



STEPHEN HAWKING'S BRAVE NEW WORLD



“Shockwaves of progress are heading our way. With technology at our disposal, the possibilities are unbounded. Our greatest hopes could be reality in the future.” – Stephen Hawking

STEPHEN HAWKING'S BRAVE NEW WORLD – SEASON 2

SERIES SYNOPSIS

Professor STEPHEN HAWKING investigates today's cutting-edge science and reveals how it will transform the world in years to come in this landmark series.

Stephen Hawking has spent over 40 years analyzing, understanding and describing the world that we live in. **STEPHEN HAWKING'S BRAVE NEW WORLD** challenges Hawking to predict where science is taking us. By exploring today's cutting-edge technology, he draws conclusions about how different life will be in the future.

Hawking's team of five dynamic scientists travel the world to investigate the newest and most exciting scientific innovations, from advanced robotics and breathtaking realistic digital avatars, to cutting-edge smart homes and electronic brain stimulation. The team reports on their experiences and reveals the year each innovation will be rolled out.

Hawking ties the threads together and draws uniquely insightful conclusions about what the world will be like in the years to come.

The series features six one-hour episodes, each focusing on one area of progress. The episodes are:

- **Inspired by Nature:** Innovations driven by biomimicry.
- **Code Red:** Inventions that will change how we deal with crises in the future.
- **Virtual World:** Technology transforming our idea of reality.
- **Perfect City:** Urban living transformed by technology.
- **Designer Human:** Breakthrough science applied to the human body and mind.
- **Hyper Connections:** Different disciplines joining forces to create new solutions to pressing issues.

For more information:

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STEPHEN HAWKING'S BRAVE NEW WORLD – SEASON 2

BIOGRAPHIES



Professor Stephen Hawking (UK)

One of the world's best-known scientists, Stephen Hawking is the former Lucasian Professor of Mathematics at the University of Cambridge and author of the international bestseller *A Brief History of Time*. Now Director of Research at the Centre for Theoretical Cosmology at Cambridge, his other books include *A Briefer History of Time*, *The Grand Design*, the essay collection *Black Holes and Baby Universes* and *The Universe in a Nutshell*. In September 2013, he released his memoir *Stephen Hawking: My Brief History*, a revealing look at his own life and intellectual evolution, and his autobiographical film *Hawking* which opened the Cambridge Film Festival. On November 15, 2013, Season 2 of *Stephen Hawking's Brave New World* premieres on Discovery World. For more information, visit www.hawking.org.uk.



Dr. Carin Bondar (Evolutionary Biologist – Chilliwack, BC)

A prolific science writer, Carin Bondar is a biologist and filmmaker with a PhD in Population Ecology from the University of British Columbia. She was once a ballerina and German linguist and has varied interests including marine biology and the sex lives of animals. She has appeared in a scientific capacity on various television networks such as Discovery World, Discovery Canada, CTV, SHAW Canada, and Citytv, Vancouver. For more information, visit www.carinbondar.com.



Professor Chris Eliasmith (Neuroscientist – Waterloo, ON)

Professor of Philosophy, Systems Design Engineering and Computer Science and Director of the Center for Theoretical Neuroscience at the University of Waterloo in Canada, Chris Eliasmith is a technology enthusiast and author of the books *Neural Engineering* and *How To Build A Brain*. For more information, visit www.arts.uwaterloo.ca/~celiasmi/.

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BIOGRAPHIES CONT'D



Dr. Daniel Kraft (Physician-Scientist, Healthcare Innovator - US)

Daniel Kraft is a Stanford and Harvard-trained physician-scientist, inventor and innovator with over 20 years of experience in clinical practice, biomedical research and healthcare innovation. He is Executive Director of FutureMed at Singularity University (NASA Research Park in Silicon Valley); the program explores convergent, exponentially developing technologies and their potential in biomedicine and healthcare. For more information, visit www.futuremed2020.com/daniel-kraft/.



Dr. Aarathi Prasad (Geneticist - UK)

With a PhD in molecular genetics from Imperial College London, Aarathi Prasad specializes in human biology and is fascinated by our species' future trajectory. As a broadcaster, she presented the *Quest for Virgin Birth* on BBC Radio 4, and Channel 4's controversial *Is It Better to Be Mixed Race?* She is also the author of numerous science articles and the book *Like A Virgin: How Science is redesigning the Rules of Sex*. For more information, visit www.aarathiprasad.com.



