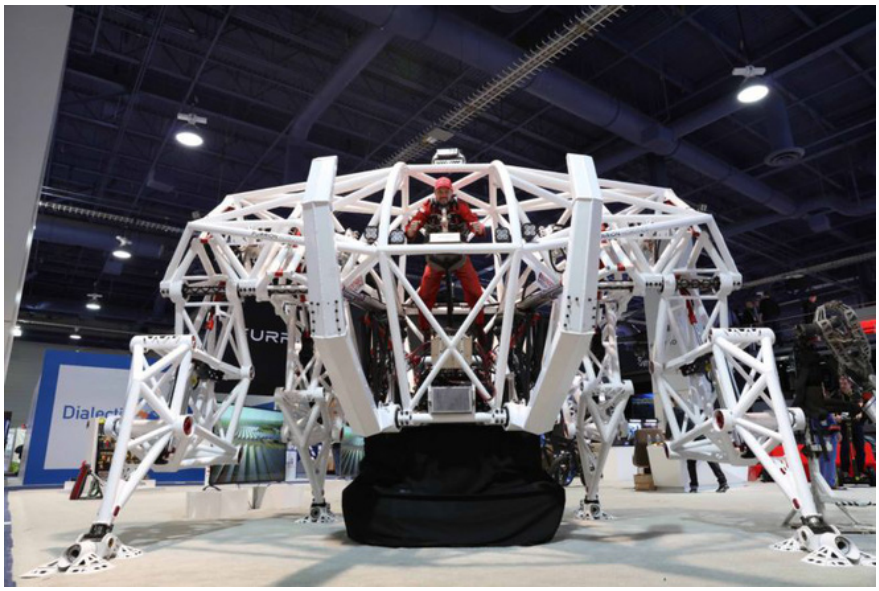
Not only did he want to create a manned robot inside, he wanted to create a robot race

Further, Tippett wants this inner-rider robot race to develop into a sport that can participate in the Olympics.

If Jonathan Tippet is right about his way of doing things, the Olympic Games in the future will not only involve humans, instead there will be robot athletes with the driver inside. And at a tech event in Toronto in July, this Canadian mechanical engineer imagined a race where participants would sit inside giant mechanical machines.

And people didn't have to imagine long when only very quickly then Tippett introduced the first athlete for the idea of ??the robot race. Prosthesis, an electrically-hybrid, biomass-based mechanical chassis, weighing 8,000 pounds (about 3.6 tons), 15 feet high (about 4.5 meters), can amplify the driver's movements inside the cockpit. Made of colored steel, Prosthesis can run at 21 miles per hour (about 33 km / h), leaps up to 10 feet (about 3m) and operates continuously for 2 hours on a single charge.

The numbers were a little technical and production, but months later, Tippett thought his mission had more philosophical implications than people thought. ' *Prosthesis can be seen as a high-tech machine, but this 3.6-ton machine is a metaphor for technology that can allow us to do what we want and the important role of people in the robot industry* . '



That thought is why Tippett and his team at Furrion, an Indiana technology firm partnered with him to build Prosthesis, chose to add a cockpit to this machine and create a console. instead of the remote control panel as we often see in drone races. ' *Prosthesis as an extension to the driver's body* .' Tippett said. ' *It's like riding a*

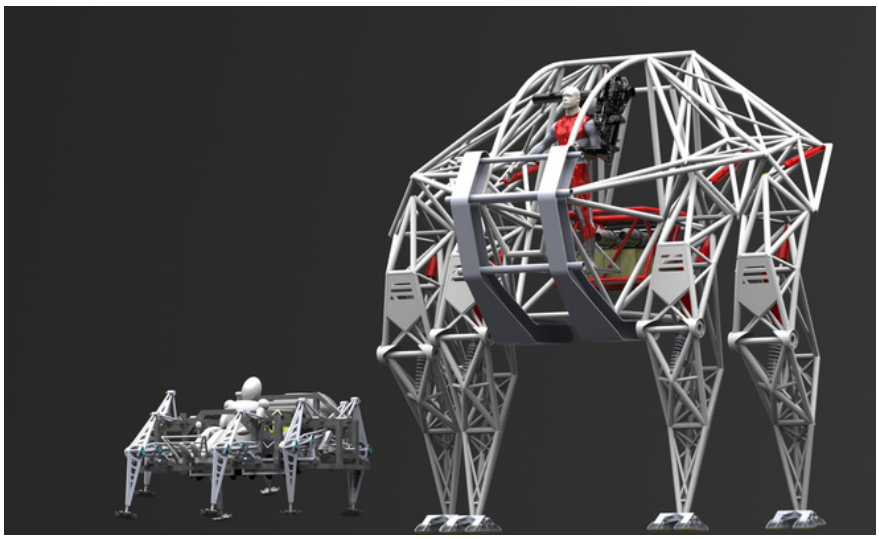
mountain bike, which directly brings the experience to you instead of just being an audience .'

