

BIONIC WORLD

BETTER LIVING THROUGH TECHNOLOGY

Emerging technologies, such as rapid prototyping, are enabling today's best and brightest engineers to completely transform the way we live – especially when it comes to advancements in healthcare. From medical devices to biomedicine, these technological breakthroughs are changing the future of health and medical design.

Where We Are

3D CAD tools, virtual testing and 3D printing have begun to change medical science and design.

Transforming Touch

Prosthetic limbs have been the go-to for years to provide movement for those with missing arms and legs. Today's technologies, however, put power in the limbs and help people attain a full range of movement.



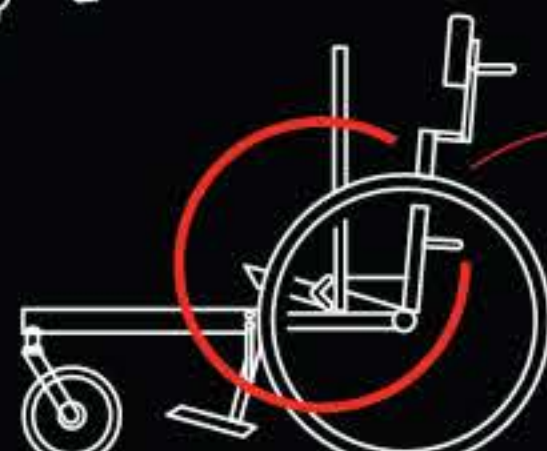
1

Magic Arms for the World, a 501(c)(3), is dedicated to providing high-tech exoskeleton arms to children born with rare diseases that restrict movement.¹



Providing Movement

The traditional wheelchair has perfected a way to help immobile people get around, but more efficiently designed components can take the wheelchair to another level and provide even more mobility.



2

Designers at Global Research Innovation and Technology (GRIT) redesigned the wheelchair to adapt to the varied mobility needs of people in developing nations.²



Transforming Touch

Jaundice, which affects two-thirds of newborns around the world, often requires treatment. This is easily helped with phototherapy from doctors in high-tech hospitals, but for those in the developing world, phototherapy devices are unwieldy. Only with an expertly designed, 3D-printed model could volunteer doctors show its benefit to those in the Third World.



3

Design That Matters was able to work with social enterprises to bring this concept to life and provide a simple solution for a potentially deadly disease.³



3D-Printed Rock Stars

Prosthetic hands often lack the precision needed to navigate tight corners or apply varying amounts of pressure, such as when playing the guitar. But specialized 3D-printed prosthetics for specific hobbies are inexpensive to produce and allow wearers to have experiences they never could before.



4

When 3D Gluck heard that Colombian teen Diego Corredor, who has lived without a right hand since birth, wanted to learn to play guitar, the company produced a hand costing around \$50 that allows Diego to shred.⁴



Protecting the Body

Newborns with birth defects such as underdeveloped organs constantly struggle to simply live and make it past infancy. High-tech 3D-printed materials can be inserted into newborns' bodies to help stabilize and improve their organs.



5

The cartilage in newborn Garrett Peterson's windpipe was so soft that it would routinely collapse. Doctors from the University of Michigan created 3D-printed splints that allowed Garrett to breathe on his own and live at home with his family.⁵



