Noordwijk, Netherlands
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Matt Harasymczuk

Bioastronautics Researcher, Pilot, Aerospace and Software Engineer, Astrobiologist.
Working in ESA on Astronaut Lunar EVA.

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About Matt

Matt is a bioastronautics researcher, pilot, engineer (aerospace, software), scientist (biology, geology) skydiver, scuba diver and military combat medic (TCCC, ACLS). He currently collaborates on Moon and Mars research with ESA on habitat, 3D bioprinter, photosynthetic bioink, hydroponic and aeroponic plant cultivation, polarized light influence on human time perception.

He studied at Polish Air Force Academy and wrote thesis on "Astronaut Training for Long Duration Space Flights and Extravehicular Activity". Currently he is studying both Biology and Geology. He has also a degree in Computer Science and worked as a Systems Engineer and team leader for 3D printing, C.A.D. technology and biomedical R&D companies. He also studied postgrad Aerospace Management and Philosophy of Human Interactions. He gave 1100+ hours of public speaking related to the S.T.E.M. field.

He was chosen as an Astronaut Flight Surgeon for Lunar Analog Simulation, V-ce Commander for the Expedition 1 of M.A.R.S. project and Crew Medical Officer for Arctic mission. He was trained in Sea Survival, Water Spacecraft Egress, Space Suit and Bioastronautics in USA. Matt focuses now on creating a training process for future astronauts and continue building M.A.R.S. habitat in Poland.

Work Experience

Moon and Mars Mission Research Collaborator

Sep 2016 - Present (8 months), **European Space Agency, ESTEC**

- R&D on 3D bioprinters and photosynthetic 3D bioink materials with ESA ESTEC ACT
- Influence of polarized light on time perception, research with ESA Advanced Concepts Team
- Building the Moon/Mars habitat facility with functional laboratory to demonstrate analog simulations and 3D printing

Astronaut Trainer, Mission Organizer and Habitat Builder at M.A.R.S. Habitat

Jun 2016 - Present (10 months), **marshub.org**

- Building the habitat (walls, hemisphere roof, living compartments, electricity, water, light, air circulation, air-lock).
- Erected 20m height satellite communication radio-wave antenna.
- Author of the software operating systems for the habitat.
- Astronaut training and organization of future missions (Jul 2017 - Lunar, Aug 2017 - Mars, Jan 2018 - Arctic)

Astronaut Flight Surgeon at M.A.R.S. Analog Simulation

Jul 2016 - Sep 2016 (3 months), **marshub.org**

- Responsible for crew health, daily medical evaluation, control of the Extravehicular Activity parameters, ECG, Pulse Oximetry, Pulse, Blood Pressure, urine sampling, color, consistency and pH determination
- Day and night EVA crew member as EV1
- Day and night rover and gripper remote control, precision driving (internal habitat competition winner), rocks and soil sampling, in blind (without video camera) emergency rover operations: navigating, contingency rock sample securing, return to base scenario
- Microgravity plant grow experiment with RPM (Random Positioning Machine)
- Astronomical observation, night lunar precise photography of full moon (in EVA suit)
- Designing and 3D printing tools to use inside the habitat

Systems Engineer with 3D printing R&D

Dec 2013 - Present (3.5 years), **Astro Tech**

- End-to-end process of C.A.D. design for tools development using 3D printing technology
- Team-leader and technical quality assurance supervisor for 3D printed tools and printers
- Trainer in software engineering, 3D printing, portfolio management, risk management, soft-skills like leadership, task management, team-building and communication.

Head of Software at 3D Printing R&D Department

Apr 2016 - Sep 2016 (6 months), **Zortrax.com**

- Management of 3 teams of engineers (software, firmware and models library website)
- Creating and management of product backlog for software and firmware for two 3D printer models.
- Passing management to new director upon successfully delivering two products

Proces Architecture Main Specialist

Jan 2014 - Jan 2016 (2 years), **Center for Information Technology at Polish Ministry of Interior**

- Leader of the first polish government organization transformation to agile software development and project management
- Project management and portfolio management (Scrum, Kanban, Lean, XP) for 11 teams in Polish Ministry
- Technical transformation (DevOps, continuous integration and continuous delivery, versioning, releasing and quality processes).