But Tippett's ambition didn't stop at creating a manned robot inside. He is currently focusing on training the driver and making sure the machine is tuned to be ready for a race. Instead of on two feet like athletes, Prosthesis moved on all fours more like a gorilla. So far more than a dream about

From a giant, mechanical spider

This is not the first time people have met Prosthesis. This giant mechanical machine has appeared at many technological events such as CES 2017 and Burning Man in the past summer. Burning Man really inspired the spirit of innovation in Tippett before he embarked on Prosthesis.

Here, Tippett and his colleagues in Vancouver can build the Mondo Spider, a giant machine spider that can move thanks to hydraulic motors and motors. Later, with CODE Live's authorization, the machine switched to electrical power, allowing the Mondo Spider to be relatively quiet, solar-powered, and emitting no emissions.



Mondo Spider next to Prosthesis.

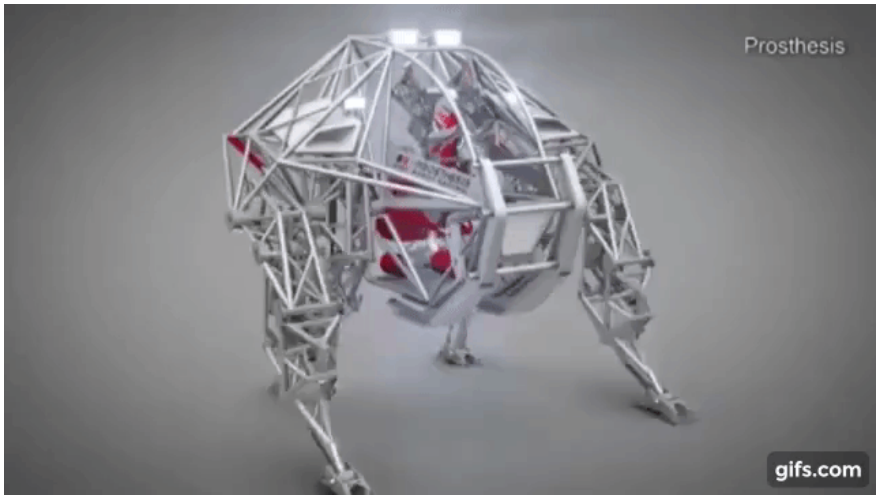
The Mondo Spider project increased confidence in Tippett's technical capabilities, now he wants something bigger, faster and cooler. " *So create a rollercoaster with a driver* ." Tippett remembers the early days. " *Sitting in the cockpit 4m above the ground, using your limbs to control the movement of the machine . it will feel disoriented, scary and thrilling, all at the same time* ."

Build a robot body

When starting out with Prosthesis, its specifications gave Tippett a headache. What would a suspension system for a 3.6 ton walking machine need to be? By moving on 4 feet versus 8, how to ensure this machine will always be in balance?

Not only that, bringing the cockpit into this robot is a very important thing with Tippett's vision. Using a set of 5-point straps, riders will place their arms in metal braces and pins wrapped around calves in pins. Then limbs are also protected by similar items to maintain normal blood pressure.

Instead of replicating the exact gait of a human and Tippett chose to repeat the gorilla walk, thanks to the combination of short strides of "hands" and legs. In the cockpit, the rider's body moved to control Prosthesis's steps: folding the elbows and the machine squatting. Stretching your arms and pushing your legs forward, Prosthesis will perform the same movement as curling up.

