

1. Record Nr.	UNINA9910877204603321
Autore	Gangadevi E
Titolo	Computational Intelligence in Bioprinting : Challenges and Future Directions
Pubbl/distr/stampa	Newark : , : John Wiley & Sons, Incorporated, , 2024 ©2024
ISBN	1-394-20487-6 1-394-20486-8
Edizione	[1st ed.]
Descrizione fisica	1 online resource (346 pages)
Altri autori (Persone)	ShriM. Lawanya BalusamyBalamurugan
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Cover -- Title Page -- Copyright Page -- Contents -- Preface -- Chapter 1 The Emergence of Bioprinting and Computational Intelligence -- 1.1 Introduction -- 1.2 Related Study -- 1.3 Understanding the Basics of Bioprinting and Computational Intelligence -- 1.3.1 Bioprinting: The Basics -- 1.3.2 Computational Intelligence: The Basics -- 1.3.3 Applications of Bioprinting and Computational Intelligence -- 1.4 The Role of Computational Intelligence in Bioprinting -- 1.5 Applications of Bioprinting and Computational Intelligence in Medicine -- 1.6 Bioprinting and Computational Intelligence in Tissue Engineering and Regenerative Medicine -- 1.7 Advancements in Bioprinting and Computational Intelligence Technologies -- 1.8 The Ethical and Regulatory Implications of Bioprinting and Computational Intelligence -- 1.9 The Future of Bioprinting and Computational Intelligence: Opportunities and Challenges -- 1.10 Case Studies: Bioprinting and Computational Intelligence in Action -- 1.10.1 Trends in Computational Intelligence and Bioprinting -- 1.10.2 Challenges in Computational Intelligence and Bioprinting -- 1.11 Conclusion -- References -- Chapter 2 Design, Architecture, Implementation, and Evaluation of Bioprinting Technology for Tissue Engineering -- 2.1 Introduction -- 2.2 3D Bioprinting -- 2.3 Material Characteristics -- 2.3.1 Printability -- 2.4 Mechanical Properties -- 2.5 Biomaterials --

2.6 Design, Architecture of 3D Bioprinting -- 2.6.1 Inkjet Bioprinting -- 2.6.2 Laser-Assisted Bioprinting (LAB) -- 2.6.3 Extrusion Bioprinting -- 2.7 3D Bioprinting Tissue Models -- 2.8 3D Multimaterial Bioprinting-Development of Complex Architectures -- 2.9 Implementation and Evaluation -- 2.10 Bone -- 2.11 Cartilage -- 2.12 Soft Tissue Engineering -- 2.13 Vascular Tissue -- 2.14 Skin -- 2.15 Biocompatibility and Control of Degradation and Byproducts. 2.16 Conclusion -- References -- Chapter 3 Design and Development of IoT Devices: Methods, Tools and Technologies -- 3.1 Introduction to IoT Devices and 3D Bioprinting -- 3.2 Methodology for Designing IoT Devices for 3D Bioprinting -- 3.3 Additional Considerations in IoT Device Design for 3D Bioprinting -- 3.4 Tools for Developing IoT Devices for 3D Bioprinting -- 3.4.1 Microcontrollers and Development Boards -- 3.4.2 Sensors and Actuators -- 3.4.3 Communication Protocols -- 3.4.4 Software Development Kits -- 3.4.5 Cloud Platforms -- 3.4.6 3D Printing Software -- 3.4.7 CAD Software -- 3.4.8 Simulation Software -- 3.4.9 Data Analytics Tools -- 3.4.10 Cybersecurity Tools -- 3.5 Techniques for Developing IoT Devices for 3D Bioprinting -- 3.5.1 Agile Development -- 3.5.2 Rapid Prototyping -- 3.5.3 Test-Driven Development -- 3.5.4 Continuous Integration -- 3.5.5 Modular Design -- 3.5.6 Power Optimization -- 3.5.7 Data Processing Techniques -- 3.5.8 Quality