

July-September 2016

The Magazine of the International Child Art Foundation

ChildArt





EDITOR'S NOTE

Dear Reader,

When Dr. Ashfaq Ishaq invited me to be the guest editor of this special edition of *ChildArt* Magazine devoted to Space Art, I was thrilled to accept his invitation. Many of you are probably asking yourselves "What is Space Art?" In this special edition of *ChildArt* you are about to find out and hopefully will be pleasantly surprised. What began with just a handful of artists, myself included, in the late 1970s and early 1980s has taken off and blossomed into an exciting international movement in the world of art. Perhaps your imaginations will come up with some new ideas about combining art, science, and technology. We look forward to your comments, which can be emailed to childart@icaf.org or posted at www.Facebook.com/ICAF.org.

My very best wishes,

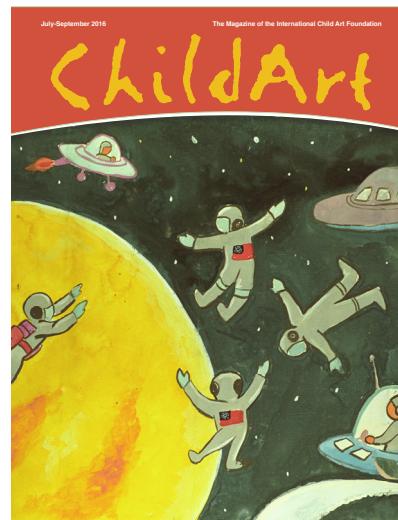


Richard Clar
Guest Editor

ChildArt

The Magazine of the International Child Art Foundation

JULY-SEPTEMBER 2016, VOLUME 16, ISSUE 3, NUMBER 47



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A 501(c)(3) charity, the ICAF has been nurturing children's creativity and developing empathy through the arts since 1997. Published since 1998, *ChildArt* is a commercial-free arts learning, self-discovery, and global competency periodical written expressly for 10 to 14 year-olds but useful as a teaching tool for early educators and inspirational for creative individuals of all ages. Subscribe to *ChildArt* online at www.icaf.org.

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Space Art

CONTENTS

- 1 Foreword and Overview**
Richard Clar
- 5 Conversations with World Space Leaders**
Simonetta di Pippo - Director, United Nation Office of Outer Space Affairs
George Whitesides - CEO, Virgin Galactic
- 9 The Only Way is Up**
Chris Welch, Ph.D
- 11 The Earth Turns Without Me**
Christian Waldvogel
- 13 Art Experiment on the Space Station**
Takuro Osaka, Ph.D
- 15 The Sound of the Celestial Spheres - Heaven's Carousel**
Tim Otto Roth, Ph.D
- 17 OPTICKS and Visual MoonBounce**
Daniela de Paulis
- 19 Only the Nose Knows Earth**
Carrie Paterson
- 21 Sky in Your Palm**
Ioannis Michaloudis, Ph.D
- 23 A Sculpture on the Moon**
Anilore Banon
- 25 The Girl Who Touched the Stars**
Navneet Mezzciani
- 27 Cosmos and Art Within You**
Yuri Tanaka
- 29 Space Flight Dolphin**
Richard Clar



Foreword and Overview

In this issue, you will discover an outstanding group of women and men from different parts of the world who have broken boundaries in their fields of art, high-level space administration, and education. The stories that they have to tell are both fascinating and inspiring with the potential to allow you to see the world around you, and especially space, in a new and different way. Observing the examples of artwork here, in addition to understanding the philosophy behind them, will provide you with insights into each artist's creative process and imagination.

Speaking of imagination, when I was in Junior High School, (what is now called Middle School), I took a ceramics class in the 8th grade that I was very excited about. Working with clay was appealing. Not long after I started the class, my teacher sent me home with a "failing notice" in hand for my parents to sign. The notice read: "Richard is capable of doing "A" work but will not follow instructions." Instead of being acknowledged for my imagination and creativity and how I expressed myself, I was reprimanded. After high school I enrolled in art school with ceramics as my first major and some of my work was selected for national juried ceramic exhibitions. So don't be afraid to stand up for what you believe in and don't worry about what others might be thinking.

How many of you know about the Italian Renaissance artist Leonardo da Vinci? He lived between 1452 to 1519 A.D. and is considered to be one of the greatest artists of all time. Not only was he a painter, the Mona Lisa being his most famous painting, he was a mathematician, an astronomer, a musician, an architect, and an inventor. In addition to his great imagination he was also very curious and sought to find out how and why things worked. Some of his inventions were hundreds of years ahead of his time! The design of the modern day helicopter is thought to be based

on the drawings of Leonardo's "Air Screw," a device that would be capable of vertical flight and maneuverability. He also is credited with the first drawings and design for a parachute that was not built and tested until the year 2000 and proven to be correct. These are just a few examples of his ideas which demonstrate that he was a person of great imagination far ahead of his time.

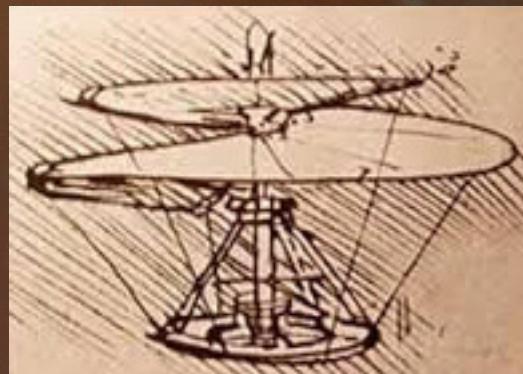
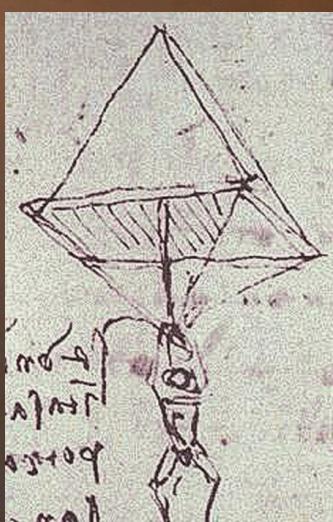
Art may be seen as a universal language that spans both time and culture. Art has the capacity to reach people on a high emotional level without having to rely on words. Oftentimes all that remains after civilizations have crumbled is their art.

Stop and think for a moment. One of you reading this article could be the first person to set foot on Mars—something that you will no doubt see in your lifetime. You are alive at an incredible time in the history of humanity. Never before has there been so much information and opportunity within reach. This is relatively new since the beginning of the World Wide Web in the early 1990s. You have the opportunity through the Internet to access and be inspired creatively by new technologies, materials, data, and imaging techniques. You can create on an inter-disciplinary level combining art with science, technology, music, and dance or wherever you want to make an artistic statement. You can also reach out to almost anyone in the world who has access to the Internet; scientists and engineers can be contacted regarding work they are doing that you find of interest and that may have a novel use in the creation of an artwork. Oftentimes the perspective of an artist can add a new dimension to the work of the scientist or engineer. This can be a very rewarding experience for both.

"To be yourself in a world that is constantly trying to make you something else is the greatest accomplishment."

- Ralph Waldo Emerson

The articles in this issue are outstanding examples of the power of imagination. These artists used their unfettered imaginations to come up with ideas that push the boundaries of art, while at the same time establishing new art paradigms.



Invention designs from da Vinci's sketchbook: left, parachute; above, air screw



Now for some introductions to the World Space Leaders and authors who have shared their exciting and imaginative work and stories with you in this SPACE ART edition of ChildArt Magazine.

Conversations with World Space Leaders

Ms. Simonetta Di Pippo is the Director of the United Nations Office for Outer Space Affairs. Her experience includes serving as Director of the Observation of the Universe at Agenzia Spaziale Italiana (ASI) (2002-2008) and Director of Human Spaceflight of the European Space Agency (ESA) (2008-2011). Prior to her appointment at UNOOSA in March 2014, she was Head of the European Space Policy Observatory at ASI Brussels. In 2008, the International Astronomical Union (IAU) named asteroid 21887 "Dipippo."

Mr. George T. Whitesides is the CEO of Virgin Galactic, the spaceflight company founded by Sir Richard Branson. In his role George is responsible for guiding all aspects of building the world's first commercial spaceline including the spaceflight and the Launcher One small satellite programs. Prior to Virgin Galactic, George served as NASA's Chief of Staff. George is a board member for Virgin Unite USA, the philanthropic organization of Virgin Group, and a member of the World Economic Forum's Global Agenda Council on Space Security.

Authors

"The Only Way is Up" by Chris Welch Ph.D.

Dr. Chris Welch has been a United Kingdom professor of space engineering for many years and has a strong interest in the interdisciplinary aspects of space, including art. As a matter of fact Chris is one of the stars in the documentary "The Visit" that came out last year and provides a very interesting perspective of what the reaction might be if aliens landed on Earth. The cast of this movie is made up of real people all related to space research and policy.

"The Earth Turns Without Me" by Christian Waldvogel

Christian Waldvogel is an artist and architect from Switzerland, whose imagination has taken him to very high places, including flying above the earth in a Swiss jet fighter plane at super-sonic speed. This was part of his project "The Earth Turns Without Me." By traveling in a jet fighter plane in a westward direction at 1158 km/h, faster than the speed of sound the artist was able to stand still. You will learn all of the exciting details in Christian's article.

"Art Experiment on the Space Station" by Takuro Osaka, Ph.D.

Dr. Takuro Osaka is both an artist and a university professor in Japan. Having flown his artwork on the International Space Station (ISS), Takuro is responsible for creating some art that is not only very beautiful, but reveals some of the unseen aspects of space such as cosmic rays. As human beings, our eyes have limitations that allow us to see only in a small range of the electromagnetic spectrum. Takuro's art will enable you to surpass the limitations of your own eyes in very imaginative ways.

"The Sound of the Celestial Spheres - Heaven's Carousel" by Tim Otto Roth, Ph.D.

Dr. Tim Otto Roth hails from the Black Forest, Germany. He works on a very large scale, usually outdoors, creating dynamic and colorful works of art that are both captivating and rich philosophically such as "Heaven's Carousel," a combination of art and science. Both light and sound are important elements of this particular piece and will provide you with a new exciting experience should you be able to view the work in person. The kinetic action of this work is totally engaging and on a very impressive scale.

"OPTICKS and Visual MoonBounce"

by Daniela de Paulis

Daniela de Paulis comes from Italy and now resides in the Netherlands. Daniela creates her art using the Dwingeloo Radio Telescope in the Netherlands to receive images transmitted from different parts of the world that are bounced off the reflective surface of the moon. The images received at the Dwingeloo Radio Telescope have some distortion, which is an interesting added touch to the artwork. Daniela works with radio astronomers and engineers, which she finds very rewarding. She has also brought children to Dwingeloo to MoonBounce their own artwork.



"Only the Nose Knows Earth" by Carrie Paterson

Carrie Paterson is an artist and professor from the U.S. She lives and works in Southern California on projects that combine science, art, and engineering. One of these is the engaging concept that different smells could be used as part of an interstellar message intended for reception by an extraterrestrial intelligence (ETI). In an olfactory related project Carrie has developed a perfume to be worn on Earth called Signal. Carrie says she sees perfume "...as a conversation starter and an introduction to using organic chemistry as vocabulary to build a complex signal to communicate with extraterrestrial intelligence." This very imaginative work opens the doors to new horizons.



"Sky in our Palm"

by Ioannis Michaloudis Ph.D.

Dr. Ioannis Michaloudis is an artist and professor from Greece currently teaching and working in Australia. Ioannis works with a fascinating material called Silica Aerogel. This amazing material is comprised of 98.2% air, making it practically weightless. It was developed for use in Aerospace. Ioannis has created cloud-like structures inside blocks of Silica Aerogel which gives the impression of holding a cloud in the palm of your hand. These sculptures are almost weightless. Ioannis works with aerospace scientists and engineers in the development of his artwork.