Professor Jim Al-Khalili (Theoretical Physicist - UK)

A passionate optimist, Jim Al-Khalili OBE is a British scientist, author and broadcaster. He is a professor of Physics at the University of Surrey where he also holds a chair position in the Public Engagement in Science. He is president of the British Humanist Association and has written a number of books such as *Black Holes, Wormholes and Time Machine*, and *The Nine Greatest Enigmas in Science*. For more information, visit www.jimal-khalili.com.

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STEPHEN HAWKING'S BRAVE NEW WORLD – SEASON 2

EPISODE SYNOPSES

Episode 1: INSPIRED BY NATURE

Hawking and his team investigate groundbreaking innovations in science inspired by nature.

Stephen Hawking and his team investigate innovations driven by biomimicry, a rapidly expanding new field that is already making an impact. Advances in robotics, bioengineering, technology and bioscience are examined.

Aarathi Prasad road tests two of the most advanced all-terrain robots in the world designed to go where humans and vehicles can't; Chris Eliasmith examines an extraordinary new fabric that mimics the adhesive ability of gecko feet and bonds to any surface; Daniel Kraft visits Vancouver-based Nuytco Research where underwater subs are used to simulate zero gravity to train astronauts for deep space exploration; Jim Al-Khalili examines how re-engineering a virus can prevent pandemics; and Carin Bondar discovers how Nikola Tesla's remarkable dream of wireless power is finally being realized.

Innovations featured:

Boston Dynamics' LS3 and Atlas Robots

Aarathi Prasad investigates the animal-inspired LS3 and humanoid Atlas, among the most advanced robots in the world. They are designed to go where wheeled vehicles and humans can't.

Gecko Skin Adhesion

Chris Eliasmith investigates **Geckskin**, a new concept in adhesion technology. It's an extraordinary new fabric that mimics the adhesive power of gecko feet and bonds to any surface without leaving residue.

Vancouver-based Nuytco's deepwater subs

Daniel Kraft visits Nuytco Research in Vancouver, BC, where deepwater subs are used to simulate zero gravity and train NASA astronauts for space exploration.

Pathogen Scanner

Jim Al Khalili visits the University of Birmingham, England, where bioscientists are developing a portable device that uses re-engineered viruses to quickly detect the presence of bacteria.

WiTricity

Carin Bondar discovers how Nikola Tesla's dream of wireless power (without cables) is being realized by harnessing one of nature's greatest phenomenon: magnetism.

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EPISODE SYNOPSES CONT'D

Episode 2: CODE RED

Hawking and his team examine new inventions that will change how we deal with crises in the future.

Dealing with crises has always been one of science's greatest challenges. Stephen Hawking and his team investigate astonishing breakthroughs that are making human life less fragile in the face of danger.

Chris Eliasmith looks into a revolutionary pilotless helicopter that can fly and perform complex manoeuvres on its own; Daniel Kraft tests out the latest high tech bomb disposal robot; Jim Al-Khalili checks out a sniper rifle equipped with jet fighter target tracking technology; Carin Bondar examines face recognition binoculars that can identify criminals within 15 seconds; then, Aarathi Prasad examines a lifesaving breakthrough that allows oxygen to be injected directly into the bloodstream.

Innovations featured:

K-MAX

Chris Eliasmith investigates Lockheed Martin & Kaman's groundbreaking autonomous helicopter.

Robo Sally

Daniel Kraft visits inventors in Maryland who have crated the most advanced bomb disposal robot.

Tracking Point Rifle

Jim Al Khalili investigates state-of-the-art weaponry that uses jet fighter target tracking technology.

Face Recognition Binoculars

Carin Bondar investigates Stereovision's new 3D binoculars, which provides near real-time identification of suspects.

Blood Oxygenation

Aarathi Prasad investigates a new innovation from Boston that allows oxygen to be injected into the bloodstream.

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EPISODE SYNOPSES CONT'D

Episode 3: VIRTUAL WORLD

In this episode, Stephen Hawking and his team investigate how reality is being increasingly stretched as we become less dependent on the physical world and more involved with the virtual, electronic world.