Assurance -- 3.5.9 Cybersecurity Techniques -- 3.5.10 Standardization -- 3.6 Case Studies of IoT Devices for 3D Bioprinting -- 3.7 Future Directions in IoT Devices for 3D Bioprinting -- 3.8 Conclusion -- References -- Chapter 4 AI-Based AR/VR Models in Biomedical Sustainable Industry 4.0 -- 4.1 Introduction -- 4.2 Mixed Augmented Reality -- 4.2.1 SDK in Augmented Reality -- 4.2.2 Application Scope of Augmented Reality -- 4.2.2.1 Video Capabilities -- 4.2.2.2 AR Toolkit Technology -- 4.2.2.3 Quality of Tracking System -- 4.3 AR Technology -- 4.3.1 High Level Augmented Reality -- 4.3.2 Limitations of Enhanced Image -- 4.3.3 Limitations of CAD Model -- 4.3.4 Augmented Reality in Manufacturing Sector -- 4.4 Requirement of Augmented Reality -- 4.4.1 Capability of AR -- 4.4.2 Computational Hardware Capabilities -- 4.4.3 Symbol-Based Tracking Software -- 4.5 Conclusions -- References. Chapter 5 Computational Intelligence-Based Image Classification for 3D Printing: Issues and Challenges -- 5.1 Introduction -- 5.2 Brief Concepts -- 5.2.1 3D Printing Tools -- 5.2.2 Artificial Intelligence-Based Digital Marketing -- 5.2.3 Automated Machine Learning Prediction System -- 5.3 Role of Artificial Intelligence in Industry 4.0 -- 5.3.1 3D Printing Process -- 5.3.2 Enhancement in Machine Learning -- 5.3.3 Genetics-Based Machine Learning -- 5.3.4 Slicing Technique in 3D Model -- 5.3.5 Printing Path Trajectory -- 5.3.6 Improvement in Computational Simulation -- 5.3.7 Improving Service-Oriented Architecture -- 5.3.8 Capabilities of Cloud Computing -- 5.3.9 Hamming Distance Technique -- 5.3.10 Improving Knowledge Skills -- 5.3.11 Object Detection Algorithm -- 5.3.12 Improvement in Manufacturing Defects -- 5.4 Conclusion -- References -- Chapter 6 Role of Cybersecurity to Safeguard 3D Bioprinting in Healthcare: Challenges and Opportunities -- 6.1 Introduction -- 6.2 Related Work -- 6.3 Creation of 3D Objects and Printing -- 6.3.1 Benefits of 3D Printing -- 6.3.2 Bioprinting -- 6.3.3 A Flow Diagram Depicting the Bioprinting Process -- 6.3.4 Datasets Used in Bioprinting -- 6.4 Schematic Diagram of 3D Bioprinting -- 6.4.1 3D Bioprinting Strategies -- 6.4.2 Comparison Among the 3D Bioprinting Approaches -- 6.4.3 Materials Used in Bioprinting -- 6.4.4 Bioprinting in Diverse Domains -- 6.5 Cyberthreats Posed to Bioprinting -- 6.5.1 Challenges and Opportunities of Cybersecurity in Bioprinting -- 6.5.2 Proposed

Solutions -- 6.5.3 Combating the Cybersecurity Risks of 3D Bioprinting -- 6.5.4 Blockchain Technology and Bioprinting -- 6.5.5 A Comparative Survey of Cyberthreats in Additive Manufacturing Technology -- 6.6 Conclusion -- References -- Chapter 7 Legal and Bioethical View of Educational Sectors and Industrial Areas of 3D Bioprinting. 7.1 Introduction -- 7.2 Current 3D Bioprinting Market Trends -- 7.3 Legal and Ethical Perspectives -- 7.4 Regarding the Introduction and Advancement of 3D Bioprinting -- 7.4.1 Current and Potential Paths for Bioethical Discourse -- 7.4.2 Legal Concerns with the Introduction of 3D Bioprinting Into Clinical Practice -- 7.4.3 Ethical Concerns with the 3D Bioprinting of Artificial Ovaries and Their Use in Clinical Settings -- 7.5 Conclusion -- 7.6 Future Scope -- References -- Chapter 8 Optimizing 3D