"A Sculpture on the Moon"

by Anilore Banon

Anilore Banon lives and works in France and likes to create sculptures on a very large scale. For example she created, "Les Braves," a memorial sculpture on the Omaha Beach in Normandy, where the massive invasion of allied troops occurred during World War II. Now she has her sights on the moon via a project called "Vitae" that will be landed on the lunar surface. The sculpture will be made of a shape-memory alloy called Nitinol. Vitae will hold one million handprints of people from all over the world.

Read her article to find out how to add yours.



"The Girl Who Touched the Stars" by

Navneet Mezzciani

Navneet Mezzciani lives and works in the aerospace industry in Southern California. In addition to being a senior project engineer, Navneet is also an artist and a fashion designer.

Navneet's personal story is both fascinating and inspirational, illustrating in a wonderful way how dreams can come true with hard work and self-determination. Born and raised in Bahrain, Navneet entered the research University of Alabama in Huntsville, Alabama when she was just 16 years old.

In her article you will read the amazing story of where her dreams and commitment have taken her.

"Cosmos and Art Within

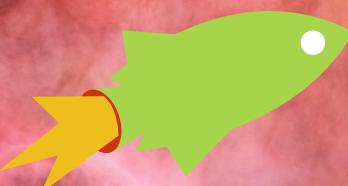
You" by Yuri Tanaka

Yuri Tanaka comes from Japan and has also lived and studied in different parts of the world. Currently, she is working on her Ph.D. thesis on Cosmic Art. Yuri once lived on Naoshima, a very small island inhabited by 3,000 people. In these surroundings she has helped to develop Art Setouchi, an international art festival that takes place every 3 years starting in 2010. Yuri, who says "Think Cosmically, Act Locally" has a strong interest in what forms Cosmic Art might take among contemporary art disciplines, and how she can introduce this exciting work to new audiences.



"Space Flight Dolphin" by Richard Clar

Richard Clar was born and raised in Los Angeles, California. Having witnessed the Apollo Moon Landing in 1969, he was also fortunate to see Sputnik I as it orbited the earth in October 1957. That, and growing up in Southern California surrounded by the aerospace industry, left an indelible mark on his psyche. In later years, his ideas of creating art in outer-space using space technology, data, and materials to create art seemed perfectly natural. Richard has always been fascinated by how things worked and asks lots of questions.



Interview with Ms. Simonetta di Pippo

-by Richard Clar



Director, United Nations Office of Outer Space Affairs

Simonetta Di Pippo, Director, UNOOSA / Natercia Rodrigues

At what age did you think you wanted to become a scientist?

Since it was more a journey for me to become an astrophysicist, and a passion about space, I honestly cannot identify a specific age. I have been always a very curious child and I was used to satisfy my thirst for knowledge doing experiments, mixing up elements, seeing their reactions and transformations. At that time, my interest for the scientific field grew rapidly and by the time I had to choose a Degree area I had no doubt about it.

Who or what inspired you the most as a young child?

I grew up during a golden decade for the space exploration. I was 10 years old when the first human being walked on the Moon, so in a way, I'm a daughter of the Apollo era, which showed that science can make things possible, things which have been deemed science-fictional only a few years before. I was fascinated by the fact that everything in science can be challenged and the "Limits of impossible" can always be moved. The enthusiasm of being part among those who build the future of the whole humankind has been the impetus inspiring my entire career. And I'm lucky enough to admit that I still feel the same impetus.

When did you become interested in space?

Space has always represented a source of inspiration and great interest but it was only during the years of the university it turned into a concrete field of work. In general, I consider space activities, and STEM more in general, as a great opportunity to learn and grow, to discover and solve, to fail and succeed; in other words, it's the substance of life.

Did your parents support and encourage you with your career path?

Yes, they did. My parents have always been by my side. They supported and encouraged me in every choice of my life, even when they were unconventional. And my son did the same too. Probably because I have always been very convincing about my work and the inspirational side of it. Or, because I have been doing my job with a lot of passion, and it

was impossible not to share my enthusiasm?

Would you recommend to young people to embark upon a career in space science, engineering or any other classical STEM fields or possible Arts making it STEAM fields?

Definitely yes. I would actually incite young generations to do so. Space is "Innovation per definition", it can move boundaries and offers a field of work, which unites different disciplines requiring experts with a diverse set of skills. More in general, we need the young generations to focus on space, and in general, STEAM, we need progress and a sustainable future, and for achieving this, we need a sustainable Earth, and long-term sustainability of outer space activities. That's what I'm working on, more or less, days and nights.



#whyspacematters photography contest with NASA and Astronaut Scott Kelly, NASA and UNOOSA

What is the one piece of advice you would offer young girls and boys who might be interested in becoming a space scientist or engineer?

In the long run there is nothing you can achieve without commitment. And the driving force for commitment is passion – that's how one can overcome any obstacles. Young generations need to be inspired to unleash their creativity and to materialize their dreams and Space has this uncontested power to do so.

What would you like to see in the future regarding the commercialization of space beyond providing rides?

I am fully convinced that we are currently at the moment to realize cutting-edge visions of commercial enterprises operating in the space sector. Space applications are part of our day-by-day life and we often even don't realize this simple truth. With the cost reduction in accessing space, and the availability of off-the-shelf technologies, we experience more and more opportunities for opening new markets and revitalize old ones. That's the future. If we look at one of the most promising areas for employment in the next coming 20 years, we find 'astronaut' as a job. Amazing! In this respect, let me underline again that I am

really an advocate for bringing the benefits of space to humankind and my daily business is the promotion of the peaceful uses of outer space, hence my clear motto is to work on the international cooperation in outer space activities for all.

Do you see interactions in space as a place in which design and art are intertwined?

Art can be intertwined with every field. Like for instance CHEOPS – for CHaracterising ExOPlanets Satellite – is a space telescope that will observe nearby stars known to host planets. ESA and its mission partners invited children to submit drawings that have been miniaturized and engraved on two plaques that will be put on the satellite. But also let's have a look at the awesome images of the Earth taken by the astronauts on the International Space Station (they are all art masterpieces) or robotic images taken by the numerous satellites in orbit...and what about the Hubble space telescope images of distant galaxies? Art, pure art!

As you know this special edition of ChildArt Magazine is dedicated to Space Art. Artists working with space technology, data, and materials to make art can provide valuable contributions to design teams working on human space flight and space habitats. From your perspective what can be done by space agencies and international organizations such as the United Nations Office of Outer Space Affairs to implement artists into the initial design phase of human space programs?

In light of long space journeys, innovative architectural approaches and art for living become more and more relevant. A large number of Space Agencies active in the sector of human space flight have to involve in their ambitious projects professionals, designing habitats. The planning and designing of livable module is a challenging task. The researchers and architects have to develop and incorporate new structures and designs which have to be resistant in extreme conditions such as those experienced in outer space. Astronauts will spend far more time beyond the Earth's limits and the psychological side of their missions will have a huge impact on their behavior and performances. Art can help them to feel at home, surrounded by familiar things, and by creativity.

During your time at ESA as Director of Human Space Flight you interacted with many astronauts from around the world. Were there any specific characteristics or traits that these astronauts exhibited that were particularly noticeable to you?

Astronauts can come from really many different backgrounds. They are test pilots, medical doctors, engineers, and scientists. They need to have the ability to live in extreme conditions, and be adaptive and flexible. At the same time, they have to be able to repeat their tasks in a perfect manner, and they need to learn how to be both followers and

leaders when it's needed. Last but not least, they need to have a very good team spirit, work together for the same goal, be supportive when needed, and work with the understanding that life is an enormous value. We have however to consider that for an astronaut to be safe in orbit and perform his/her job properly, we have hundreds of experts in different locations, with different cultures, working together as a team. What counts again is commitment, passion, humility, and understanding that each and every challenging goal can only be achieved in space with the support of others. No one is alone in space! And this is a good lesson learned for our activities on Earth too.

Technological challenges are not the only ones facing long-duration human space flight on a mission to Mars. The real showstopper could in fact be medical issues the astronauts face in space such as bone-loss, cardio-vascular, and permanent eye damage. Will we be able to overcome these obstacles in the near future?

National Space agencies are currently tackling these pressing issues and are promoting more and more long staying missions such as the recently finished one year mission from NASA Astronaut Scott Kelly and Russian Cosmonaut Mikhail Kornienko. The application of Space technology already brought crucial improvement in the methods to perform, among others, surgery in teleoperation mode. Nowadays medical telerobotics, enabling surgeons to execute medical operations from remote places, far from their patient, are a reality. Life experiments and medical quests concern a large number of researches carried out aboard of the ISS. Specifically, to follow up those experiments the astronauts' crews flying in Outer Space are often completed by medical doctors. I believe that the combination of improved technology enabling to shorten the trip together with a more performing equipment and a proved safe long presence for human being will make it feasible in a relatively short horizon of time.

Looking back over your illustrious career in space science is there anything that you wish someone would have told you at the outset?

Not really. I did find my way by myself. The only way to succeed is: Never give up! Only with great determination we can turn our dreams into reality.

Thank you very much for taking time out of your busy schedule for this interview.



Young Simonetta with little sister

Interview with George Whitesides, Virgin Galactic CEO

-by Richard Clar



George Whitesides, CEO,
Virgin Galactic

Who or what inspired you
the most as a young child?

Looking up at the night sky
is what really always grabbed
my attention. That and Legos.

When did you become
interested in space?

When I was about 11.

Did your parents support and encourage you with your
educational pursuits?

Yes, always. One thing my parents are very committed to is
education. They always supported my studies and even sent me
to Space Camp when I was in High School.

Would you recommend to young people to embark upon
a career related to space?

Find something you are passionate about and study it. Reach
out to people in the field you are interested in to learn more or
get ideas of things to do. You can always lead from wherever
you are. Even in rural Zambia we found a local space club, who
listened to weekly radio show about space and were more up to
date on space news than most Americans. With the internet you
can learn, lead and inspire from anywhere.

What advice would you offer young girls and boys
who might be interested in becoming a space scientist,
astronaut, or engineer?

It may not always be easy, but it is very rewarding. At the end
of the day you will learn from your mistakes or disappointments
and it will make you stronger and smarter. Ultimately you will
be able to have the satisfaction of seeing your work (or yourself!)
fly into space.

What would you like to see in the future regarding the
commercialization of space beyond providing rides in low-
Earth orbit?

I would like to see point to point transportation to anywhere on
Earth in under an hour. I would also like more access to orbital
facilities that will allow people to spend longer in space.
Once you do that you can bring people from different
cultures to meet there and help them focus on how they
have more in common than they have in conflict.

As you know this special edition of ChildArt
Magazine is dedicated to Space Art. Artists
working with space technology, data, and
materials to make art can provide valuable
contributions to design teams working on
human space flight and space habitats.
From your perspective what can be done
by space agencies and private space
companies to implement artists into
the design phase of human space
programs? In this sense we are
talking about an art paradigm not
bound only by aesthetics.

