

The impact of the bionic prosthetic arm at Open Bionics company

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INTRODUCTION

- Bionic technology for prosthetic arm
- Company that use this technology
- Giving an idea about the Bionic Prosthetic Arm at Open Bionics company



Background of Open Bionics company

- It's a UK based company (Bristol)
- Founded in 2014 by Joel Gibbard and Samantha Payne
- They worked with well known companies

(Open Bionics,2021)

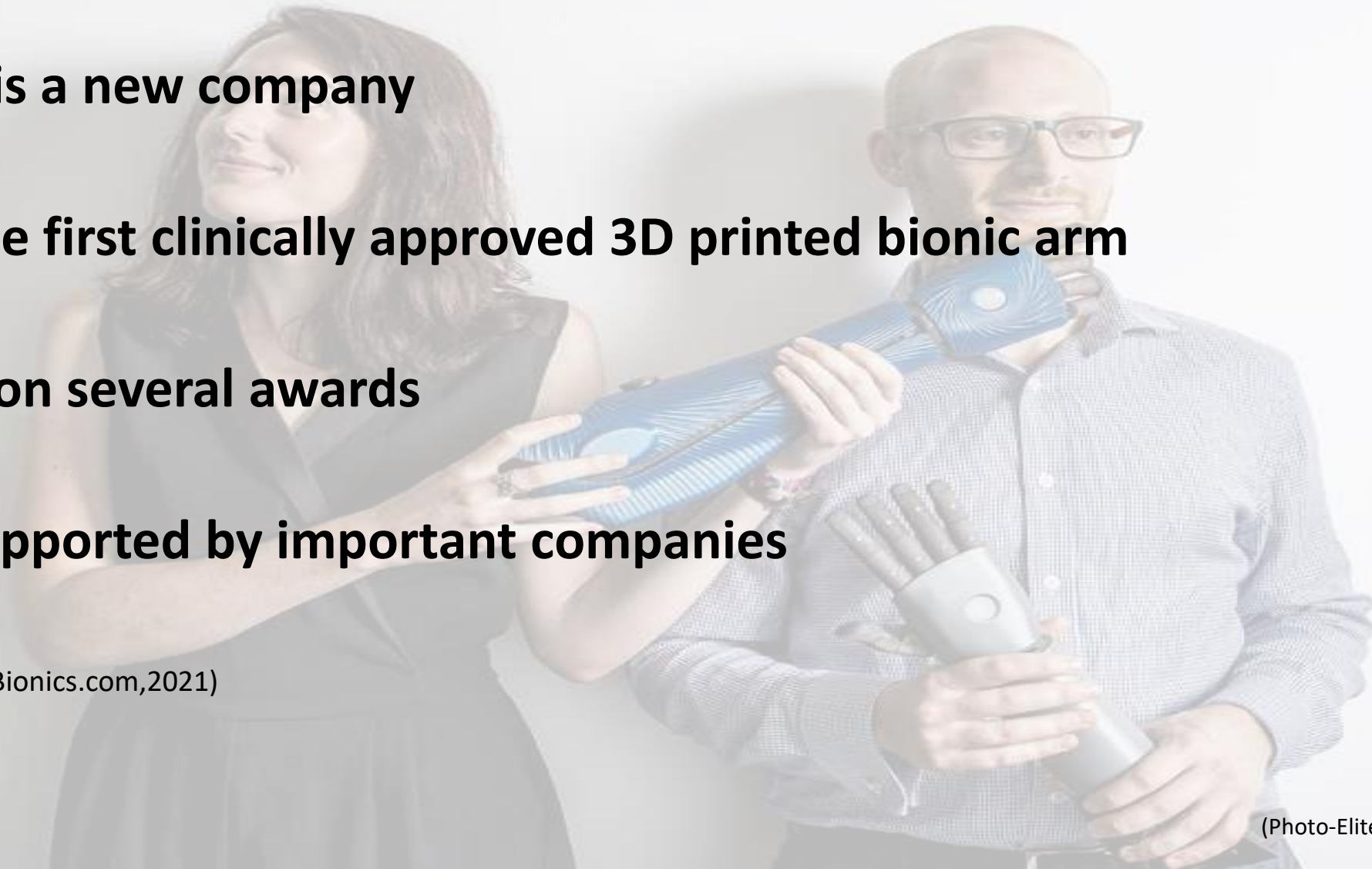
(Photo-Nerduell.com,2020)

