

technology TODAY

Alan Pierce
pierceaj@optonline.net

A One-Wheeled Motorcycle

A tricycle has three wheels, a bicycle has two, and a unicycle has one. The amount of time needed to master riding each type of cycle has a direct relationship to the number of wheels touching the ground.

Your sense of balance didn't enter the picture when you learned to ride a tricycle. Learning to ride was all about learning how to change the striding motion of your legs into a pedaling motion that would make the tricycle go.

The bicycle called for learning side-to-side balancing. Your ability to balance the bicycle is actually handled by the gyroscopic effect created by the bicycle's spinning wheels once you get the bike in motion. The wheels function as

spinning gyroscopes that create vertical stability. If this statement doesn't make sense, you will want to read up on *precession*, Newton's first law of motion, and *gyroscopes*.

The unicycle's one point of ground contact and lack of fast motion make riding it very difficult to

master. But can the same type of gyroscopic technology found in a Segway People Mover help create a new breed of one-wheeled motorcycles?

The one-wheeled motorcycle shown here recently won the 2003 prestigious Gold Award from the Industrial Design Society of America and *Business Week Magazine*. Bombardier Recreational Products of St. Bruno, Quebec, designed the ve-

hicle. The Bombardier press release calls its Embrio design an "advanced concept . . . one-wheeled recreational and commuting vehicle that promises a whole new experience on the road."

Without explaining the technology behind this vehicle, I asked two technology educators, who happen to be major motorcycle enthusiasts, if they would like to take a new motor-unicycle on a road trip. They both looked at me like I was crazy, helping me realize that the Embrio is, at this time, a concept vehicle that Bombardier

designed to meet future (2025) rather than present recreational needs. It will take a major advertising campaign to make even extreme sports enthusiasts comfortable with the idea that they are going to ride a motorized unicycle very, very fast.

To provide greater stability for starting and stopping, the Embrio has what Bombardier calls a "stand-by configura-

tion," in which front wheels deploy in much the same way as an airplane's landing gear. Just like a Segway, the Embrio uses a series of gyroscopes and electronic sensors to balance the rider on one wheel. On ABC's *Good Morning America*, the Segway was described as "the world's first self-balancing human transporter."

The Embrio adds fun and excitement to the Segway equation. To

start to move, the driver activates a hand pedal on the left handlebar. The sensors adjust the rider's position so that it will continuously project a feeling of balance and control as the vehicle accelerates or decelerates. To brake, the driver presses a similar hand pedal on the right handlebar. To turn the vehicle, the driver simply leans in the direction that he or she wants to go.



Photos Courtesy Bombardier Recreational Vehicles

At 20 km/h (12.428 mph), the landing gear automatically retracts so the fun of high-speed motor-unicycling can begin. Note that as long as the gyroscopes are spinning, the Embrio would be stable even if it were standing still without its landing gear down.

You can learn more about the Embrio on the Internet by going to Bombardier Recreational Vehicles' web site (<http://recreation.bombardier.com/>) or by typing Bombardier Embrio into your favorite search engine.

Recalling the Facts

1. What is the significant difference between a unicycle, bicycle, and tricycle?
2. Why does forward motion make it easier for you to balance a bicycle?
3. How is a Segway People Mover similar in design to the Bombardier Embrio? ©

Alan Pierce, Ed.D., CSIT, is a technology education consultant, technical writer, and public speaker on technology issues.