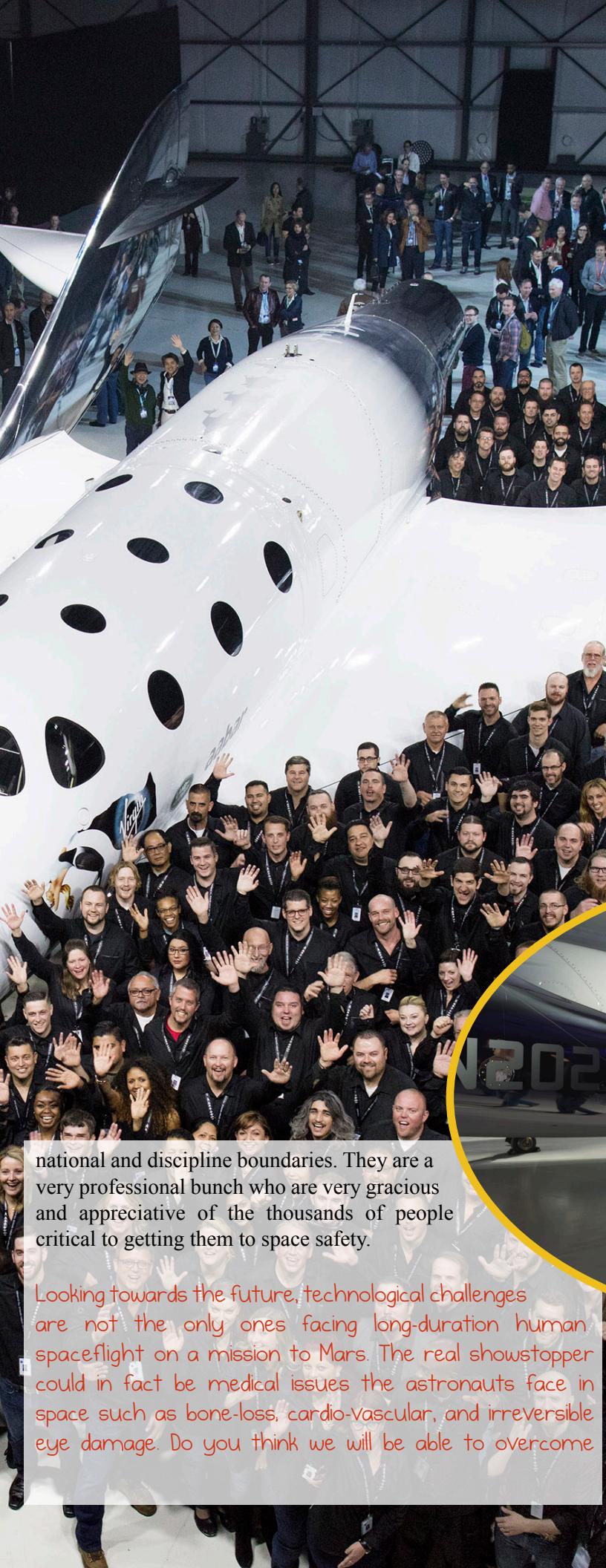
Planet Labs has a great artist in
residence program that has done
some amazing things turning
the sides of their satellites and
ground stations into art. It
helps make what they do more
accessible to the public and it also keeps the engineers inspired.
It's a great model for the impact of art on spacecraft design.

Before you became CEO of Virgin Galactic you were Chief
of Staff at NASA HQ in Washington DC and prior to that
you served as the Executive Director of the National Space
Society (NSS). During this period you interacted with many
astronauts from around the world. Were there any
specific characteristics or traits that these astronauts
exhibited that were particularly noticeable to you?

I have always appreciated astronaut's ability to work across

Young George Whitesides
with Star Wars figures





national and discipline boundaries. They are a very professional bunch who are very gracious and appreciative of the thousands of people critical to getting them to space safety.

Looking towards the future, technological challenges are not the only ones facing long-duration human spaceflight on a mission to Mars. The real showstopper could in fact be medical issues the astronauts face in space such as bone-loss, cardio-vascular, and irreversible eye damage. Do you think we will be able to overcome

these serious obstacles in the near future?

Absolutely. Scurvy was quite a challenge to early sailors. But ultimately we figured out the Vitamin C was the critical piece needed and they started carrying limes. These days we have refrigeration and vitamin C pills. With enough thoughtful problem solving and research humanity will find ways to get where we want to go.

Your undergraduate degree is in Public and International Affairs. For your graduate degree what led to your choice of Geographic Information Systems (GIS) and Remote Sensing?

When I went to Cambridge I wanted to get more into the technical side of space exploration. I was drawn to GIS because of the power of using satellites to understand our home planet.

Thinking back over your illustrious career related to space exploration is there anything that you wish someone would have told you at the outset?

That the sci-fi future we dream of doesn't just arrive, it has to be invented, worked for, funded, built, tested and made real. It's fun, but it also takes a lot of work. Progress isn't automatic. It has to be earned. I can't think of a better way to spend a career though- working to bring about the future of our dreams.



George Whitesides with
Richard Branson, Founder
of Virgin Group. Photo by
Ed Carreon

The Only Way Is Up – Imagination as Fuel for Space Endeavors

- by Chris Welch, Ph.D.



Chris Welch, age 9

When you think of space, what comes to mind? Is it a rocket rising into the sky on a bright pillar of flame? Or an orbiting satellite, sending back signals and information to help the inhabitants of Earth? Maybe an astronaut in a space suit floating in zero-g as she works on a space station? Perhaps a distant planet, maybe, with an alien landscape and sky being explored by a robot that we have sent there? Or maybe you imagine the even more amazing things that we will do in space in the future.

All these different visions of space and the ideas that you have about them are driven by your imagination, which is the most important thing here. This is because, we can only do things that we can imagine first. Without the power of our imaginations, we cannot envision how life and the world (and space!) might be different and so we cannot use our energy, our thoughts and our skills to actually create these new possibilities.

The importance of imagination is not a new idea. Last century, the philosopher Ludwig Wittgenstein said, “What cannot be imagined cannot even be talked about.”, while the physicist Albert Einstein stated, “Imagination is more important than knowledge. For knowledge is limited, whereas imagination embraces the entire world, stimulating progress...”.

Others recognized the importance of imagination, as well. The British Interplanetary Society is one of the

oldest space societies in the world. It was founded in 1933 when most people thought that travel to space was not just impossible, but a crazy idea! The Society’s motto is “From Imagination to Reality”. It was chosen exactly to try to communicate just how important imagination is when we want to do new things in space (or anywhere else, for that matter). And, of course, now no-one thinks that space travel is crazy. In fact, it may soon become nearly as routine as air travel.



If you think of your life as a rocket flight, taking you to unexpected heights and achievements, imagination is the fuel that launches your personal rocket from the pad and starts it on its journey towards its final destination. Almost every person who works in the space field does so because from a young age they had the imagination to see themselves doing so. Fuelled by imagination and propelled by a desire to do and know more, they have worked hard in their own particular part of the space field to fulfill their dreams.

Maybe you think that the only jobs in the space field are for astronauts. This is not the case - which is probably just as well, as there have been only about 530 astronauts since the first one (The Russian, Yuri Gagarin) flew fifty-five years ago in 1961. Fortunately, there are many other ‘space jobs’.

Firstly, there are many space scientists and space engineers. The space scientists want to study different aspects of space and find out more about them. In most cases, the scientists cannot go to space themselves (unless they are lucky enough to be chosen to be astronauts), so they design scientific instruments that can be attached to or placed inside spacecraft to carry out experiments, take measurements, or – sometimes – bring samples back to Earth.

Space engineers often work closely with the scientists.

The role of the space engineers is to build the missions, rockets, spacecraft and other machines which will travel and work on planets in space. This requires them to know just what conditions in space are like, because they are very different from those on Earth (much hotter or colder, a vacuum, different gravity, radiation, etc.) so that what they create will be able to survive and work properly.

Other space careers include space doctor, space lawyer and space business person. Space doctors exist to make sure that astronauts stay physically and mentally fit, before, during and after their space missions. Usually a space doctor has qualified as a normal doctor first, and then goes on to do extra training to specialize in space.

Space lawyers exist to make sure that space law (did you imagine such a thing exists?) is respected. Space law deals with many questions. Some examples are: Who is allowed to put a satellite in a particular orbit? If one spacecraft damages another, who must pay for the damage? How and when can someone lay claim to part of the Moon or an asteroid and use it for themselves?

Space business people look for ways to make money from or using space. This might be by building satellites or by launching spacecraft on rockets or it could be by offering a service delivered from space, for example weather forecasts, navigation information or telephone and television by satellite. Space business is big business. In 2014, world space business was more than \$250 billion.

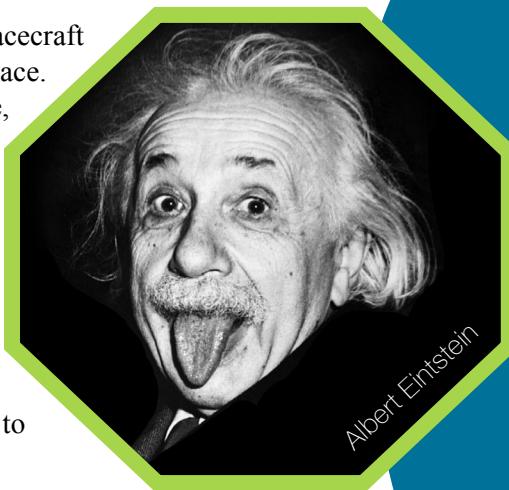
But what about space artists? There are not very many of them so far (but you can read articles by some of them in this magazine). Space artists have a special role. Because art is linked very deeply with the way we humans create our societies, artists are specially placed to bring together new ideas from across many fields and so use their imaginations to stimulate new ways of looking at space and new ways of thinking about space and how we interact with it.

So far, most ‘space art’ has been art about or inspired by space but created and viewed on Earth. As we start to look deeper, explore

Chris Welch, PH.D.
further and move out into space ourselves,
our art will do the same, expressing
even more new ideas and
relationships and stimulating
even more discoveries.

Imagination is the fuel.
Artists create the ‘engines
of imagination’ for our
endeavors. Space is
waiting. The only way is
up!

Chris Welch is Professor of
Astronautics at the International Space
University in Strasbourg, France.



Albert Einstein



Yuri Gagarin



NASA's Fermi Gamma-ray telescope



Chris Welch, PH.D.

Artist Christian Waldvogel describes his thought-provoking art project:

THE EARTH TURNS WITHOUT ME

turns around its axis? That all of us turn along with it? And that we only recognize this indirectly, by observing the Sun and the stars seeming to travel across the sky?

The Apollo astronauts, who looked at our planet from the Moon, are the only humans who have actually *seen* the Earth turn — aside from myself, that is, an artist who spent two years of his life convincing his country's Air Force to send one of their supersonic jets to participate in an art project. And yourself, of course, if you get the chance to see my art piece *The Earth turns without me*, look it up online, or continue to read on here.

When I set out to remove myself from the rotation of the Earth I was struck by the seeming simplicity of the undertaking: One just has to travel opposite the rotation, at the speed of that rotation. At the north and south pole it would suffice to simply turn around one-self, and at the equator one would need to cover the earth's circumference in a day, which translates to 1040 mph. In Switzerland, where I live, one needs to travel at 719.55 mph, which is faster than the speed of sound: not easy

to do. In fact, only the Air Force are able to go that fast, but they took some convincing. Then, I needed to learn about the jets, plan the flight in detail and get ready for a medical exam to prove that I was in excellent shape. Even though I never served in the military, they gave me the insignia of a captain, for non-officers are not



Christian age 11



Our mission patch shows what happened: flying along the red arrow I stood still. All others —including yourself! — kept on turning with the Earth (black arrow).

Portrait of the artist not turning with the Earth (2010)



allowed in the cockpit of fighter jets — and civilians even less!

My artist friends and I converted the rear cockpit of an F-5F into a supersonic pinhole camera, using red plastic film and tons of specially certified tape.

In front of shivering mechanics and amused pilots we installed cameras, cables, batteries and

screens so I could document my standstill. Then we took off.

Once we had reached altitude and broken the sound barrier, I installed the pinhole and adjusted the film cassette, all the while filming and photographing. We didn't turn with the Earth during four minutes, which is the

time it takes the Earth to spin by one degree of longitude. And because we didn't turn with the Earth the Sun didn't move either. I used the pinhole camera to expose the Sun onto the film during those four minutes. In the end, the photo would show a point, which itself is the shape that represents standstill — as opposed to a line, which is what you get when you move your pen across the paper.

Just like the stars actually, which appear as strokes on your pictures. But in fact, it was us, you, the Earth, your camera, which moved.

Go online* to see the video we shot with a forward-facing camera. You will see the Earth turning, as if filmed from a point which is fixed in space. Like the exposure I made in the cockpit, the film is four minutes long. It is made so the horizon is vertical and offset to the right; you can focus your sight on the center and imagine hovering to the left of the Earth. The bigger you project the film the better. In a museum, I never show it smaller than 20 feet wide.

* <http://www.vimeo.com/waldvogel/standstill>
<http://www.waldvogel.com>

Art Experiment on the Space Station

by Takuro Osaka, Ph.D.