Software Systems Engineer (Release Manager, Developer Tools Specialist)

Jun 2011 - Dec 2013 (2.5 years), **MIH Allegro Group, Enterprise Architecture Department**

- Building development ecosystem
- Supporting agile transformation
- Team leadership
- Trainer for engineering good practices, team communication, task management, process and quality assurance

Software Engineer

Jul 2006 - Jun 2011 (5 years), **MBP sp. z o.o.**

- Author of a CRM system for 2500+ users with four nines (99.9999%) SLA in since 2006.

Education

- **2017-2019** (expected), University of Warsaw, M.Sc. (Master of Science), Geology with major in Geochemistry and Mineralogy
- **2016-2018** (expected), University of Warsaw, M.Sc. (Master of Science), Biology with major in Microbiology of Extremophiles
- **2014-2017**, Polish Air Force Academy, M.Sc. (Master of Science), Aerospace and Astronautics with major in Aircraft Systems Engineering, Thesis: "Astronaut Training for Long Duration Space Flights and Extravehicular Activity"
- **2014-2015**, Polish Air Force Academy, Postgraduate, Aerospace Management
- **2011-2013**, Poznan University of Technology, Poland, Computer Science with major in IT in Business Processes
- **2008-2011**, Adam Mickiewicz University, Poland, Philosophy of Human Interactions and Social Communication
- **2007-2011**, Poznan University of Technology, Poland, B.Sc. Eng. (Bachelor of Science in Engineering), Computer Science with major in Security of IT Systems, Thesis: „Botnet analysis and protection methods”

Current research collaboration with ESA ESTEC

Building the habitat facility with functional laboratory to demonstrate analog simulations and 3D printing.

In this initiative I’m responsible for preparing the habitat ready to use during MoonMars simulations directly in ESTEC as well as operated by astronauts from other habitats on Earth. Moreover, my task is to create an analog astronaut training program and procedures for Extravehicular Activity and 3D print tools and parts for habitat. My supervisor is Bernard Foing.

3D Bioprinting photosynthetic materials.

This Project is realized in collaboration with Advanced Concepts Team. I’m responsible for assembly of a 3D bioprinter, laboratory study on optimization of 3D bioink parameters and finally help in morphological microscopic analysis of growing photosynthetic cells of extremophiles.

Influence of polarized light on time perception.

Yet another project realized in collaboration with ESA Advanced Concepts Team. I am responsible for writing a software to run experiments as well as data acquisition, processing, further statistical and correlation analysis.

Training Courses

- Project Possum PoSSUM Scientist-Astronaut Program (Spacesuit, Hypoxia, High-G, Mesosphere, Suborbital Flights) (Apr 2017)
- Survival Systems and Spacecraft Egress Instruction (Apr 2017)
- Winter Survival and Arctic Shooting course (Feb 2017)
- PADI Advanced Open Water Diver, Neutral Buoyancy, Rescue Diver (Mar, Apr, May 2017)
- Online Emory School of Medicine: Emergency Medicine (Mar 2017)
- Biology: The Science of Life (Jan, Feb, Mar 2017)
- KTHx: SD2905.1x Human Spaceflight - An introduction (Jan 2017)
- MITx: 7.28.3x Molecular Biology: RNA Processing and Translation (Jan 2017)
- KyotoUx: 003x The Extremes of Life: Microbes and Their Diversity (Jan 2017)
- Advanced Cardiovascular Life Support (Jan 2017)
- MITx: 16.00x Introduction to Aerospace Engineering: Astronautics and Human Spaceflight (Nov 2016)
- Tactical Combat Casualty Care (level I, II, III) - medical aid in extreme situations (Mar, Jun, Aug 2016)
- Basic Life Support (Jul 2016)
- Glider and private pilot course (2014, 2015)
- PADI Open Water Diver course (2016)

Conferences and workshops

- Stratospheric balloon flight for Extremely Low Frequencies research, member of navigation, track and recovery team (Nov 2016)
- ESA Innovation Exchange: When Space Meets Health, with brainstorming session on radiation protection
- Moon Village workshop on Architecture aspects (Nov 2016)
- Moon Village workshop on Geology aspects (Oct 2016)
- ESA ECSS - European Cooperation for Space Standardization - training course (Sep 2016)
- Symposium "Astronaut Preparation for Long Duration Spaceflight" (Sep 2016)
- European Rover Challenge (Sep 2015, Sep 2016)
- Poland in Space Symposium (Mar 2016)
- ESA ESMATS 2015 - European Space Mechanisms and Tribology Symposium (Sep 2015)
- attendee and speaker at 100+ conferences on Computer Science