Carin Bondar takes part in a remarkable 3D virtual training program created for the military; Aarathi Prasad tests a new system that maps locations inaccessible by GPS; Daniel Kraft investigates 3D bio-printing where computer designs can be turned into living tissue; Chris Eliasmith tests the latest in gaming technology - a breakthrough in virtual reality that promises the most immersive experience yet; and Jim Al-Khalili tests a computer that can read the human mind.

Innovations featured:

Virtual Reality SWAT Training

Carin Bondar investigates. Raytheon's Virtsim system is for soldiers and law enforcement officers what flight simulators are for pilots - a virtual reality environment where recruits can experience dangerous situations without getting in harm's way.

eMaps

Aarathi Prasad meets the innovators at Johns Hopkins University who have come up with a system that accurately maps building interiors.

Bioprinted Live Tissue

Daniel Kraft investigates the Organovo. The Organovo uses 3D printing to create live human tissue – an important step along the road to bioprinting whole organs to order.

Oculus Rift

Chris Eliasmith investigates a Californian gaming device that creates 3D virtual reality with almost no latency.

Typing By Thinking

Jim Al Khalili investigates a Maastricht University innovation, where fMRI brain scanning is used to enable subjects to write words simply by thinking.

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EPISODE SYNOPSES CONT'D

Episode 4: PERFECT CITY

Stephen Hawking and his team examine every aspect of the urban experience.

Already, more than half the world's population live in cities. By 2050 it is expected that two thirds of the population will live in urban areas. This episode looks at how increasing demands will be met in the future.

Jim Al-Khalili examines paving tiles that generate electricity from footsteps; Chris Eliasmith tests out a remarkable robotic army that can transform online shopping; Daniel Kraft investigates a spectacularly realistic avatar that will revolutionize the entertainment industry; Carin Bondar looks at the rise of the smart home; and finally, Aarathi Prasad visits New York where a controversial fertility control experiment is being applied to the city's rat infestation problem.

Innovations featured:

Pavegen

Jim Al Khalili investigates. British engineers have designed paving tiles that generate electricity from footsteps.

Automatic Warehouse

Chris Eliasmith investigates Kiva robots, computerized warehouse machines that radically speed up product distribution.

Digital Avatar

Daniel Kraft investigates the University of Southern California's Digital Ira project that has created astonishingly realistic computer-generated human avatars.

World Kit

Carin Bondar investigates breakthrough infrared depth camera technology that can create interactive touch screens on any surface.

Contrapest

Aarathi Prasad investigates a radical new method of pest control trialled in New York, which aims to reduce the rat population by managing fertility versus extermination.

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EPISODE SYNOPSES CONT'D

Episode 5: DESIGNER HUMAN

Hawking and his team investigate 21st century breakthroughs in technology that are being applied to human beings, not only for more effective repairs and replacement body parts, but also for upgrading the brain, ultimately improving on evolution.

Jim Al-Khalili tests a radical new technique that improves the brain's ability to perform mathematical tasks; Aarathi Prasad discovers how ligaments can be repaired using advanced regenerative techniques; Carin Bondar investigates cutting-edge bionic limbs; Chris Eliasmith looks into new technology that will revolutionize sight; Daniel Kraft discovers how advances in the study of physiology and biomechanics can improve soldier performance.

Innovations featured:

Brain Stimulation

Jim Al Khalili investigates an Oxford University innovation - a technique called transcranial direct current stimulation being used to improve the brain's ability to perform mathematical tasks.

Synthetic ligaments

Aarathi Prasad investigates. Boston researchers have found a way to use synthetic materials to help anterior cruciate ligaments regenerate themselves.

Bionic Limbs

Carin Bondar visits Hugh Herr's biomechatronic lab at MIT, a world leader in the design of microprocessor-controlled prostheses.

Artificial Eyes

Chris Eliasmith visits Cornell University where researchers are analyzing how the brain interprets visual signals to greatly improve the quality of electronic retina implants.

Natick

Daniel Kraft investigates. The US army uses advanced physiology and motion to capture measurements to study fitness and performance and improve soldier efficiency.

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EPISODE SYNOPSES CONT'D

Episode 6: HYPER CONNECTIONS

Hawking and his team examine how science is adapting and reinventing itself.

It is the dawning of a new age where machines talk to machines, where previously isolated sciences come together to form new disciplines, and where even on an atomic level, new connections are being made every day.