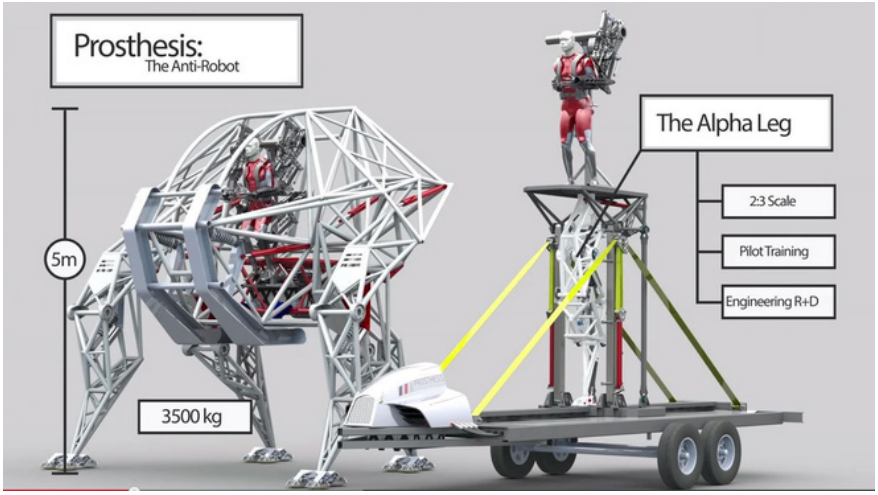


To strengthen these four tripod, each leg of the machine is equipped with two hydraulic actuators. The "hip" drive connects to the upper leg, and allows it to turn forward and backward. The second actuators connect to the back of the chassis due to four steel bars linked together.

Retracting the actuator at the knee shortens the leg and lifts the entire machine off the ground as the hip drive drives the leg forward. When it leaves the ground, the foot that moves forward will extend to touch the ground. The actuator on the hip can pull the legs backwards when the dampers support the weight of the engine and the vehicle.

' *The key point in all these parts is motion sensitivity* .' Tippett said. ' *We spend weeks refining the control straps, shock absorbers and bumper in the cockpit to make sure everything works perfectly for the driver. It can be said that testing Prosthesis is really a tiring and challenging job* . '

Like other pioneers, Prosthesis's lofty goals required many false attempts. Even the number of times Tippett fell over in this machine was so much, it was like participating in a sport. ' *How many ski trips do you have to fall before you know how to walk?* He said. ' *With Prosthesis, a lot of the same trial and error is needed* .'



Vehicles for Prosthesis control training.

Staying on the right footing was the first step for Tippett and his team, and now he's looking for a way to make the machine walk smoothly - but still can't run. Tippett emphasizes, you have to know how to walk before you can run, right?

' *Look at the people operating those monster trucks, with the way they performed that dance move* .' Tippett said. ' *It is not much different from Prosthesis. It is a physical requirement. And finally, fans will appreciate the human skills to control these robots* . '

This is what he always emphasized in the interview, that ' *this machine is designed around the driver - not in the opposite direction* .' In that sense, this machine is an extension of the human body, creating a symbiotic feeling between humans and machines, something that has been difficult to reproduce so far.

Barriers for the forefront

According to robot experts, Tippett will face many challenges ahead. Jonathan Hurst, CTO of Agility Robotics, said that the movement of the foot of this machine may seem very easy to perform, but it is a real difficulty. 'This *type of movement will require a carefully calculated mechanical system with the correct spring type and control delay* .' He also added that any obstruction to the movement of the machine, such as rough terrain, can eliminate the momentum on its feet.

Earlier this year, Agility also introduced a bipedal walking robot, Cassie, which has a bust design with a free-standing, hip-like rotating hips. This design allows Cassie to rotate her legs forward or backward, stepping to the side and turning them all at once. Hurst said he and his colleagues would soon equip Cassie with arms, torso, and sensors, but they were ready to ship the current version for research laboratories.

Agility's Cassie Robot.

The movement of both Cassie and Prosthesis robots is similar to LS3, a walking robot manufactured by Boston Dynamics, marketed as a transport solution for the military. The latter LS3 was delayed in 2015 due to its many limitations, including noise, repair challenges and the ability to integrate it into the patrol squad.