Takuro, age 10

Greetings! I'm Takuro Osaka, a Japanese artist that presented Space Art on the ISS (International Space Station). I would like to share with all of you why I became an artist, who influenced me, and why I create space art. I would also like to introduce my artwork that was chosen to be exhibited in space.

The reason I chose art as my field.

Ever since I was a kid I have always liked to draw. My father also loved to draw, and I can still remember the vehicles and creatures he drew. When I was in third grade in elementary school, my mother gave me a daily assignment--to observe nature and draw it every day. I believe my parents helped train my perspective of the world by having me draw. I was so touched by the paintings and sculptures I saw that I decided to become an artist myself.

The people who inspired me as a young person.

Artists I admired between my elementary and junior high school years were Yokoyama Taikan, the ink painter, European modern artists such as Monet and Rodin, and Alexander Calder, the inventor of the mobile, a moving sculpture that moves in response to air currents. Others that inspired me include Walt

Disney, who created "Fantasia," an animation set to classical music, and "The Living Desert," a documentary, and Jacques-Yves Cousteau, the oceanographer who created the movie "The Silent World". I became interested in the world of nature through artists and how they portrayed it.

The reason I make the kind of art that I do

I observed the American satellite Echo in my sixth year of elementary school, and saw the Leonids while in high school. These were some unforgettable experiences with space. In 1968, all I could think about was art and space after seeing the image of Earth taken by Apollo 8 spacecraft. I got the idea for space



Figure1.1: "Marbling Painting on a Sphere of Water" 2008. Plan: Takuro Osaka. Execution: JAXA



Figure1.2: "Marbling Painting on a Sphere of Water Light, Life, and the Sea" 2011. Plan: Takuro Osaka. Execution: JAXA

art using lights during my university years while gazing at the beauty of the transforming twilight sky from the peak of Mount Karamatsu in the Northern Alps of Japan.

In the years to follow, I seized cosmic rays with a sensor and created light art and another piece that gathered moonlight using multiple mirrors.

I participated in the Space Art Experiment in the ISS conducted by JAXA between 2008 and 2013. Here, I will show you two types of art that move in zero gravity.

Takuro Osaka, Ph.D.



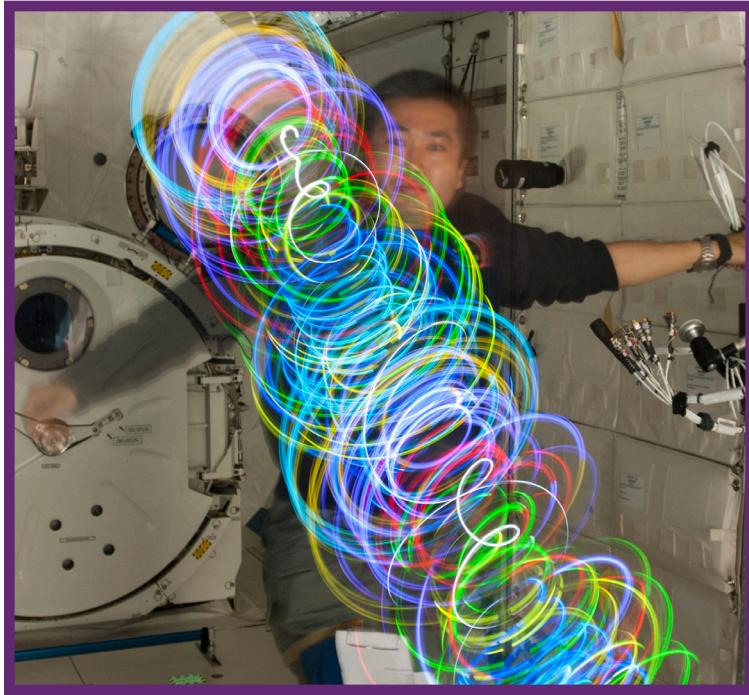


Figure 2.1: Moving sculpture “Spiral Top” 2009. Plan: Takuro Osaka. Execution: JAXA

Space Art Experiment

1. “Marbling Painting on a Sphere of Water”

Earth is known as the “water planet.” In order to portray this magical image, I used “ink marbling,” a traditional art form that floats ink on water. The themes of the piece were light, water, and life. Water forms spheres in zero gravity and in this experiment, we could see beautiful 3D marble patterns. This

masterpiece was created by astronaut Gregory Errol Chamitoff (Fig. 1.1). The second water sphere used salt water in place of sea water, and was injected with fluorescent blue ink and sea-fireflies, a luminescent organism from our ocean. When lit by an LED black light, a blue striped pattern would appear, resembling Jupiter’s surface and deep space. This masterpiece was created by astronaut Satoru Furukawa (Fig. 1.2).

2. Moving Sculpture “Spiral Top”

Complex spiral patterns surround us, from the shape of our DNA to the Milky Way. The masterpiece, Spiral top-II “Aurora Oval,” has four arms with flickering LEDs attached to them. They engrave a light trail mid-air, creating a spiral pattern while spinning in reverse in zero gravity. In 2009, astronaut Koichi Wakata created such a pattern in his experiment (Fig. 2.1).

In 2011, astronaut Catherine Coleman and Nespoli Paolo captured an image resembling the Aurora during their experiment (Fig. 2-2). Spiral movement is one of the dynamic motions of space.

There are many mysterious phenomenon that occur in zero gravity that cannot be seen on Earth. Through my participation in this project, I was able to appreciate the greatness of space, humanity, and art once again.

I hope all of you will be captivated by Space Art and one day create a groundbreaking masterpiece to be exhibited in space.

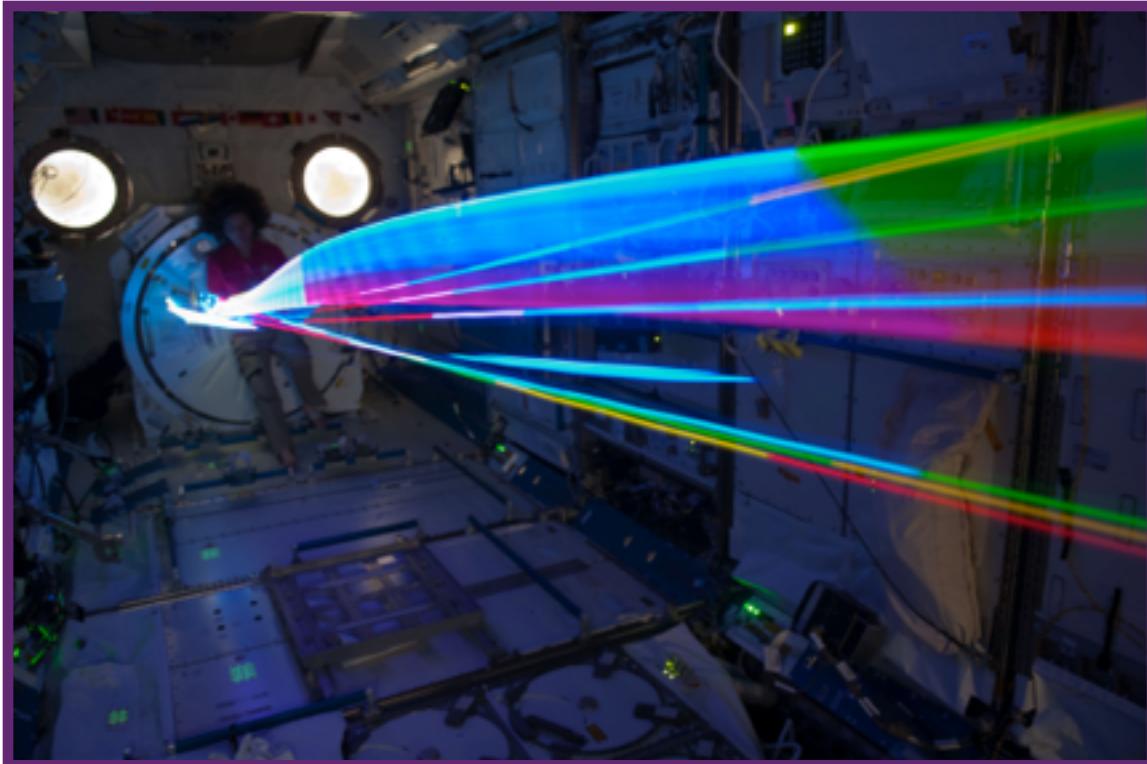


Figure 2.2: Moving sculpture “Spiral Top - Aurora Oval” 2011. Plan: Takuro Osaka. Execution: JAXA



Can we actually hear the stars and the galaxies? Antiquity had long ago assumed that the movement of planets in outer space produced sounds. The resulting music of the spheres was considered an expression of greatest harmony. The idea of extraterrestrial tones emitted by stars and planets is what inspired Tim Otto Roth to undertake a quite spectacular space-art project. "Heaven's Carousel" shows how antiquity's music of the spheres might sound like in view of present-day astrophysics.

Space-art is commonly linked to space travel. For his work, Dr. Roth developed his own approach to space-art. "Space travel actually begins with the fact that people long ago began to observe the movements of heavenly bodies," the German artist says. "The fact that these bodies in motion do not clash makes it quite evident that heavenly space must be tiered. This observation allows what is actually perceived as a flat firmament to expand into cosmic space. As a consequence, any observer of the sky becomes a space traveller."

With "Heaven's Carousel", Dr. Roth makes the movement in space experienceable in a quite particular way and invites the visitor to become a space traveller on his/her own. On occasion of the 25th anniversary of Hubble Space Telescope, celebrated in spring 2015 at the American Visionary Art Museum in Baltimore, the artist hung 36 spheres from three rows of steel cables that at night were almost invisible. The construction slowly begins to turn and the spheres are driven outwards by gravity, like a swing carousel. In one piece the spheres light up red and emit deep, hardly perceptible tones. The movement slowly accelerates;

the tones' pitch becomes higher and the colors change. The spheres glow in orange, yellow, green and blue, according to the pitch. If you walk into the area under the circling spheres, you make a surprising discovery.

Once under the orbiting loudspeakers, you hear the tones' pitch change with the motion of the spheres.

A tone is in a higher pitch when the loudspeaker swings towards the visitor and is deeper when the loudspeaker swings away. This so-called

Doppler effect is what we recognize from ambulance sirens. There is, however, one place under the carousel when this effect is nullified. Exactly in the middle of the carousel, the sound no longer shifts but stays the same. In this way the visitor can him/herself change the tones being heard and, with "Heaven's Carousel," experience his/her own personal music piece, which no one else hears in the exact same way.

Dr. Roth, with his Carousel, not only visualizes antiquity's ideas of the music of the spheres, but re-imagines them on the basis of current astrophysical research. Here the Doppler-effect comes into play, too.

The light of celestial objects approaching us at very high speed is compressed so the color is shifted to the blue, whereas the light of departing objects is stretched, so its colors are shifted to the red. By this "redshift" you can determine, for instance, the rotation of galaxies. On a larger scale a "cosmological redshift" was discovered telling us that the whole universe is expanding as space-time is stretched. Though up to now it was assumed that—after first being triggered by the big bang—the universe's expansion has been slowing down, scientists can today report that the redshift proves that the universe is instead expanding at an ever-faster pace.

Herein lies the key to "Heaven's Carousel." Dr. Roth, as it were, lets us share in time travel: a journey that begins in red from galaxies billions of light years away and takes us ever closer to the present. The accelerated expansion of the universe is, in addition, suggested by the orbiting motions of the carousel construction. Gravity compels the spheres to fly centrifugally outwards. "Heaven's Carousel" is—after "From the Distant Past"—the second space-art project with the Hubble Space Telescope that Dr. Roth has produced. We impatiently await the next time when he will invite us on another excursion to outer space.

Tim Otto Roth is a German conceptual artist, composer and scholar. His work infers a plea for a "physics of art."