First, Jim Al-Khalili gets to the bottom of how advanced quadcopters work in unison to perform astonishing feats; then, Daniel Kraft investigates bioengineered shrimp shells that have led to a lifesaving new innovation in blood clotting products; Chris Eliasmith discovers how biologists and engineers have joined forces to develop an unmanned aircraft with the agility of a pigeon; Carin Bondar tests out a new electric sports car that uses computerized battery management and a radical three-wheel design to outperform rivals; and Aarathi Prasad checks out the progress on the largest scientific experiment ever - nuclear fusion.

Innovations featured:

Quadcopters

Jim Al Khalili visits Zurich where innovators have developed computer-driven feedback loops that allow machines to learn from each other, with no human involvement.

Hemagrip

Daniel Kraft examines Chitosan, derived from the exoskeletons of shrimps and the basis for a new bioengineered blood clotting product.

Pigeon Navigation

Chris Eliasmith visits MIT where biology and engineering connect in the creation of a robotic aircraft that has bird-like attributes.

Electric Sports Car

Carin Bondar investigates the Torq RV, a high performance sports car that is 100% run on light weight computer managed batteries.

Fusion

Aarathi Prasad visits the Culham Centre for Fusion Energy in England, which is at the centre of research for the huge ITER project in France aiming to be the first to produce large-scale power from nuclear fusion.

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PRODUCTION TEAM

STEPHEN HAWKING'S BRAVE NEW WORLD is co-produced by IWC Media Limited (UK) and Handel Productions (WMW) Inc. (Canada) in association with Bell Media's Discovery World, Canal D Canada, Discovery Science, National Geographic Channel and SBS (Australia). Executive producers are Mike McDowall (IWC) and Alan Handel (Handel Productions). Series producers are Richard Sattin (IWC) and Andre Barro (Handel Productions).

About IWC Media Limited

IWC Media was formed in 2004, and has been making a huge range of hit TV programmes out of its Glasgow and London offices ever since. Driven by a passion for great ideas and vivid storytelling, the company is well known for the breadth of its output, which extends from flagship science and history series to popular property shows and factual entertainment. Under the leadership of MD Hamish Barbour, numerous well-known brands have been created including LOCATION, LOCATION, LOCATION (now in its 16th season, Robson Green's Extreme Fishing, BRAVE NEW WORLD, BIG BODY SQUAD, LOST KINGDOMS and MAKING FACES. IWC Media makes programmes for a wide range of top broadcasters both in the UK and abroad, is part of the Zodiak Media Group and works closely with sister production companies Lucky Day, Bullseye, as well as the distribution team at Zodiak Rights. For more information, visit www.iwcmedia.co.uk.

About Handel Productions

Handel Productions was founded by Alan Handel in 1985 and is now one of Canada's leading producers of factual television series and specials including ambitious CGI programs. Their reputation is built on a history of great storytelling and entertaining television. Handel Productions has won numerous awards including the prestigious Gemini and two Primetime Emmy nominations. They are active in international co-production and work with leading broadcasters around the world, including Discovery Channel, CTV, CBC, Global Television, National Geographic, Bravo US, The History Channel US, PBS, ARTE, Channel Four, Channel Five UK, and other major networks. Award-winning programming includes INSIDE THE TITANIC, JOURNEY TO THE EDGE OF THE UNIVERSE and HOW WILLIAM SHATNER CHANGED THE WORLD. For more information, visit www.handelproductions.ca.

About Discovery World

Escape to the extraordinary. With original content not found anywhere else, Discovery World is home to breathtaking landscapes, fascinating people and incredible stories from around the world. Offering an unparalleled sensory experience that explores life's most amazing journeys, Discovery World presents high quality documentaries and immersive series that capture the biggest and boldest high-definition viewing experience. With awe-inspiring imagery and expansive detail, Discovery World reveals the wonders of the world – past and present – with themes ranging from culture, science and natural history to travel and lifestyle. A Canadian leader in high-definition programming – and featuring a fully-unique primetime schedule – Discovery World launched in 2010 and brings audiences even closer to their world. Discovery World is a division of Bell Media, which is owned by BCE Inc. (TSX, NYSE: BCE), Canada's largest communications company. Discover more at www.DiscoveryWorld.ca.

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