Publications

- Harasymczuk M., Kolodziejczyk A.M., Foing B. H. Operational Lessons Learned From Human-Robotic Partnership in Exogeology Analog Extravehicular Activity Simulation at Eifel Volcanic Region: ILEWG Euromoonmars. Human and Robotic Partnerships in Exploration - Joint session of the Human Spaceflight and Exploration Symposia. International Astronautical Congress. Australia. 2017. Conference Paper. IAC-17,B3,6-A5.3,x41593
- Kolodziejczyk A.M., Harasymczuk M., Girardin P., Davidova L. Circadian Clock and Subjective Time Perception: a simple Open Source Application for the Analysis of Induced Time Perception in Humans. International Journal of Medical, Health, Biomedical, Bioengineering and Pharmaceutical Engineering. 19th International Conference on Time Perception and Time Consciousness. Prague, Czech Republic. 2017. Article.
- Harasymczuk M., Foing B., Kolodziejczyk A.M. Operational issues for geological analog simulation at Eifel volcanic region: ILLEWG EuroMoonMars. Lunar and Planetary Science Conference 48th. Universities Space Research Association. Woodlands, TX, USA. 2017. Scientific Poster. "LPSC2017-2997. doi: 10.13140/RG.2.2.33223.70565"
- Vos H., Harasymczuk M. Kolodziejczyk A.M., et al. Field Spectroscopy, imaging and sampling at the Eifel MoonMars analogue. Lunar and Planetary Science Conference 48th. Universities Space Research Association. Woodlands, TX, USA. 2017. Scientific Poster. LPSC2017-2359
- Vos H., Kolodziejczyk A.M., Harasymczuk M. Laboratory spectroscopy of minerals, water and plant biomarkers. Lunar and Planetary Science Conference 48th. Universities Space Research Association. Woodlands, TX, USA. 2017. Scientific Poster. LPSC2017-2419
- Vos H., Harasymczuk M. VIS/NIR reflectance and fluorescence spectrometric studies of minerals, water, organics and biomarkers in MoonMars analogue samples. EGU General Assembly 2017. European Geosciences Union. Vienna, Austria. 2017. Abstract. EGU2017-1537
- Kolodziejczyk A.M., Harasymczuk M. MoonMars Base in Poland: a Simulation Habitat and Laboratory for Research. EGU General Assembly 2017. European Geosciences Union. Vienna, Austria. 2017. Abstract. EGU2017-1601
- Kolodziejczyk A.M., Harasymczuk M. Terrestrialization of isolated habitats. EGU General Assembly 2017. European Geosciences Union. Vienna, Austria. 2017. Abstract. EGU2017-1356
- Kolodziejczyk A.M., Harasymczuk M., et al. Operational Lessons Learnt from the 2016 Lunar Expedition in Poland for Future Improvement of Analog Simulation of Lunar Environment.(to be submitted).2017. Article.
- Harasymczuk M., Kolodziejczyk A.M. The effect of polarized light on time perception.(to be submitted).2017. Article.
- Harasymczuk M., Kolodziejczyk A.M. Measuring the effect of root growth using random positioning machine.(to be submitted).2017. Article.
- Harasymczuk M. Astronaut training for long duration spaceflights and Extravehicular Activity.(to be submitted).2017. Thesis.
- Harasymczuk M. Analog missions astronaut and flight surgeon case study. Astronomical Calendar 2016. Astronomia Nova. Czestochowa, Poland. 2016. Article.
- Harasymczuk M., Wylecial P. Botnet analysis and protection methods. Poznan University of Technology. Poznan, Poland. 2014. Thesis.

Community

- Polish Parachuting Association
- Polish Rocket Society
- Poznan Flight Club

Interests

Aerospace: human space flights, extravehicular activity, manned lunar missions (Apollo Program), Moon/Mars habitat construction
Astrobiology and medicine: extremophiles, 3D bioprinting, human space physiology, cognitive science
Engineering and computer science: 3D printing, artificial intelligence, machine learning, big data, data science
Physical Activity and sports: aerobatics, flying, skydiving, water diving, sailing, skiing, squash, survival, swimming
Computer Games: Kerbal Space Program, Orbiter 2016, X-Plane, Interkosmos