*History of Open Bionics

- **It is a new company**
- **The first clinically approved 3D printed bionic arm**
- **Won several awards**
- **Supported by important companies**

(Open Bionics.com,2021)

(Photo-Elitebusinessmagazine.co,2018)

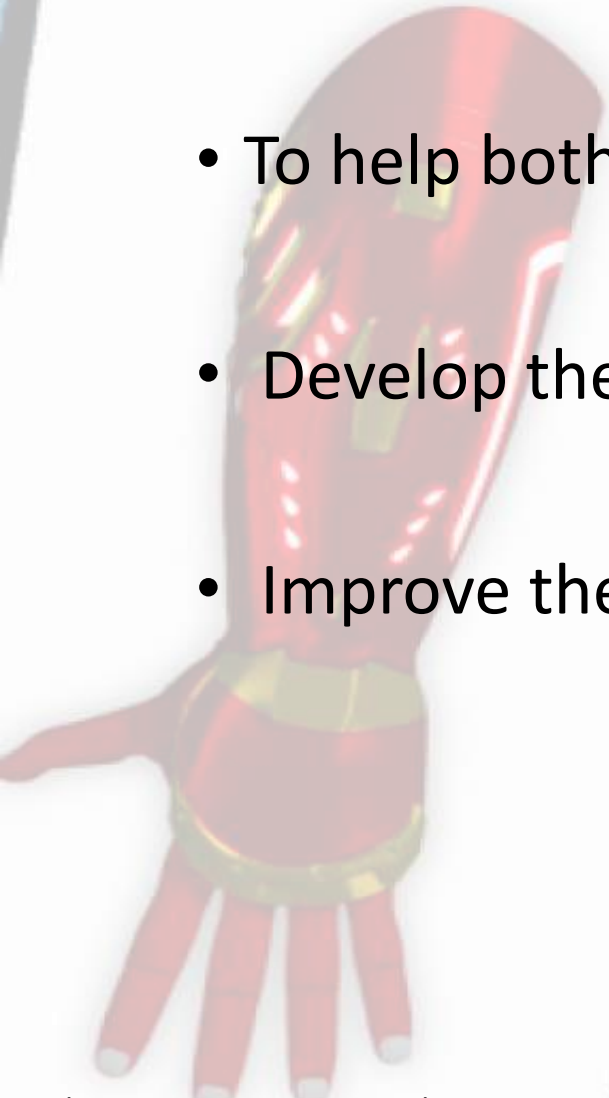


* Aim and objectives of Open Bionics

- To create low-cost prosthetics (below-elbow)
- To create Disney themed prosthetics for children
- The prosthetics to be available to a wide range of countries

*Purposes of Open Bionics

- To help both adults and children in need of prosthetics
- Develop the technology even further
- Improve the technology used



(C)2015 MARVEL

(OpenBionics.com,2021)

Disney
FROZEN



(C)2015 Disney

STAR
WARS



(C) & TM Lucasfilm Ltd.