Preparing the "Heaven's Carousel" for the show at the American Visionary Art Museum, Baltimore in spring 2015

"From the distant past", laser projection on the Hayden Planetarium, Rose Center for Earth and Space, American Museum of Natural History, New York 2011, credit: Tim Otto Roth; AMNH



OPTICKS and Visual Moonbounce

by Daniela de Paulis



Daniela and the Ford Capri
Image credit: Enrica Simonini



Daniela de Paulis portrait with antenna on a sunny day in Normandy



Left: Charles Duke family portrait, image credit: Charles Duke
Right: Charles Duke Family Portrait on the Moon's surface,
Image credit: NASA/Charles Duke

OPTICKS is an art/science project realized by visual artist Daniela de Paulis in collaboration with the CAMRAS radio amateur association based at the Dwingeloo radio telescope in The Netherlands. The project is presented as a live audio-visual performance during which digital images submitted by the audience are transmitted as radio signals to the Moon from a radio station in Brazil, the UK, Switzerland or Italy. The signals reflected by the Moon's surface are then received by the Dwingeloo radio telescope, converted back into the original images and projected live at an exhibition venue.

The project uses Visual Moonbounce, an innovative application of Moonbounce technology developed by Daniela de Paulis

1946 humankind touched another celestial body for the first time in history by means of radio waves during the first Moonbounce contact. Moonbounce, also called Earth-Moon-Earth or EME, was developed after WWII by the US Navy as a reliable form of voice communication that was not affected by the terrestrial atmosphere, however it was replaced in the 1960s by the deployment of artificial satellites. Visual Moonbounce and OPTICKS are a contemporary take on the technology. They aim at making Space Travel available to all by transporting images to the Moon and back.

Back in October 2009 I got in touch with a team of radio amateurs at the Dwingeloo radio telescope in The Netherlands, with a proposal for an artistic project involving a live, visual communication with the Moon using images, videos and sound.

For the last few years I had been thinking about Moonbounce, in fact since first hearing an echo from the Moon I had been amazed by this technology. CAMRAS radio operator Jan van Muijlwijk replied enthusiastically to my email and started looking into technical possibilities.

Immediately after our initial contact, Jan started experimenting with possibilities of moonbouncing images using the MMSSTV software. The very first test was carried out on December 6, 2009 when Jan sent the portrait using his 3 meter dish in the back garden of his house to the moon, with the reflected signal received by the Dwingeloo dish. The result of this first experiment was very promising, although the original image was not recognizable at this point. Several attempts followed until the moonbounced images started becoming more and more clear. The radio signals containing the information of the image become weaker while travelling the long distance to the Moon and back (approximately 768,000 Km). This is one of the causes for the distortion of the original colors and shapes in the image, together with the poor reflective qualities of the Moon's surface. The noise showing in moonbounced images is, however, what makes them interesting and evocative of the long journey to the Moon and back. During transmission the MMSSTV software converts the colors and pixels of the image into sounds that are then converted into radio waves; these are sent to the Moon and after bouncing off they are received by Dwingeloo radio telescope, converted into sounds and then back into image using the same software. The sounds produced by each moonbounced image are unique to that image; in fact no two moonbounced images will ever be alike due to the continuously changing astronomical



Moon reflected image

When the technology of moonbouncing images using the MMSSTV was fully tested by Jan, I started working on ideas for using this great technology within a live performance. After some research

I came up with the title for the project, 'OPTICKS', inspired by the 1704 essay by Isaac Newton on the reflections, refractions, inflections and colors of light.

The title aims at suggesting the phenomenon of reflection and refraction of the radio waves by the Moon's surface, through a poetic and philosophical link

between Moonbounce and the light spectrum. Every OPTICKS event is a bit of an adventure, and we always experienced some technical problems either before or even during the live event. One of my favorite performances was in collaboration with RAI Radio 2 program 'Rai Tunes,' directed by Italian DJ Alessio Bertallot. The event can be still seen on YouTube. The photos submitted by the radio listeners, including some iconic images from popular culture, such as Pink Floyd's 'The Dark Side of the Moon' album cover, were sent to the Moon by a Howard radio operator in the UK and received by Jan at Dwingeloo while some classical and pop music tunes accompanied the event.

In April 2015, as part of a recent live event, presented in collaboration with Astronomers Without Borders, we reflected off

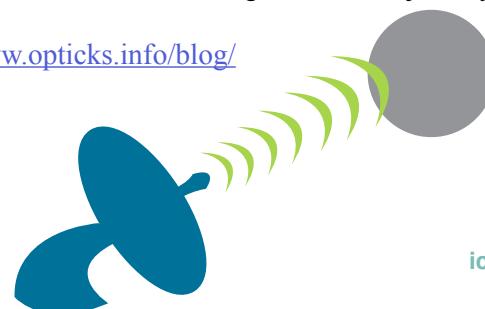
the Moon the historic family portrait left on the Moon's surface by astronaut Charles Duke during the Apollo 16 mission in 1972. It is feasible to think that the portrait might be completely bleached out by now because of the Sun's radiation hitting the Moon. Charles Duke agreed to send me a digital scanned copy of the original photo which was sent to the Moon once again, this time returning back to Earth. I printed the Moon reflected image, signed it and sent it as postcard to Charles Duke himself who wrote: 'I think it is remarkable that you can do this'. You can see the result on the left.

Experimenting is an important process for artists, radio amateurs and scientists alike. Something that started as a playful experiment for an art project might lead to many interesting pioneering ideas in this fascinating technology called Moonbounce, and beyond even that.

Being a small part of this adventure is for me an amazing experience. I will never be grateful enough to CAMRAS, Jan, Daniel, Bruce, Howard and Armand for making 'visible' the journey to the Moon and back.

<http://www.opticks.info/blog/>

"Experimenting is an important process for artists, radio amateurs and scientists alike."



Only the Nose Knows Earth

- by Carrie Paterson

In October 2015, excitement filled the air. CNN announces the discovery of a strange astronomical anomaly around a distant star: is it a natural phenomenon (a storm of comets) or could it be the sign of an alien intelligence? Scientists still don't know, but they are studying it.

What if we could communicate with alien beings? The thought fills many with excitement, fear or even joy. What would they be able to tell us about themselves, about physics, about the universe we share? Would we have anything in common? These questions raise profound issues regarding how humans think about ourselves, our planet, and Earth's creatures – questions I think about as an artist.

I started my life as an artist making sculpture and thinking about bodies, time and space. But soon I became more interested in the invisible parts of bodies – their thoughts, the air around them and bodies' effects on the world.

In 1926 a Russian bio-geologist named Vladimir Ivanovich Vernadsky (1863-1945) published *The Biosphere*. Vernadsky proposed we are all part of the same ecological system and all life on Earth like plants, humans, animals, microbes and viruses are a geological force. He proposed that LIFE is a cosmic phenomenon, just as constant as gravity and the speed of light.

How would alien life make its own biosphere? How different would it be from ours? Could we find out what the geological features, atmosphere and chemistry are of their planets? And what does this have to do with art that you and I can do?

Our biosphere might be extremely special and rare. Just as all forms of life here share elements (like DNA), they are still incredibly unique, just like fingerprints or snowflakes – every one is different. As life evolves, it becomes more complex – more creatures, more types of plants, more genomes. Vernadsky also thought about this, and his idea was that the longer there is

life on a planet, the more complex its influence. I think of it like this: a planet is a kind of self-contained, cosmic art experiment. Now humans are at an important cross-roads: our activities here, which include weaponry, war, deforestation, pollution of the oceans, mining, and the destruction of habitats all negatively affect this process natural to the biosphere. Are we like the asteroid that killed the dinosaurs, but in slow motion? Slowly but surely killing the life forms on the present planet, which may include ourselves? What will become of the biosphere after us?

When we search for distant planets – a process some call “sniffing” – and we look for signs of life, what do we expect to find? A planet at its peak of complexity? A planet recovering from an episode of devastation? A sign that intelligent life, though now extinct, may have lived and prospered there?

This “sniffing” idea is the basis for my artwork, which uses perfume.



Copernican System

By using our sensory perception, could we learn something about distant planets? We think of our noses as useful only within range of something, well – smelly – be that good, bad or mysterious. But did you know that our olfactory sense is actually distributed through many organs in our bodies – our liver, our lungs, and our skin? That's right, we “smell” with our skin! When we go into a forest, our bodies experience the moisture, the trees, the particularities of that ecosystem; when we go to a familiar place near the ocean, our bodies, not just our noses, know that we are there.

When we are home, our bodies know that too. We are all born and raised in different places and cultures, with different environments, foods, and people around us. Not only that, but each of us humans only has about 350 olfactory receptors, each of us with different ones. Each body senses different environments and decodes them like maps.

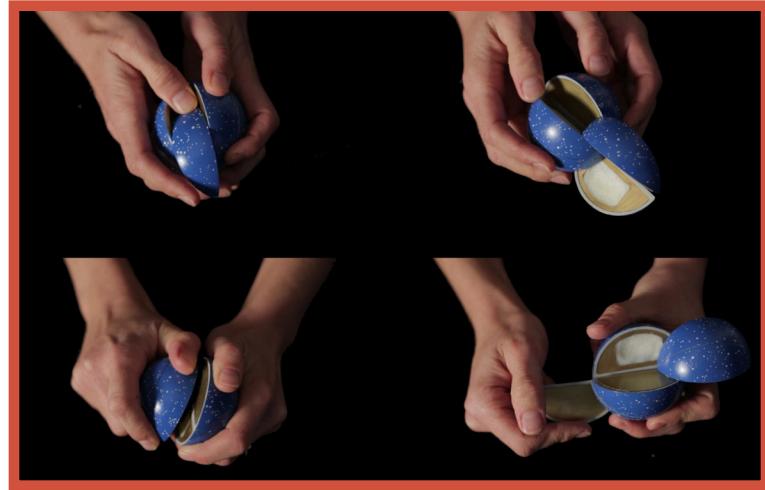
Now, get out of your body for a minute and imagine that in the wide universe, our unique “home” is our biosphere. We know other planets and moons have characteristic smells – methane, sulfur, iron, for example – because we can sense them with probes



Carrie, age 9



Carrie Paterson



Homesickness Kit

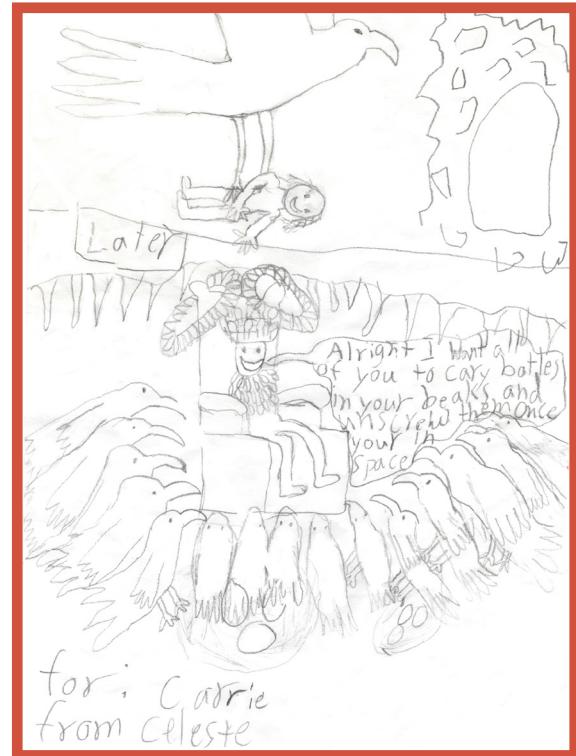
that read the unique chemical "signatures" in those atmospheres. But Earth – imagine all the smells here! What an interesting place to call home. Even trees and plants communicate with each other using chemical signals; the bees know exactly where the roses are; and animals know where other friends or foes may be waiting. We all SMELL – actively and passively.

Perhaps intelligent lifeforms elsewhere can "sniff us out". This is a far-fetched idea – even our astronomers don't have sensitive enough instruments. We can't see more than fractions of the sky at once, and we haven't looked for very long. With telescopes we read light waves to tell if a star is hot or cold; we know if a planet is rocky or gaseous, but little else. We know there are complex organic molecules in interstellar gases, but we can't tell which ones they are. If we build more sensitive instruments, we might decode this information and zoom in on an interesting smelly place. Maybe then we could discover an alien biosphere....

