OLYMPIC history was made in the year 2012 when South African Oscar Pistorius became the first double amputee to compete at the Olympic Games. Nicknamed “Blade Runner” because of his J-shaped carbon-fibre prosthetic running blades, Oscar captured the world’s attention during a race in Lignano, Italy, when he left non-disabled competitors behind. In a very short span, he won more than a dozen gold medals in the few events he participated.

In the past few decades, the world of sports prosthetics has realised technological advancements that have allowed artificial body parts to become increasingly refined and targeted for high-level competitions. Advanced sports prosthetics are enabling today’s top athletes to not only participate in their chosen sport, but also to excel at the international level.

The history of false limbs and prosthetics dates back to 2500 B.C. when the ancient Egyptians used braces to assist crippled legs. Wooden prostheses became the only form of false limbs for hundreds of years. Over time, however, new materials like fiberglass gave more strength and flexibility to prosthetics.

Oyogu – Swimming Arm Prosthetic
Oyogu, a prosthetic arm for swimmers, allows users varying levels of resistance. The arm features numerous holes which can be adjusted to let the required amount of water pass through the arm while swimming. Closing the holes allows for maximum speed while opening them enables more experienced swimmers maximum resistance. Irish designer, Robert MacCarthy, developed the prosthetic arm after having worked as a lifeguard while studying for his degree in product design at the Dublin Institute of Technology.

Prosthetic Fin
The fin is divided into three “fingers” – a stiff digit in the middle flanked by two pliable ones – which allows wearers to emulate the vaguely circular motion of treading...
water; swimmers can use the slider to adjust the flexibility to match their strength. And in a modification suggested by one of the amputees, the fin can rotate 90 degrees to switch from the sideways kick of the breaststroke to the up-and-down motion of the crawl.

**ProControl Cycling Hand Prosthesis**
Scottish designer Andrew Flynn’s prosthetic arm, ProControl, allows an arm amputee to have full control over the breaking and steering functions of a bicycle. The arm includes grips which can be custom made to the dimensions of the bicycle’s handle bars. The design means that in order to brake the bicycle all you have to do is simply push the arm forward.

**Microprocessor-controlled Knees**
The first microprocessor-controlled prosthetic knee joints were introduced in the United States during the early 1990s with the Otto Bock C-Leg. The technology helped lower-limb amputees regain normal leg movement. Today, microprocessor-controlled knees have revolutionised treatment options for above-knee amputees by providing safety and stability features that were not available in traditional prosthetic knees. These devices adjust to each individual’s walking patterns automatically. Internal microprocessors are used to interpret signals from built-in sensors during movement and these signals are analysed by hydraulic cylinders to regulate extension and determine resistance in the knee joint.

**Blades**
These intricately curved lower-extremity prosthetics are the most advanced and well-known sports prosthetics. During his iconic appearance in the 2012 London Olympics as the first double leg amputee competing against able-bodied athletes, Oscar Pistorius wore specially designed blades that allowed him to sprint at high speeds. Made of carbon fibre optimised using computer analysis and mechanical testing, these blades are specially fabricated to match the runner’s weight and impact level while providing the appropriate amount of traction.

**Flex-Foot Cheetah**
The Flex-Foot Cheetah is a prosthetic human foot replacement developed by biomedical engineer Van Phillips, who himself lost a leg below the knee at age 21. The Flex-Foot Cheetah is made from carbon fibre, and unlike all previous foot prostheses, it stores kinetic energy from the wearer’s steps as potential energy, like a spring, allowing the wearer to run and jump.
Sixty-year-old Bob Radocy is an archer and skier who also runs a company that specialises in creating prosthetics for people who have lost limbs and want to engage in sports. He teamed up with graduate students at Delft University of Technology in the Netherlands to form the DIPO Power Team and develop a device called the “GRIP 5 Prehensor”. Unlike many of the lower-arm prostheses the Prehensor does not resemble a complete human hand, nor does it rely on an external power source. Instead, it is designed to emulate a human index and middle finger in opposition to a thumb. The device is body-powered, and works similar to a hand brake on a bicycle; movements of the arm and torso produce power that is transferred along an artificial external tendon to the device.

Both of his legs were amputated after a disastrous climbing expedition when he was a teenager. But Hugh Herr enjoys scaling a cliff with his prosthetic legs. Herr even runs a lab making bionic legs at the Massachusetts Institute of Technology. Herr made it to TIME magazine’s Top Ten Inventions list in 2004 and 2007, was the winner of the prestigious Heinz Award in 2007 and was 2008’s recipient of the Action Maverick and Spirit of Da Vinci Awards.

Heroic Paralympians
Apart from Oscar Pistorius there are many other sportspersons who have benefited from prosthetics and gone on to shine in the sports of their choice.

Jessica Long exploded on to the sports scene in 2004 when, at the age of 12, she won three gold medals at the Athens Paralympics. She continued to win awards, including the 2006 US Olympic Committee’s Paralympian of the Year, and, at the age of 15, the 2007 AAU Sullivan Award, given to the nation’s top amateur athlete. She was the first Paralympian to receive this honour.

Then there is Jeremy Campbell who won his first pair of gold medals in discus and pentathlon at the Beijing 2008 Paralympic Games. Campbell followed this up with another Paralympic gold in London in 2012 and a world title at the 2013 IPC Athletics World Championships. He was born with a rare birth deficiency Fibular Hemimelia. Now he has his sights set on being the first Paralympic discus thrower to qualify for the Olympic Trials and secure a slot on the 2020 US Olympic Team.

Kelly Cartwright, an Australian athlete, was struck with a form of cancer called synovial sarcoma when she was fifteen. Part of her right leg needed to be amputated due to the cancer because chemotherapy was not an option. Cartwright is today a T42 classified runner. At the 2008 Beijing Paralympics, in the 100-metre finals, she finished sixth racing on a carbon fibre leg. At the 2012 London Paralympics, she won a gold medal in the Women’s Long Jump event and a silver medal in the Women’s 100 m event.

Sportspersons on the Prosthetics Bandwagon
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