But the challenge for these robots is not only that. Harmut Geyer, a professor at Carnegie Mellon University's Robotics Academy, doesn't want Prosthesis to suffer the same fate as LS3. He suggested that the appearance of Prosthesis could even stimulate a robot race.

' *The biggest challenge is not just controlling* .' Geyer said. ' *Is the leg strong enough to run fast or is it just good enough for specific movements? And then you also have to worry about engine overheating* . '

Several other four-legged robots have also learned how to overcome difficult terrain, but this is not a mechanical robot like Tippett and Hurst. Instead, they are 3D printed rubber robots developed by the University of California San Diego. Despite this, it is being promoted as the first robot capable of walking on rough terrain with sand and gravel.

Despite this, the potential to create these legged robots is so attractive that some universities dedicate parts to this challenge, such as MIT's Leg Laboratory.

Creating races, not wars

So far, perhaps Prosthesis will make many people remember other giant mechanical robots from experts at MegaBots, which just held a confrontation between these giant machines. In September, robot MK. III of MegaBots is twice as wide as Suidobashi's rival Kuratas from Japan. MegaBots co-founder Gui Cavalcanti said that it was ' *the first giant robot battle in the world* .'

Like the idea of ??Tippett's robot race, the Cavalcanti is directing its vision to robot battles with the driver in the cockpit. ' *All this is about human play, a human story, in sport* .' He said. ' *When you remove people from this*

equation, the climax of that play goes down. Take a look at the BattleBots battle, which is a great show, but when a robot is torn to pieces, the camera cuts the scene to switch to the scowling operator holding his control. That is not attractive. We want to see the drop like a boxing match . '

The team that made Prosthesis.

Tippett's vision for Prosthesis was broader than that, he wanted to turn the idea of ??robotics racing into a sport. With that vision, he can find his inspiration from the other robot athletes of The Drone Racing League (DRL). Teddy Tzanetos, former chief engineer at DRL and currently a robot technologist at NASA, said that to launch a new sport, Tippett will need a core skill to meet the hype.

' *You will have to handle the message and expectations* .' Tzanetos said. ' *When it comes to' robot racing 'it's easier for people to imagine a fierce race like in a video game than anything else* .'

Tippett continues to make strides now with driver training. His initial hope was to show his robot at the World Future Sport Games in Dubai in December, but transporting these giant monsters will be difficult and there is much more to be done. do.

This forced him to set a new deadline: April 2018, to launch Prosthesis in his first race at a set location. However, some of these delays and obstacles do not prevent Tippett from dreaming about the potential for this race in the future.

Prosthesis robot outside Furrion's office.

Some robots are designed to race on regular surfaces, while others may be tailored to more complex terrains. Each robot will have a unique characteristic, probably related to the driver in the cockpit. If F1 drivers can attract fans with their unique style and flair, why can't robot riders do that?

But Tippett also has to admit that, perhaps the competitive races have yet to launch in the short term. The trial period will form the first phase of the robotics race, where athletes can change positions in Prosthesis. When each robot is controlled by both human movement and energy, its power and running speed will depend entirely on the skill of the driver. ' *Creating an android is an ambitious project, and I don't necessarily roll up my sleeves and say' Come in, I'm waiting, ' ' '* said Tippett. ' *I know the barrier to entry in this field is very high* .'

Although the challenge is still ahead, Tippett is optimistic about the opportunity for the robotics race. He thinks the problem is when, not if. ' *When drivers show off their talents and unleash the potential of these machines, it gets people excited, especially that comes with their money* .' As with other industries, when such factors come, they will provide opportunities and fuel to develop Tippett's ideas.

Further afield, Tippett's dream of robotic athletes does not stop at a few races. For him, the Holy Grail would be the drive to bring this robot race to the Olympics. But when Prosthesis was just walking instead of being able to run, and never had the revenue from its introduction to the world, Tippett only allowed himself to have short-term dreams.

Refer to Arstechnica

Less than 12 years old but these three girls have made world-class inventions, some of them can program robots themselves

regularly.