My whole proposition is science fiction, but it also makes me feel creative. It makes me appreciate Earth and everything here. I feel very much at home. If I were to communicate with an alien, I'd like to talk about where I come from and what makes it beautiful and quirky. I would want to know the same about where the aliens were living. Perhaps we could share some ideas after that, about gravity and physics, things we know how to do, and whether there are wormholes, and how not to die.

Gulf of Alaska, image credit: NASA

But distances in the universe are vast. It takes a long time for messages to get anywhere, maybe more time than we have. But that doesn't mean we can't call out into space, or dream about an answer from the cosmos. In the process we might learn more about what is most important to us, if we only try.



A comic from Carrie's friend Celeste, age 9

icaf.org 20

Sky in Your Palm by Ioannis Michaloudis Ph.D.

Ioannis, Age 12



Dr. Michaloudis gazing at a test tube containing a piece of sky, © Charles Darwin University, 2016

- Have you ever wondered what the sky is made of?
- Why it is blue? And why, during the sunset, does it turn a golden hue?
- Is it useful to have a sky around Earth?
- Could we use sky and clouds as art materials and create with them?



Earth's atmosphere over the Caribbean Ocean.
Image Credit: NASA

Looking down on Earth from space, one can see a very beautiful transparent blue haze around the planet covering the surface of all mountains and seas. Our Earth is enveloped by a vast amount of air called the atmosphere. This last layer of our globe is the inhalation of our planet, our own blue

and gold breath, we can say. Planet Earth is a space island, an oasis enveloped by its atmosphere. The atmosphere is a layer of gases surrounding and protecting life from genetic damage by ultraviolet solar radiation. By imitating nature, humans create garments and architectures in order to protect themselves from bad weather. The very first function for every dress and building is to insulate a human body. There is something better! Recently we discovered an excellent material called silica aerogel that is the best insulator worldwide. We'll talk about this later. Let's go up again, to the sky.

Our atmosphere looks blue because of the scattering of sunlight off the tiny particles of the atmosphere. The scattering of light from larger particles in the sky, is what creates the sunset colors. Do you remember the vivid red sunsets in windy summer days? A lot of dust is up in the atmosphere and the scattering of light on this "thick" environment causes these dramatic golden-red hues of the sunset. Nevertheless when you look up the sky continues to be blue, doesn't it? Clouds appear white because they contain extreme amounts of water vapors; and during the sunset all these clouds will look orange, pink and yellow.



Sunrise, from the International Space Station.
Image credit: NASA

I am a cloud-hunter; lying in wait of air streams, grabbing pieces of sky, shaping them, molding them, and baptizing them as aerosculptures. I am the first visual artist to bring the space technology material silica aerogel into the field of Art. But how can a visual artist mold air and create artworks out of sky? Using

silica aerogel. Silica aerogel is the lightest solid material in the world; NASA uses it as a spacecraft insulator and also in order to catch stardust. Aerogels have excellent thermal insulation properties and they are paradigmatic materials for designing our future homes.

I encountered silica aerogel back in 2001 when I was a Research Fellow at MIT. For the reason that this ethereal material looks like our sky, I transferred it to Art and Design. In order to do so, I had to refresh my memory on Chemistry and Physics and study nanotechnology; collaborating with scientists from California and India. From then on, the space technology nanomaterial silica aerogel became the epicenter of all my Art & Science research and artworks, like the ones you see here.

Every aerosculpture has a blue and an orange natural color because of scattering phenomenon. Let's take a look at the Bottled Sky in Photo 1. The light scatters off and offers this natural blue color. If now, you put the Bottled Sky between your eyes and a source of light, then the sky will turn to a transparent orange. For the same reason, when viewed in direct light, the SkyFlower in Photo 2 appears blue. But when the light is passing through the sculpture, then—as we can see its shadow projection on a sheet of transparent velum in Photo 3—the sculpture offers a dramatic gold/orange hue. There is even a Stairway to Heaven inside the sculpture's sunset in Photo 4!

The paradoxical visual qualities of the aerosculptures will impress you: their shadows are not black but transparent gold. The thicker the sculpture is, the darker orange its shadow will be. Additionally every aerosculpture can change the beam of a laser pointer to a line. That's why aerogel has the nickname of "frozen smoke." I use this material to express my vision for ethereality, immateriality and to collect sky and clouds from our wounded atmosphere. Imagine, when we'll begin to travel to other planets, we'll probably want to have our cultural heritage with us. We cannot carry the marbles of Parthenon nor the Pyramids, inside the spacecraft. But what if we could have copies made from the lightest material found on planet Earth?

**Do not look for
a hidden meaning in
Michaloudis artworks. There is
no message inside his Bottled Skies,
neither in this writing. There is
only a distress signal, an SOS, a
Save Our Sky warning.**

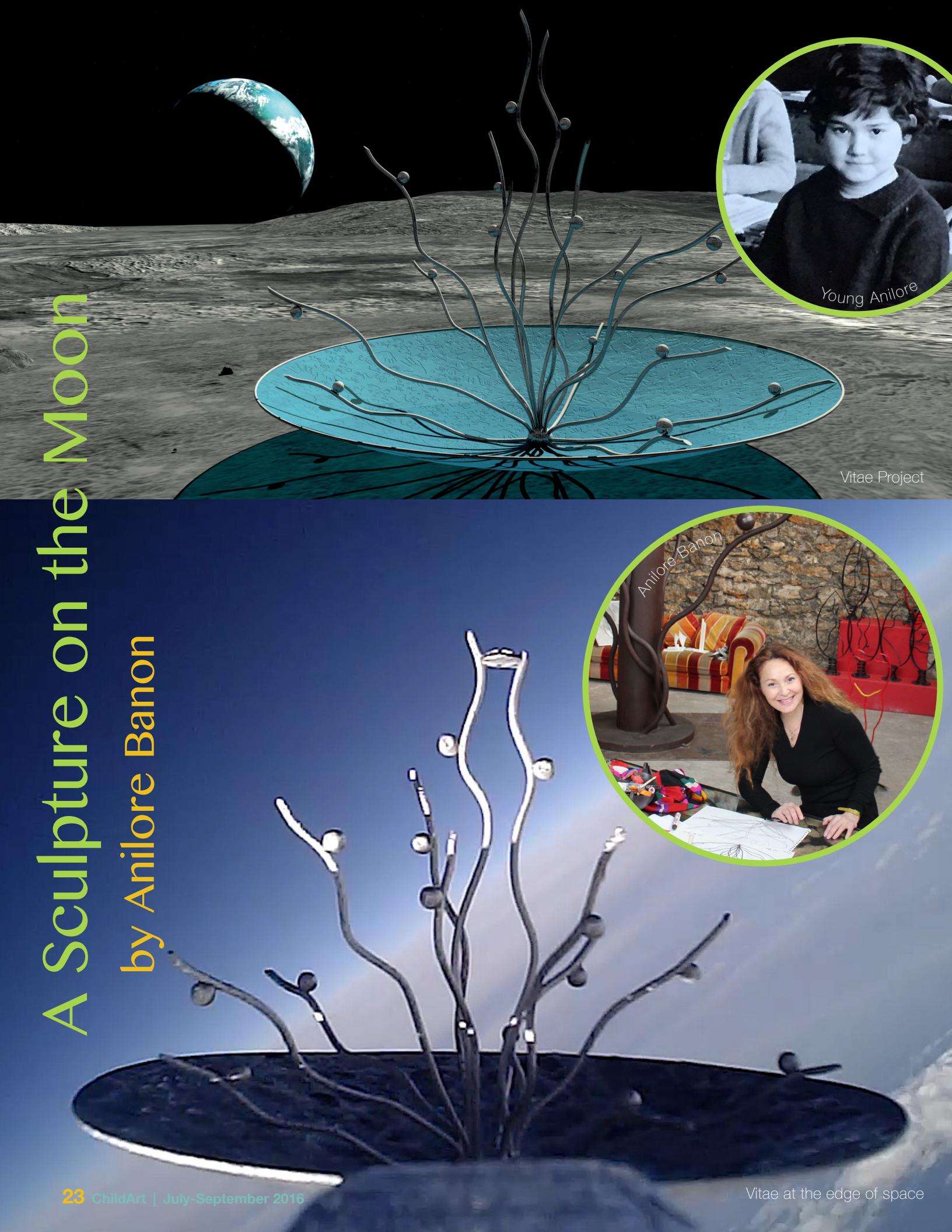


Photo 1: Bottled Sky,
silica aerogel, glass
vial, rubber cork,
© Michaloudis 2008

Photo 2 & 3: SkyFlower,
silica aerogel, stainless steel,
LED, motor. Wedding Gallery,
Berlin, © Michaloudis
2009

Photo 4: Skydisc, silica
aerogel, aluminum,
© Michaloudis 2011

A Sculpture On the Moon by Anilore Banon



Some people express their feelings with words, I express mine through sculpting.

My passion is to create sculptures that I install in parks, towns, even on the beach or in the sea. This time I chose the Moon!

I believe no one should tell you something is impossible to do. It might be difficult but never impossible. It is only impossible until it's actually done. To the word "Impossible" I prefer the word "Challenge".

A few years ago, I created a sculpture about Courage. I named it "The Braves". It weighs more than 20 tons. I wanted to install it on a beach, with the tides coming in and out and specifically on the historical D-Day landing site: "Omaha Beach" in France. I was told relentlessly it was impossible. And yet, it has been installed on Omaha Beach in France for 10 years, to pay tribute to the heroes of D-Day who fought for our freedom.



"The Braves" on Omaha beach. Image credit: Anilore Banon

Today, I am working on an even bigger challenge: Installing a sculpture on the Moon!

The "Vitae Project."

Some people could find this crazy, I know, but even this can be done if the right people get together. To turn my project into a reality, I had to work with scientists and integrate within my creativity the realities of Space and of the Moon. If you can convince the right people, if you can share your enthusiasm, and if you work really hard, you can bring together a chain of people that will make the impossible possible. Forever, Man has dreamt to go on the Moon. In 1969 American astronauts left the first footprints on the moon. We could now install a "living" work of Art that will carry millions of hand prints. Even yours! We could all take this incredible trip together to the Moon. I conceived this sculpture as a flower that would open up at night and close during the day. A "living" sculpture, like us, that moves, like us. A large corolla carrying imprints of all the hands collected on earth. From the center grows out long stems representing people, you, me, all of us. All united in the middle with the two tallest in the center holding a precious stone: the source of life.

During the day, it closes up like a cocoon, protecting everyone inside and during the night it quietly opens up so all the people inside can stretch out. Then we will be able to see it from Earth with a little telescope. To bring a touch of humanity on the Moon, isn't it a beautiful dream? Let's try to make it come true together.

The alliance of Art and Science

Great scientists have been working for the last 3 years to make this project possible. They found a solution for each problem. It is not so simple to send a sculpture to the Moon. Over there, it is very hot during the day: +150°C and very cold at night: -150°C. A day or a night on the Moon lasts as long as 14 of our days on Earth.

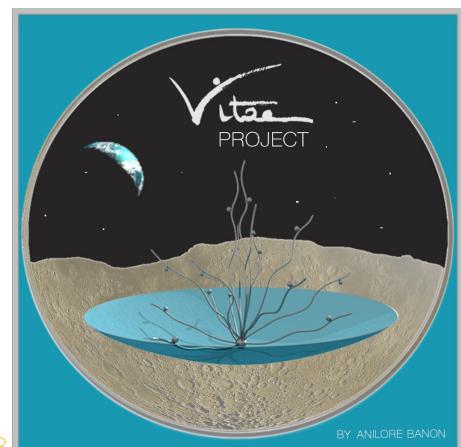
A material with a memory

The metals and materials I use every day are no longer appropriate for that type of environment. To make the sculpture, I had to find a material that could sustain such temperatures and be light enough to be transported in a rocket while taking as little space as possible. We finally found it, it is called "shape memory alloy".

You give this material the shape you want, in a special oven and it remembers it. You can then compress it and as soon as it reaches a given temperature it goes back to its original shape. As of today, a maquette of the sculpture went to the stratosphere. We had put on it all the handprints of the team which worked on the project for 3 years. The sculpture was sent with a meteorological balloon about 40 km above the Earth. Thanks to the engineers' calculations and to the GPS which they had installed on the sculpture, we got it back when it returned to Earth.

