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INSIDE:

Sensors for personal mobility devices

EDITED BY **MIKE SANTORA**

How sensors help enable personal mobility devices

For wheelchair users, engineering and accessibility can often help offer vastly improved mobility. Working on these challenges is New Zealand-based Omeo Technology. The manufacturer specializes in what it calls "personal mobility devices," and the engineering and technology it is built on enables its users to have a freedom and control that was previously unavailable.

The Omeo

The Omeo personal mobility device provides hands-free control, beach and other off-smooth or -paved surface mobility, a zero-degree turning radius, and substantial power and speed capabilities. Hands-free control is achieved with an active seat control that enables the user to move the Omeo forward, back, left, and right by leaning in the seat.

The drive and tires are designed to work on sand, gravel, dirt, and smooth surfaces. Zero-degree turns let users roll through tight spaces indoors or outdoors which could be a non-starter for conventional wheelchairs. The run time on a single charge of the battery gives the Omeo a range of up to 31 miles and at speeds of up to 12.4 mph.

Why does such sportiness matter? Well, in just one user's case, it lets him roll alongside his wife while she goes for a multi-mile jog. Participating in activities that were once out of reach can be life-changing.

The technology behind the Omeo

To understand how the Omeo works, it helps to start with the Segway — the device on which the Omeo platform is based.

The Segway is a personal transporter device designed for a rider to be standing up and steering by leaning left, right, forward, or back while holding a handlebar. The handlebar contains an angle sensor at its base to detect the angle of the handlebar and its left or right direction of tilt. The handlebar, together with the sensor, is referred to as LeanSteer by Segway. There are sensors on the platform for riders to stand on to detect their forward or backward lean — both in direction and degree. Two controller boards under the rider's platform accept inputs from the batteries, motors, LeanSteer sensors, rider platform sensors, rate, and gyroscopic tilt sensors.

Omeo has re-engineered the motion controls to adapt the functionality to a seated rider.

A seated rider controls the Omeo's motion by shifting their weight about a central pivot point using sensors under the seat to detect a forward, backward, left, or right weight shift around that point. Omeo calls this Active Seat Control (ASC). There is also a joystick so riders can choose between one of these control input methods. In either case, the sensors and joystick use angle sensors to generate output control signals that are sent to two controller boards with microprocessors and software stored in memory to process these signals.

Omeo can only be started in joystick mode with the stabilization legs extended to ensure the rider's safety. Once a rider is ready, they can retract the legs and switch to ASC mode.

Two Novotechnik SP 2800 angle sensors are used in the Omeo for motion control. They both have redundant circuits to maintain operator control even in the unlikely event of a failure of one of a sensor's circuits.

When a user moves the Omeo joystick in one direction, the angle sensor converts this movement to an

The Omeo personal mobility device on the beach. The drive and tires are designed to work on sand, gravel, dirt, and smooth surfaces.

electrical signal. That signal is sent to a controller in the Omeo's base. The joystick is spring-loaded to maintain a neutral position unless a rider moves it. The joystick is used for turn information only and not forward or backward motion input. Only one sensor is needed to assess the position of the joystick.

The second angle sensor is coupled to the Omeo's seat and is used by the ASC for left or right tilt input. The seat is also spring-loaded to maintain a neutral position unless the rider shifts their weight, thereby changing their center of gravity. Omeo has also engineered hydraulic dampening into the seat to smooth out seat motion for the rider and enable the Omeo to be steered in a consistent and highly controlled manner. This is achieved by a needle valve that restricts the flow of hydraulic fluid between two cylinders on each side, under the seat, and supported by a mechanical pivot point.

There are two modes of operation with the Omeo that enable riderless operation. In the first case, called Walker Balance Mode, a user may want to roll the Omeo without a rider while walking behind it. One example in the manual describes moving the Omeo up or down a ramp. The second is called Free Wheel Mode and is used when moving the Omeo without powering the wheels is desired.

The Omeo has front and rear lights for travel in low light. It measures 35 x 25.6 x 39-in. (l x w x h). With the off-road kit, the width is 34-in. It comes with a Railblaza attachment port that accepts add-on accessories, including storage compartments, cup holders, umbrellas, or fishing pole holders. Its maximum combined rider and cargo capacity is up to 250 lbs. The weight of the Omeo itself is 172 lbs with batteries, and it has a ground clearance of 3.4-in. Omeo specifies that it will operate on a slope of up to a 20 to 25° incline and 30° decline — with sufficient traction. DW

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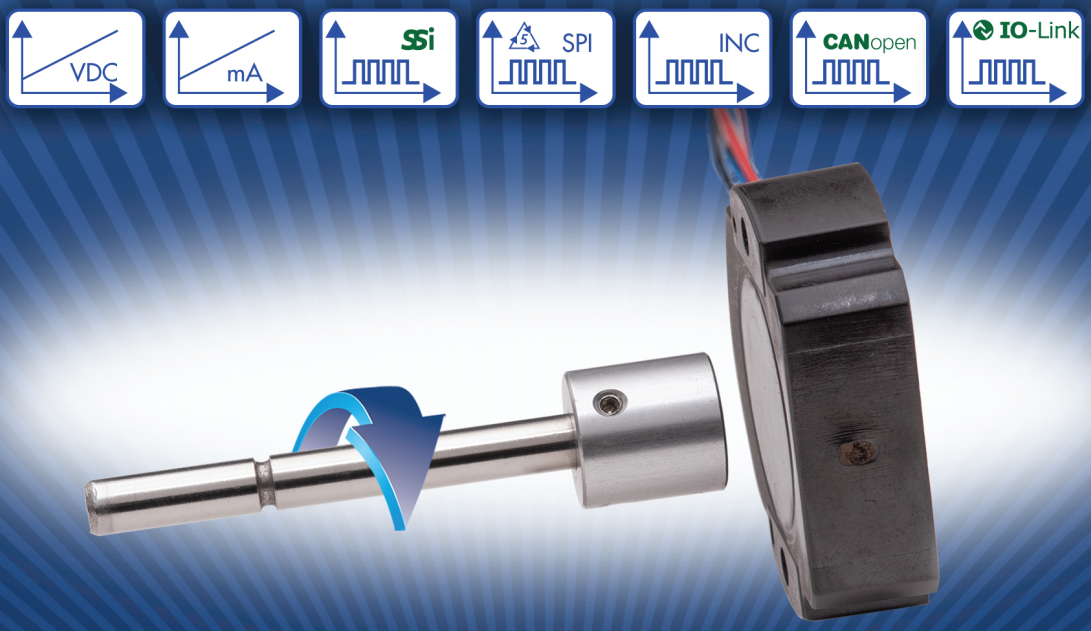
Wear-Free Angle Measurement Made Easy



RFC 4800 Series of touchless sensors use a magnet attached to your application's rotating shaft. Now with IO-Link output option, analog and IO-Link versions of RFC 4800 sensors can be easily connected with three wires—power, ground and signal.

Touchless angle sensing technology excels in many applications including:

- measuring through a wall or plate
- sealed-shaft environments
- high-vibration shaft
- shaft with limited play
- low friction torque
- driveshaft misalignment

Key specifications:

- Repeatability to 0.1°
- Measures 0 to 360°
- Resolution to 14-bit
- Linearity ≤ ±0.5% of F.S.
- 2-ch. version option
- speed output option

View video and white paper: www.novotechnik.com/rfc48

Novotechnik U.S., Inc. Telephone: 508-485-2244
Email: info@novotechnik.com

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