob to unfold and change diameter the further down they are in the list. It can also assume the shape of a selector when browsing among various social media, or the shape of a scrubbing wheel when searching through podcasts. There are many more shapes with the opportunity to make each interaction more intuitive.

Key highlights

- Rotary in-vehicle input device which is dramatically re-engineered to be also an output device
- Allows car to communicate with driver in an almost subconscious way
- May reduce driver sensory overload since senses are largely processed in parallel
- This is an industry first, and a radically novel user experience (UX), protected by multiple patents (granted and pending)

HARMAN LIVS

HARMAN's Life-Enhancing Intelligent Vehicle Solutions (LIVS) use an end-to-end approach by integrating the in-car computing platform with the cloud platform for a new level of user experience.

SCALABLE | Compute Platforms

Tailor-made for the needs of automakers and vehicle segments

CONNECTED | Modular Connectivity

Ready for delivering connected services – enhancing efficiency, productivity, and entertainment

SAFE | ADAS & E-Horizon

Monitoring and assessing the surroundings of the entire vehicle and beyond line of sight

SECURE | 5+1 Security Architecture

Full protection for the driver and the vehicle, OTA (over-the-air) updateable

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Features and benefits

New communication channel

- The system creates a new communication channel between car and driver which relies on a human sense which is under-utilized in cars today
- With the system, the driver may simply feel in which IVT mode the system is without looking at the display

Not adding to information overload

- The system reduces information overload since people can process certain sensory information in parallel; this particularly includes the sense that is used here

Flat learning curve

- After a short time of associating knob outlines or knob motions to IVT system modes and functions, drivers will not need to look at the display anymore

New language

- HARMAN has developed a new proprioceptive language which uses a variety of shapes and diameters of the rotary controller, both static and as motions, to create an expressive back channel between car and driver

Mechanical features and actuators

- Mechanical actuators rotate multiple concentrically mounted lobes to create various shapes and diameters, as well as motion patterns
- The current prototype uses lobes that have an internal ring gear that is driven by a spur gear mounted on a D-shaft. As the controller is also an input device, the whole assembly can be rotated freely by the driver

Alternative actuators

- In addition to the current controller design, multiple alternative actuator methods and industrial designs are currently available for integration programs together with our select OEM partners

An industry expert as partner

HARMAN is the market leader in connected car solutions for the world's automakers. HARMAN's innovative and highly integrated infotainment technologies offer automakers the most extensive solutions for advanced navigation, intuitive user interfaces, integrated audio, device connectivity, cyber security, and connected safety, just to name a few. From Boston to Berlin to Bangalore, HARMAN is delivering a dynamic in-car experience for an increasingly connected world. HARMAN is a wholly-owned subsidiary of Samsung Electronics Co., Ltd.

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