Put your handprint on the Moon

The next step will take VITAE even higher, to the International Space Station, before it ends its great journey on the moon. You can join us in this adventure! Take a picture of the palm of your hand, make sure to put a white sheet of paper behind it when you take the picture so we can clearly see it, and send it to me at contact@vitaeproject.com with your name.



Mission PATCH 3

The Girl Who Touched the Stars

by Navneet Mezcciani



Young Navneet

Have you ever been on an island? Imagine it's so small that when you walk around its edge you end up where you started in no time. Imagine always seeing the vast ocean to your side and wondering what lies beyond the horizon. Imagine staring up at the infinite sky and wondering if you could ever touch the stars.

I grew up on an island like that – Bahrain – an Arabic country where the palm trees swayed in the desert winds and the women shied away under their black cloaks. I was never allowed to swim in that ocean because I was a girl and had to stay covered. I wasn't meant to touch the stars – I was destined only to be married young. No career for me. My parents were Sikh immigrants from India. We were a minority. I was a girl instead of a boy, and with my dark features and third-world cultural heritage, I was rather unremarkable on this island of rich kings and beautiful princesses.

However, when my mother, a school teacher, thrust my first pencil into my hands, it changed my destiny. I drew, I painted, and wrote. Soon, I was reading, speaking and writing well beyond my age. My parents had to send me to a British convent on the island because I was too young to be accepted into any other school. After special tests, I was placed with kids who seemed bigger and better in every way. Have you ever felt small and scared? I felt that way for most of my young life.

Illustration by Navneet Mezcciani



One day in third grade, I was sitting alone in the playground during recess under the shade of a palm tree. My teacher walked over and praised me for my hard work. And then she gave me a gift – an inspiration that directs me to this day. She pointed to the top of the palm tree above me and said, “If you aim for the sky, you’ll at least make it to the top of that tree, but if you aim for the top of that tree, you won’t get very far off the ground.”

From that day onwards I aimed for everything I wanted, even if I doubted that I could touch it. I just wanted a shot at getting close. I gave everything all my might. I studied hard to stay at the top of my class. I read everything I could lay my hands on. The library became my second home. And when my mind was exhausted from letters and numbers, I drew and painted. I painted mountains and forests I’d never seen on this desert island. I painted ships on oceans that could sail me away. I painted skies with suns and stars that I longed to understand and touch. Unlike my tiny island or my culture or my gender, my imagination and will knew no boundaries.

In my final year of high school, we had to select the subjects for which we would be tested by standard British board exams. Most chose five or six. I chose ten: three languages, mathematics, the sciences, geography...and also art. Our board exam grades would determine the rest of our lives – where we’d go to university and what we would become when we grew up. After years of preparation and studies, the day had arrived for me to pick up my final results. My entire future was on a small sheet of paper, in a plain brown envelope. When the school officials broke the seal and read my results, they were astonished and became quiet. They whispered to each other, and I imagined the worst. Have you ever felt like you wanted to disappear immediately? They told me: I had broken all the records in the history of the school. I was only fifteen years old.

Over the next few days, I was offered a scholarship to a prestigious college in London that would allow me to attend the University of Oxford. But even with a 75% scholarship, my parents could not afford it. I was very disappointed. I had to find another way. So, I spent many hours researching my chances to study in the U.S. Finally, after considering several universities, and after my

parents counted all their money, including the coins in my small piggy bank, there was only one we knew we could afford.

I always knew I would study in the sciences. I loved physics and biology. The University we selected – the University of Alabama in Huntsville – was well known for its engineering program. When it came time to select my major field of study, I worried. I wanted to study computers. There was just one problem: I had neither owned nor touched a computer before. But I wanted to learn everything about it.

My father brought me to my school in America and left two days later. I was 16 years old. I had no family or friends in this vast land. I had crossed the oceans like I imagined, and the mountains and forests I had painted were finally in front of me. A girl studying computer engineering, from a foreign island, younger than everyone else: I still felt so small. But I kept looking up at the sky.

It was the first day of my very first programming class in the computer lab. When the professor asked us to start our computers, I sat in front of mine, terrified. I had never turned one on in my life. I watched everyone start theirs effortlessly and I felt so unintelligent. But I was determined to become an expert. I studied and studied. A year into my university schooling, my father lost his job. My country was engulfed in war. My family's prospects looked very grim. It became clear that they no longer could pay for my studies. But because my grades were high, and I showed much promise as a woman in computer engineering, I won scholarships from the university. I still had to work to pay for food and living expenses. I wasn't sure when the school would stop my scholarship so I took more classes than anyone else to speed up my education and finish early. I worked at night and on weekends. I sold hand-drawn portraits and my textbooks so I could have money to eat. And then, I graduated from the University, the only girl in my class with a degree in Computer Engineering, with the highest honors. I was nineteen years old.

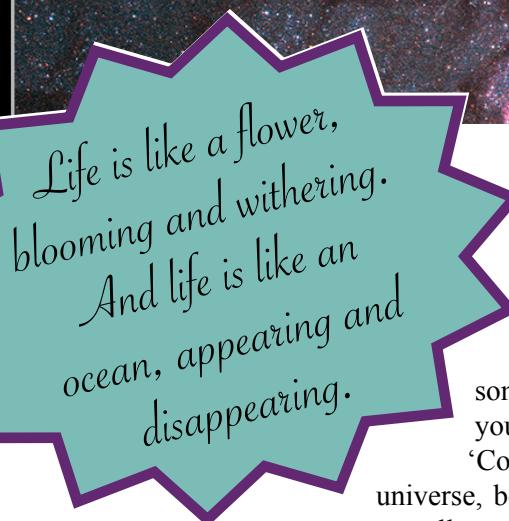
At my graduation ceremony, I was introduced to the man who became my first boss. He offered me a job working on the software for the engines on NASA's Space Shuttle that helped carry it out into space. In all the times that I was aiming for the sky, I never knew that one day I would make it beyond its limits. The unremarkable brown girl from a tiny island became a rocket scientist. Today, I work on engineering marvels and complex machines that really do touch the stars. Earth is now my island in this universe. And I'm still looking at and imagining what's beyond.

Navneet Mezziani



Cosmos and Art Within You

by Yuri Tanaka



Have you ever wondered, "What are cosmos?" or "How do we relate to cosmos or art?" In fact, cosmos and art are not something separate from you, but are within you. 'Cosmos' signifies the entire universe, both visible and invisible as well as the ideas of causation, consequence and contingency. There is always a concealed beauty in this universe. For example, when you listen to the sound of water or the wind or when you look at the flowers or the stars, have you ever found something beautiful in their nature? To tell the truth, their structures and appearances correspond perfectly with the laws of the universe. Cosmos also implies beauty and order in its original meaning in ancient Greek. True beauty is not only found in the appearance but also can be found in invisible cosmic factors within it. It is your spirit, which creates beauty in your life. If you take this perspective, you can find so much beauty in everyday life.

We have described cosmos, but what about art? 'Art', in a broader sense, covers various aspects of our lives. Art as a creative expression of human beings can be found in any form of medium. It is neither media nor space which specifies art, but it is our mind and the spirit carrying intuition and imagination which creates an artistic expression. Further, you don't have to be a professional artist to make art. As long as you put your genuine effort and spirit into art, you can create art. In this sense, you are a natural born artist. Your mind is like a mirror. A mirror which is easily damaged or dirtied, but can be polished anytime. If you polish your mirror, you can see yourself clearly. And as long as you strive to create something unique from the bottom of your heart, you can always be an artist. Art is also like a mirror, which reflects yourself, and further reflects cosmos.

To be honest, I'm not sure why I'm so curious about cosmos. However, I could imagine it may be my inevitable nature

Yuri Tanaka

Young Yuri

searching for a truth - a truth to prove who I am, where I come from, and why I exist in this universe. I have been looking for a reason for my life and trying to get closer to a truth. I began to become aware that cosmos and life are inseparable when I started to learn and practice Nichiren Buddhism¹ as a way of life, and a philosophy of life. We perceive cosmos as life, and life as cosmos. Everything is circling like an energy flow in the universe. Either you are alive or not. Your energy lasts to flow forever in this universe. Surprisingly, this thought is exactly the same as what many of contemporary physicians and cosmologists imply. I noticed everything is flowing like water which continuously makes a rhythm with its waves.

My first contact with cosmic art was when I met with Takuro Osaka - an artist and a professor at University of Tsukuba at that time. I was a student and was taking his course by chance. The more I learned, the more I got interested in that mysterious world. He has been working on a theme of cosmos, using light as a medium and also as a metaphoric visualization of cosmic rays falling from outer space and going through our bodies all the time. (fig.1) Did I ever imagine that cosmic art was to become

¹ Nichiren Buddhism was founded in 13th century by Japanese priest Nichiren who elevated the profound theory of the Lotus Sutra into a practice, which could enable everyone to find his or her highest state of life.

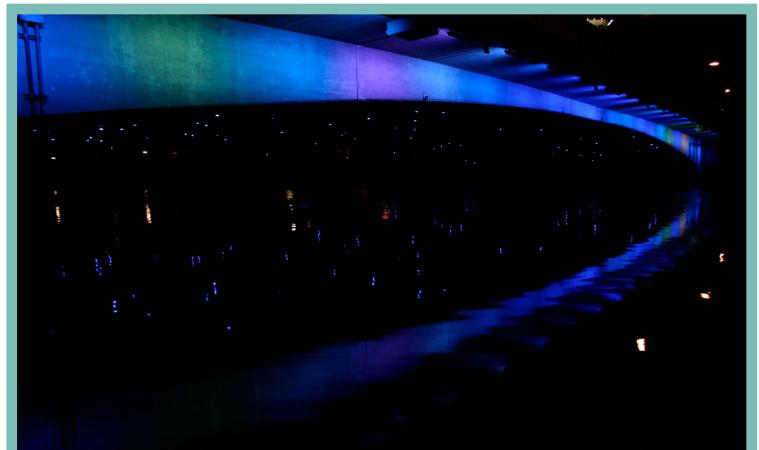


Figure1: Takuro Osaka, Sola to Mizu (Tokushima, 2010) ©Takuro Osaka



Spin galaxy. Image credit: NASA



Figure 2: Takaharu Ito, Moons of Naoshima (Naoshima, 2013-2014) photo: Daisuke Aochi

my life work? How inspiring it is to be beside a creation of art in which we can touch upon an essence of cosmos.

We can ask the question, what is cosmic art? Cosmic art, in general, is art from the cosmic point of view. Art, science, and technology are merged within the vast context of the cosmos. It is not a specific type of art, but is the idea of creating a new possibility beyond any field, via our common language - the cosmos.

Let me introduce some examples from our art practice. For instance, in fig.2, you can see the colorful spheres floating in the night sky. This Moons of Naoshima was created on a Japanese isolated island called Naoshima. These are the imaginary moons which school children made. The artwork is not only something special, created by the professional artist, but also a thing everyone can take part in.

