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Design for Sustainability and Inclusion in Space

How New European Bauhaus Principles Drive Nature & Parastronauts Projects

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Preface

This book presents innovative research and projects in the field of sustainability and inclusion in space, demonstrating the crucial role of design in improving the quality of extra-terrestrial habitats and the well-being of astronauts.

The text explores the theme of sustainability through a historical overview of astrobotany studies from the 1920s to the present day. It then discusses the development of gardens in microgravity, referencing ESA's MELISSA, which was launched in the late 1980s and has been active for over 30 years, as well as NASA's Veggie experiments, from the first one in 2014 to the most recent one in 2023.

The text also introduces the new and revolutionary theme of inclusion, which is expected to have a significant impact on the history of human space exploration. The ESA Parastronaut Fly! Feasibility Project launched in 2022 represents the first step towards exploring the feasibility of human habitation in space, with a focus on the challenges posed by confined environments and reduced gravity.

The focus of the book is on Space Design. Its aim is to stimulate new reflections on the "future nature" and "disability in space" and to answer many questions through new projects. The book examines the importance of designing for space and its implications. It also considers the possibility of microalgae cultivation on the Moon and how reduced gravity affects plants and humans. Additionally, it raises the question of whether disabled people may develop different abilities in microgravity.

To meet these challenges, the concept of "avant-garde" Space Design is proposed, which involves designing sensory environments that consider not only functional aspects but also physiological and emotional factors that significantly influence human behaviour.

The design process for addressing these considerations and proposing new solutions is based on a multidisciplinary approach and the principles of the New European Bauhaus (NEB), a project launched by the European Community with the aim of designing sustainable, inclusive and aesthetically pleasing living spaces.

The case studies supporting the themes of "future nature" and "disability in space", developed by the Space Design Lab_PoliMi and the Space4InspirAction MSc course with the support of the European Space Agency (ESA), have been selected by the

1st Festival of the New European Bauhaus in 2022. The projects explore new solutions based on two disruptive concepts: “symbiotic relationship between humans and nature” and “prosthetic objects” to enhance human performances in space.

Milan, Italy Annalisa Dominoni

Contents

1 Space Design Meets the New European Bauhaus 1
1.1 What It Means Design for Space and What It Implies 2
1.1.1 Space Design for the New Human 2
1.1.2 The Avant-Garde of Designing for Space 4
1.1.3 Confinement in Space 8
1.1.4 The Effects of Reduced Gravity on the Human Body 11
1.2 The New European Bauhaus Principles 14
1.3 The Case Studies of the Space Design Lab_PoliMi at the 1st Festival of the New European Bauhaus 16
1.3.1 The Space Design Lab_PoliMi and Space4InspirAction 18
1.3.2 Space4InspirAction Description: Aims, Syllabus, Topics 19
1.4 Conclusions and Future Design Developments 22
References 23

2 Design for Sustainability in Space: Future Nature 25
2.1 The Primacy of Nature in the Interplanetary Missions 26
2.1.1 Astrobotany 26
2.1.2 Design for Agriculture in Space 28
2.1.3 ESA MELISSA Space Research Program 32
2.1.4 Space Gardens: Veggie Experiments 36
2.2 Symbiotic Relationship Between Humans and Nature 38
2.2.1 Superfood for Interplanetary Missions: Microalgae 38
2.2.2 The Space Design Lab_PoliMI: Case Studies for Microalgae on the Moon 40
2.3 Conclusions and Future Design Developments 47
References 48

3 Design for Inclusion in Space: Parastronauts Project 49
3.1 A First Step Towards Disabled People in Space 50
3.1.1 Accessible Design 50
3.1.2 The Great Value of Diversity for Human Space Exploration 51

3.1.3 Design and Disability: Two Powerful Resources in Space ... 53
3.1.4 Space as an Inspiration for Inclusion ... 54
3.1.5 The ESA Parastronauts Fly! Feasibility Project ... 55
3.1.6 The First Parastronaut in Space ... 58
3.2 Designing New Experiences for Parastronauts ... 61
3.2.1 Some Reflections on Behaviour in Space ... 61
3.2.2 In Space We Are All Disables ... 65
3.2.3 Disable People Develop Different Abilities ... 67
3.2.4 Universal Design and Design for All ... 67
3.3 Prosthetic Object ... 75
3.3.1 Use and Gesture Design ... 75
3.3.2 User Experience Design ... 77
3.3.3 Prosthetic Objects as Body Extensions ... 79
3.4 Conclusions and Future Design Developments ... 87
References ... 90

Index ... 93

Chapter 1
Space Design Meets the New European Bauhaus

Abstract This issue presents the strategic contribution of Space Design, based on a multidisciplinary approach and the principles of the New European Bauhaus (NEB), the project launched by the European Community to design sustainable, inclusive and beautiful spaces in which to live. The first section presents the theme of design for space with reflections and design examples to illustrate what it means to design in an extreme environment characterised by confinement and reduced gravity, what the impact is on the human being and what it means for designers, what are the challenges they have to face in order to improve the well-being of astronauts. The essay goes further, introducing the concept of "avant-garde" Space Design, which is based on designing sensory environments through an innovative use of furniture, colour, light, materials, tools. It emphasizes the importance of considering not only the functional aspects but also the physiological and emotional ones that greatly influence our behaviour. The second part introduces the New European Bauhaus project, which is connected with the European Green Deal. It highlights the principles that inspire a movement to facilitate and steer the transformation of our societies through various initiatives that are spreading rapidly and gathering large participation. Among these initiatives, the most significant is the NEB Festival, whose 1st edition in 2022 allowed for the sharing of projects and values. The Politecnico di Milano, an official NEB partner, participated in the initiative. The projects developed by the Space Design Lab_PoliMi and Space4InspirAction MSc course, with the support of European Space Agency (ESA), were selected by the NEB Festival and presented through the exhibition in Milan titled "Space Design for New Human Beings. The Role of Design in the Future of Space Travel and Settlement Between Science, Technology and Beauty. Why Microalgae on the Moon and Disability in Microgravity are Pillars to Increase Sustainability and Inclusion Values". The projects have been chosen as case studies to illustrate the main themes of the book: sustainability and inclusion in space through design that creates innovation and beauty.

Keywords Space Design · New European Bauhaus · Sustainability · Inclusion · Beauty

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