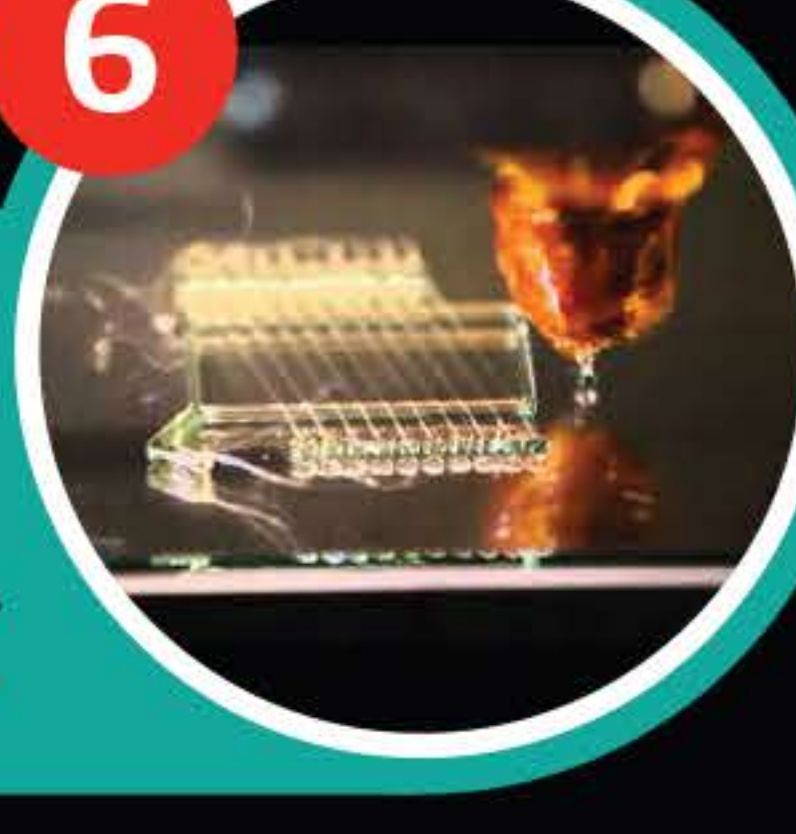
Engineering Life

As scientists and bioengineers work towards creating lab-grown organs, creating artificial blood vessel networks has presented a significant challenge. This may soon be solved, however, as technologies that can 3D print cells layer by layer now exist.



6

Professors and researchers from University of Pennsylvania and MIT have utilized 3D printing technology called RepRap that can create a blood vessel network out of sugar, which may unlock the key to creating artificial organs.⁶



Where We Are Headed

In the coming years, the world's top scientists, futurists, and thinkers envision a future led by emerging technologies.



Real Life "Eternal Sunshine"

While the cult hit "Eternal Sunshine of the Spotless Mind" imagines a world where unappreciated memories can be erased, scientists have discovered genetic engineering practices that may make this a reality.



Bionic Brains

Devices that partially restore vision to the blind are starting to appear, but the future is likely to be dominated by neuroprosthetics – devices and technologies that augment the mind and blend the line between brain and computer.



3D Printed Limbs and Organs

Hospitals are in the midst of a 3D printing revolution, but this may soon extend to the home, as ultra-powerful printers can create both limbs and biomaterials from a garage workshop.



Instant Prototyping

Creating a custom medical device, such as a hearing aid, currently involves a lengthy design, modeling, and development process. However, the future's best 3D printers will be able to prototype devices within as little as a few hours.

The Golden Rules for Medical Product Design

There are so many exciting, emerging technologies in the 3D medical design world that it may be difficult to get started. SOLIDWORKS experts have developed five golden rules for the next generation of life science engineering.

1



Solve a relevant problem by gaining a thorough understanding of an existing clinical challenge.

2



Conduct user analyses and develop a comprehensive list of user specifications early in the design process.

3



Follow a structured process to develop creative designs and apply analytical techniques to optimize iterations.

4



Know the hospital, clinic or environment in which the device will be used and be certain the facility has the resources to manage your product.

5



Become familiar with and follow FDA regulations for the specific type of device being designed.

Are you ready to design the next innovation in life sciences? SOLIDWORKS can help you meet this challenge. Visit SOLIDWORKS.com/Life_Science to learn how you can quickly develop and analyze medical devices and components –and bring them to market faster with SOLIDWORKS.

SOURCES: (1) <http://magicarms.org/>

(2) <http://www.solidworks.com/btd/go-grit.htm#> (3) <http://www.solidworks.com/btd/innovations/newborn-phototherapy.htm>

(4) <http://techcrunch.com/2015/02/02/teen-can-play-guitar-thanks-to-a-3d-printed-prosthetic-hand/>

(5) <http://www.npr.org/blogs/health/2014/12/23/370381866/baby-thrives-once-3d-printed-windpipe-helps-him-breathe>

(6) <http://www.upenn.edu/spotlights/rep-rap-3d-printing-blood-vessel-networks>