Here's another example: this work entitled Uy-uni-verse: Multiverse (fig.3) was created in the Japan Aerospace Exploration Agency (JAXA)'s Tanegashima Space Center. Collaborating with the artists, designers, an engineer, a mathematician, an architect, and local residents, we made it together. In this work,

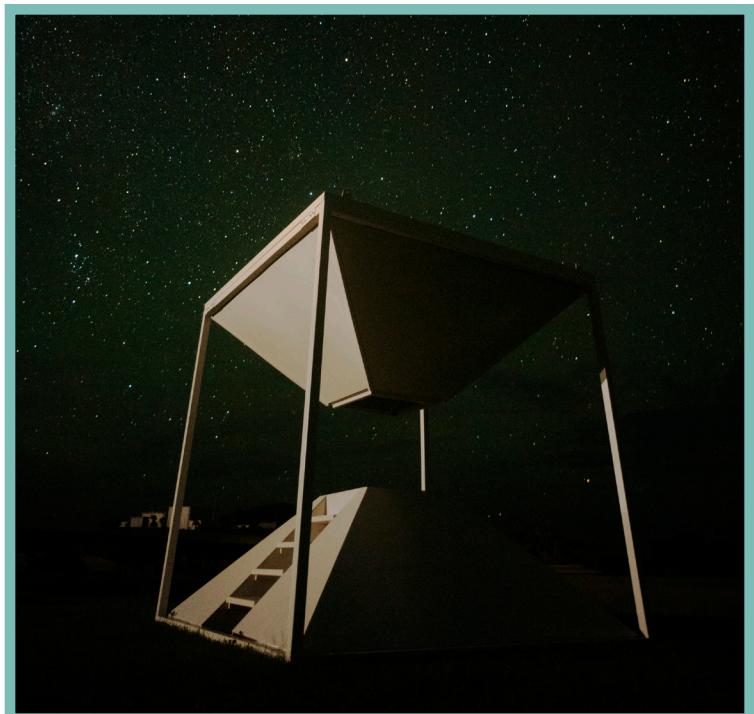
² In this article, the term 'cosmic art' is used to broaden the idea of 'space art', which refers to outer space in general. Cosmic art and space art are still not specifically differentiated, and their meanings vary.

you can experience a moment as if you were a part of the vast cosmos. If you take a few steps on the stairs, the starry night sky will surround you. Human beings are always part of the cosmos.

Cosmos and art are always within you, in ever-lasting time and space. Life is like a flower, blooming and withering. And life is like an ocean, appearing and disappearing.

Cosmic art is the art of life, and a way of life - holding a comprehensive idea of art and science as a part of our lives, which links us to every essence of the cosmos, with an ocean of imagination and inspiration. If you find these essences every single moment of your life will flourish in beauty.

Figure 3: Cosmic Art Research Lab (Ryu Sakurai, Hajime Shimoyama, Ryo Takahashi, Yuri Tanaka), Uy-uni-verse: Multiverse (Tanegashima Space Center, 2014) photo: Mitsuharu Kume



Space Flight Dolphin by Richard Clar

Richard, age 11

Richard Clar

What is the reason for putting a dolphin sculpture/satellite in orbit around planet earth transmitting dolphin sounds into space? To answer that question, it's important to share some background on how in 1982 I met the challenge of a new opportunity to access space provided by NASA.

During the fall of 1972, NASA announced the Get Away Specials (GAS) Program. This became an important part of the Space Shuttle program. On most Space Shuttle flights the cargo bay was not filled to capacity, which meant that extra weight had to be placed within the cargo bay in order to balance the Space Shuttle during flight. Someone had the bright idea that instead of flying "dead" weight, specially designed 5 cubic foot canisters, capable of carrying 200lb payloads, could be used instead. The GAS program was available to anyone anywhere in the world as long as they could meet the stringent safety requirements of the GAS Program. Universities, high schools, technology companies, and anyone else interested in conducting experiments in a micro-gravity environment could apply. For \$10,000 one could purchase the use of a 5 cubic foot canister capable of carrying a 200lb self-contained payload. This meant that the user had to provide everything inside the canister, including all of the hardware and a battery power supply that was able to withstand the rigorous space environment. Considering what it costs to put one pound in orbit, \$10,000 was a bargain. Later on in the GAS program, some other options were made available at additional cost to the GAS users. These were a motorized open door assembly followed by an ejection mechanism that would allow for the launch of a small satellite from the GAS canister. These last two options were necessary to make Space Flight Dolphin (SFD) a reality. (Fig 1)

After hearing about the GAS Program from another artist, who encouraged me to become involved and develop an art payload, I accepted the challenge. I say challenge because I came from strictly an art background and had limited knowledge about technology and particularly space-technology.

One of the requirements for obtaining a GAS launch service agreement from NASA was that the payload had to have a human or technical benefit. Art could not be flown purely for art's sake. It was necessary to have an element of human or technical benefit interwoven in such a way that the art and human/technical benefit could not be separated. This was definitely a challenge!



Figure 1: NASA GAS Canister
Image: NASA

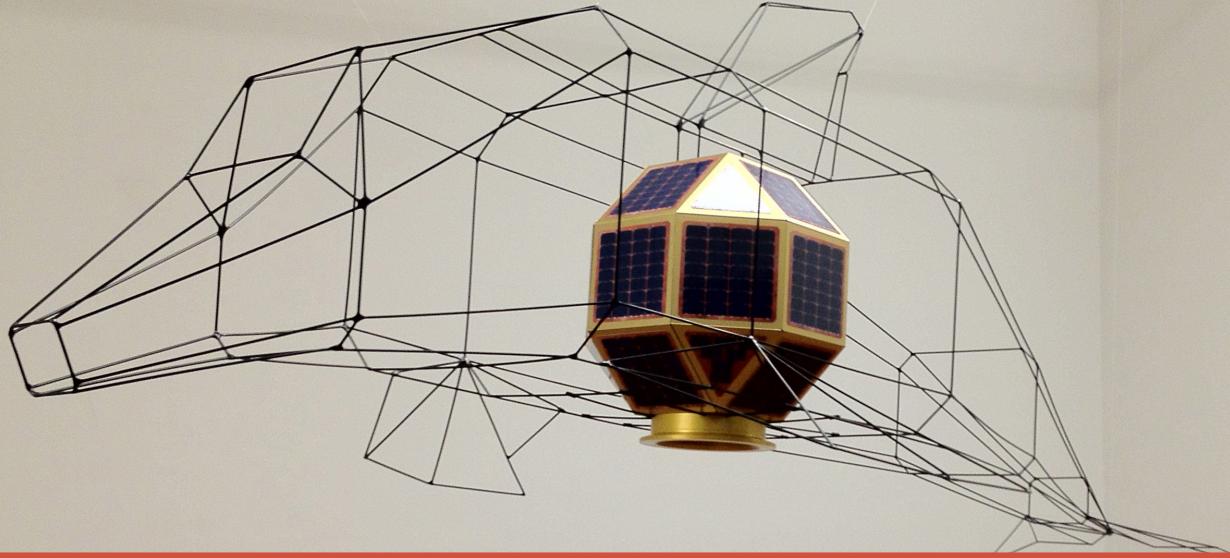


Figure 2: Space Flight Dolphin mock-up - Collection of Sweeney Art Gallery at UCR ARTSblock, University of California, Riverside. Photo UCR ARTSblock

The idea occurred to me to create SFD, a sculpture/satellite that would transmit dolphin “voices” or sounds into space that might be detected by an extra-terrestrial intelligence (ETI). Besides satisfying NASA’s human/technical benefit requirement, I felt it was important to provide some meaning or philosophical content to the payload. (Fig 2)

In an article, (Published in Leonardo Volume 26 Nr. 4 1993 pp. 293-296.), I wrote, “Human beings communicate through art with symbols that transcend the boundaries of time and culture. It seems appropriate to attempt communication with ETI through the medium of a dolphin, a symbol of intelligence and folklore for many cultures on earth. The gesture of putting a dolphin sculpture/ satellite in space says something about two intelligent species on earth. It recognizes that intelligence itself is an evolving concept that can take many forms throughout the Universe.”

Try to imagine for a moment a time when there were no fax machines, no Internet, no world wide web, no e-mail, and no cell phones. This was the milieu that pioneering space artists were faced with in the late 1970s and early 1980s. Today the answer to just about anything can be found at your fingertips in a matter of seconds with an electronic hand-held device.

In order to make a convincing argument to NASA to qualify SFD for the GAS Program, it was necessary to educate myself in all matters technological. After providing sufficient evidence to NASA that SFD met the requirements of human/technical benefit, SFD was accepted and designated payload number 445 into the GAS Program.

SFD is an example of a type of artwork where an equal amount of importance is placed on the process itself, as well as the finished artwork. This includes the research, negotiations, experiments along the way, drawings, and testing of flight-ready hardware. Often times the artist is in uncharted territory and must rely on

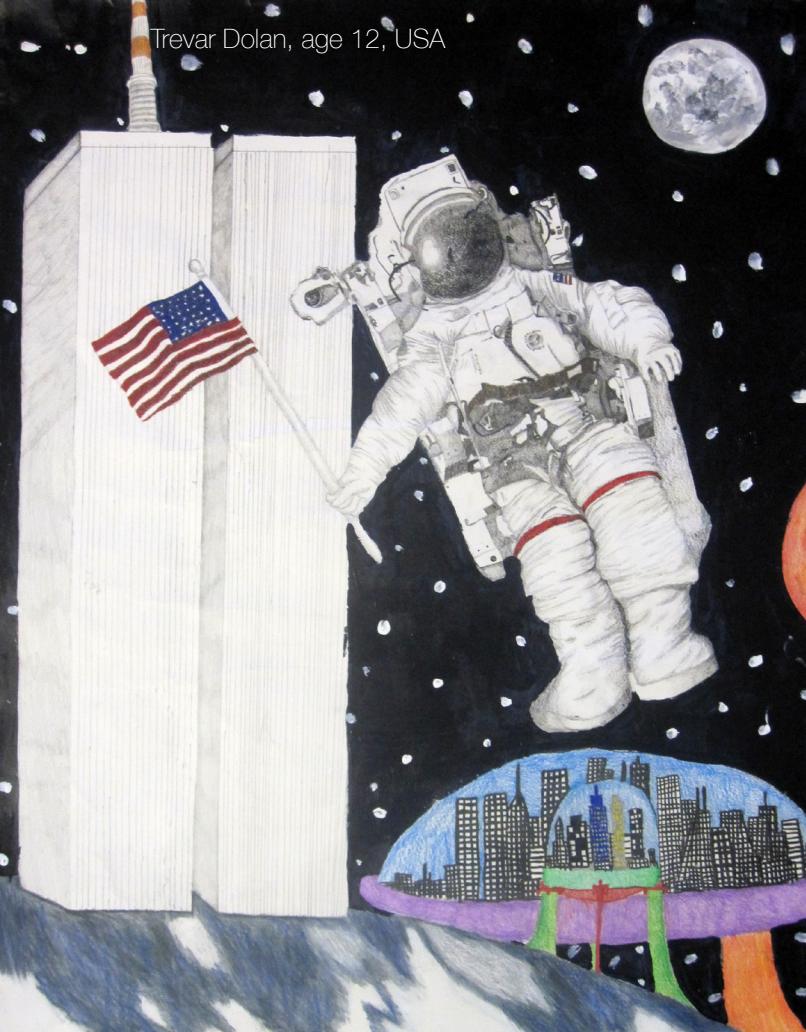
collaboration with scientists and engineers. While challenging, this can be a very rewarding experience, not only for you, but for the scientist and engineer as well. We do learn from each other.

Along the way there were many scientists and engineers who helped me with my space art projects and were very open to hearing about new ideas for creating art using space technology, data, and materials. Don’t be afraid to contact an expert in any field that you might find interesting. Whether or not you are a Boy Scout or Girl Scout, “Be prepared” is a good motto to keep in mind. Make sure before you contact someone that you do your own research first and try to gain some knowledge about the subject that has your interest. This will not go unnoticed by the person you are contacting. French chemist and microbiologist Louis Pasteur said: “Chance favors the prepared mind.”

On Jan. 28, 1986 disaster struck causing the Space Shuttle Challenger to break apart in flight just 78 seconds after lift-off. Tragically, all 7 astronauts on-board perished. Put on hold for almost 3 years while an investigation took place to determine the cause of the accident, the program resumed in 1988. A safety-conscious NASA curtailed some of the GAS options including the ejection launch mechanism and the motorized door assembly that in effect promptly put an end to the possibility of a Space Flight Dolphin launch from a U.S. Space Shuttle. The concept remains valid and still may be realized in the not too distant future aboard a private industry launch vehicle. Stay tuned! www.arttechnologies.com



Trevor Dolan, age 12, USA



Nino Bugadze,
age 10, Georgia



Alex Joseph, age 12, Guyana



We hope this issue inspired you! Make your own space art showing what you would like to see or do in space and send it to childart@icaf.org

Artwork will be posted on our website where you can vote on your favorites. The artwork with the most votes will be announced in a future issue of *ChildArt Magazine*.

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