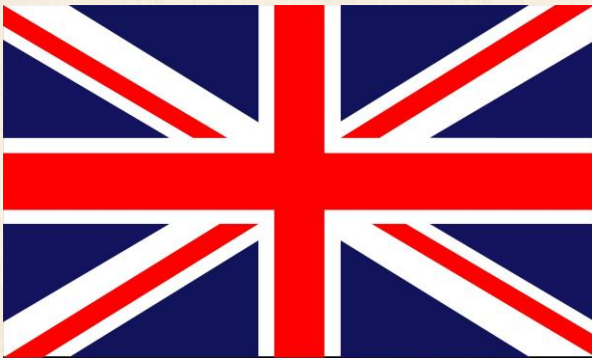
(Photo-Artsheep.com)

*Mission & Vision of Open Bionics

- Personalised designs –use of parametric models derived from human hand studies
- The use of low-cost materials and 3D printing
- Affordable
- Light-weight prosthetic
- Adaptive

*Current status of Open Bionics

- The bionic prosthetic arms are available in the UK, US, Europe Australia and New Zealand
- People can register online if they are in need of a prosthetic
- Donation can be made on their online site



Challenges before introducing the bionic technology

- **The prosthetics were not highly functional**
- **Prosthetic were heavy**
- **Not very efficient**
- **For visual purpose**

(Photo and text-
Daily.jstor.org,2017)

Challenges before introducing the modern technology

- Prosthetics were made out of wood or combined with other materials(metal, leather)
- Controlled with cables ,the prosthetic could be rotated
- They had to be operated by a different hand

Insights of the bionic technology used by Open Bionics

- Attempt to replicate the function of a natural arm
- When amputated -the brain still sends electrical signals
- Intercept the brain signals and convert into commands for bionic device

*Components of the bionic prosthetic

- **Limb**-Light weight and durable materials
- **Socket** –connects residual limb to the prosthetic
- **Suspension system**-secures the prosthetic to the residual limb
- **Control system**-myoelectric(usage of natural electric signals from human body)

*Characteristics of the bionic prosthetic arm

- Advanced pattern recognition algorithms
- A range of functional grips (power, precision close)
- Futuristic look



LIGHTWEIGHT

The hand comes in three sizes, and at 280g - 346g (0.62lbs - 0.76lbs), is the lightest bionic hand. The full arm weighs less than 1kg (2.2lbs)



INTUITIVE FEEDBACK

Haptic vibrations and beepers on the electrodes, as well as buttons and lights provide you with intuitive notifications



PROPORTIONAL CONTROL

EMG muscle sensors within the Hero Arm detect muscle movements, and give you proportional control



MULTIPLE GRIPS

Upto six easy-to-select grips, such as fist, hook, pinch and tripod, giving you outstanding versatility and control



STYLISH COVERS

You can choose from a range of swappable covers; Star Wars BB-8, Marvel Iron Man, Disney Frozen and coming soon: Alita Battle Angel



DYNAMIC SOCKET

An adjustable socket and a removable ventilated liner (both custom 3D-printed) give you exceptional fit and comfort

(Photo –Nananlyze.com ,2019)

*The intelligence in bionics

- Allows mechanical systems to function like living things
- Biomechatronics (combines mechanical elements with biological organisms)
- Benefits for humans with disabilities

Impacts of the **bionic technology** in prosthetic arms

Positive impacts

- They are LOW-COST prosthetic
- Children can also use them
- There is a wide range of colours or models for the bionic arms
- They are light weighted
- Prosthetics are personalised
- Can be made fast-3D technology

Negative impacts

- They are not extremely durable
- Still need to undergo rehabilitation for muscle strengthen

Lesson drawn from the case study

- The Open Bionics company is helping hundreds of people by developing the bionic prosthetic arm
- Low-cost prosthetics are indeed what people with disabilities need

Lessons drawn from the case study

Traditional technology

- The prosthetic was made to replace structural part of the body
- It's improving the aesthetic not really the function



(Photo-Static.turbosquid.com,2016)

Modern technology

- Bionic are overcoming deficiency in function
- It allows the person to do different tasks



(Photo-Content.assests.pressasociation.io,2020)

*Why modern technology is important for Open Bionics?