Bioprinting Using Advanced Deep Learning Techniques A Comparative Study of CNN, RNN, and GAN -- 8.1 Introduction -- 8.2 Convolutional Neural Networks in Optimization of 3D Bioprinting -- 8.3 RNN in Optimization of 3D Bioprinting -- 8.4 Generative Adversarial Networks (GAN) in Optimization of 3D Bioprinting -- 8.5 Datasets Used for Optimization of 3D Bioprinting -- 8.6 3D Slicer Medical Image Segmentation Dataset -- 8.7 Sensor Data -- 8.8 Open Organ Database Dataset -- 8.9 Proposed Model -- 8.10 CNN U-Net -- 8.11 RNN Long Short-Term Memory -- 8.12 Wasserstein Generative Adversarial Network -- 8.13 Process of Combined Model -- 8.14 Conclusion -- References -- Chapter 9 Research Trends in Intelligence-Based Bioprinting for Construction Engineering Applications -- 9.1 Introduction -- 9.2 Analysis of Bioprinting -- 9.3 Model Development in Bioprinting Technology -- 9.4 3D Bioprinting Academic Institutions in the World -- 9.5 Emerging Bioprinting Technology -- 9.5.1 Opportunities -- 9.5.2 Challenges -- 9.6 Development in Bioengineering -- 9.7 Evolution of Patent Trends in Bioprinting -- 9.8 Conclusions -- References -- Chapter 10 Design and Development to Collect and Analyze Data Using Bioprinting Software for Biotechnology Industry -- 10.1 Introduction -- 10.2 Digital Technology in Bioprinting -- 10.2.1 Shape of Bioprinting. 10.2.2 Heterogeneity Units of Material -- 10.2.2.1 Tissue Improvement -- 10.2.2.2 Formation of Biomaterials -- 10.2.2.3 Biomaterial and Biological Factors -- 10.2.3 Dynamic Changes in Fabrication Process -- 10.3 Designing Techniques in Bioprinting -- 10.3.1 Data Processing in Biomedical Imaging -- 10.3.2 Process Bioprinting Techniques -- 10.3.3 Interaction of Bioink Formulation -- 10.4 3D Bioprinting -- 10.4.1 Optimized Bioprinting -- 10.4.2 Modifying Crosslinking -- 10.4.3 Multiple Crosslinking -- 10.4.4 Enhance Bioprinting -- 10.4.5 Hybrid Bioprinting -- 10.5 Enhanced Biotissue Printing -- 10.5.1 Integrating Thickness of Engineered Tissue -- 10.5.2 Integration and Enhancement of Cellular Interaction -- 10.5.3 DNA with a Smart Biomaterial -- 10.5.3.1 Biomaterials -- 10.5.3.2 Reactive Hydrogel to External Stimuli -- 10.5.4 Simulation -- 10.6 Conclusion -- 10.7 Future Work -- References -- Chapter 11 Cyborg Intelligence for Bioprinting in Computational Design and Analysis of Medical Application -- 11.1 Introduction -- 11.2 Next Generation of Bioprinting -- 11.2.1 Medicine Management -- 11.2.2 Varieties of Bioprinting Material -- 11.2.2.1 Thermoresponsive Materials -- 11.2.2.2 Biocompatible Polymers Materials -- 11.2.2.3 Endophyte Biocompatible Polymers Materials -- 11.2.2.4 Photo-Conductive Polymer Materials -- 11.2.2.5 UV-Assisted in 3D Printing -- 11.2.2.6 Sensitivity Polymeric Materials -- 11.2.2.7 Macromolecules Materials -- 11.2.2.8 Dual-Sensitive Materials -- 11.2.3 Biosensing Scaffolds -- 11.3 Biosensors and Actuators -- 11.3.1 Fabricated Scaffold Tissues -- 11.3.2 Vascularizing Tissues -- 11.3.3 4D Bioprinting Neural Tissue -- 11.3.4 Longitudinal Deformation --

11.3.5 Uses of Biomedical Appliances -- 11.4 Enhancing Technology in Bioprinting -- 11.5 Conclusion and Future Work -- References.
Chapter 12 Computer Vision-Aides 3D Bioprinting in Ophthalmology
Recent Trends and Advancements.