- Technology is important because the whole project is based on the bionic technology
- Without the bionic technology they wouldn't be able to improve people's life

*Consequences of not using the bionic technology in the organization

- The organization would not exist
- People in need of the prosthetic arms would not get them as low-cost as possible

Future prospects of Open Bionics

- Keep developing the idea and improve it
- Helping people with disabilities to retake their independence

Conclusion

- **Helping people is the purpose of this organization**
- **Deliver LOW-COST bionic prosthetic arms**
- **Children friendly (Disney themed)**

References

- *How does a prosthetic arm work? (2021)* ,Available at - [How Does a Prosthetic Arm Work? - Types of Prosthetic Arms | Scheck & Siress \(scheckandsiress.com\)](https://www.scheckandsiress.com) (Online), Accessed on 07.08.2021
- *How bionics are redefining the Future of Prosthetics (2021)*, Available at- [How Bionics are Redefining the Future of Prosthetics \(circuitdigest.com\)](https://circuitdigest.com) (Online), Accessed on 07.08.2021
- *A complete guide to Bionic Arms and Hands (2021)*, Available at -[A Complete Guide to Bionic Arms & Hands | Bionics For Everyone](https://www.bionicsfor.com) (Online) ,Accessed on 09.08.2021
- *Open Bionics website (2021)* , Available at-[Open Bionics - Turning Disabilities into Superpowers](https://openbionics.org) (Online), Accessed on 10.08.2021
- *A brief history of prosthetic limbs (2017)*, Available at -[A Brief History of Prosthetic Limbs | JSTOR Daily](https://www.jstor.org) (Online) ,Accessed on 17.08.2021)
- *How do bionic arms work? (2021)*, Available at - [How Do Bionic Arms Work? Bionic Arm Functions, Technology, & More \(scheckandsiress.com\)](https://www.scheckandsiress.com) (Online) ,Accessed on 11.08.2021
- *The Success and Failures of 3D Printed Prosthetics (2017)*, Available at-[The Successes and Failures of 3D Printed Prosthetics - PreScouter - Custom Intelligence from a Global Network of Experts](https://www.prescouter.com) ,(Online) Accessed on 15.08.2021)

References

- *Photos*

- *Nerudell.com*, Available at <https://nerduell.com/wp-content/uploads/2020/12/most-advanced-prosthetics-1024x548.jpg>
- *Bionic arm is the future of prosthetics*, Available at [Wearing a Deus Ex-inspired bionic arm is the future of prosthetics – CNET](#)
- *Slashgear.com*, Available at [Eidos, Razer, Open Bionics to make Deus Ex augmentations real – SlashGear](#)
- *Findingyourfeet.net*, Available at [open_bionics_hero_arm.jpg \(1080×713\) \(findingyourfeet.net\)](#)
- *3Dprint.com*, Available at [openbionicsfeatured.png \(1128×564\) \(3dprint.com\)](#)
- *Content.assets.pressasociation.io*, Available at [9fbabc05-2a2e-4db2-8902-69c895c206e3.jpg \(6000×4000\) \(pressasociation.io\)](#)
- *Static.turbosquid.com*, Available at [ProstheticArm3dmodel00.jpg4ae3ed48-f494-4ec8-a6e7-6cd0844bc2d3Original.jpg \(800×800\) \(turbosquid.com\)](#)
- *Bing.com*, Available at [OIP.GvMAw6vxNqhsKxKi-GLkIQHaDk \(474×228\) \(bing.com\)](#)
- *Theschoolrun.com*, Available at [What is a question mark? | TheSchoolRun](#)
- *lchef.bbc.co.uk*, Available at [85166685_9dd8b0cf-7c78-47e7-bc1b-0b95d6e92050.jpg \(800×474\) \(bbc.co.uk\)](#)
- *Businessinsider.com*, Available at [The Evolution of Prosthetic Technology \(businessinsider.com\)](#)

