

1. Record Nr.	UNINA9910473455103321
Autore	Ratchev Svetan
Titolo	Smart Technologies for Precision Assembly : 9th IFIP WG 5. 5 International Precision Assembly Seminar, IPAS 2020, Virtual Event, December 14-15, 2020, Revised Selected Papers
Pubbl/distr/stampa	Springer Nature, 2021 Cham : , : Springer International Publishing AG , , 2021 ©2021
ISBN	3-030-72632-0
Descrizione fisica	1 online resource (371 pages)
Collana	IFIP Advances in Information and Communication Technology ; ; v.620
Soggetti	Information technology: general issues Artificial intelligence Human-computer interaction
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Intro -- Preface -- Organization -- Contents -- Keynote Paper -- Augmented Reality in Assembly Systems: State of the Art and Future Perspectives -- 1 Introduction -- 2 Basics on Augmented Reality -- 2.1 AR Techniques -- 2.2 AR Devices -- 2.3 AR Applications in Production Engineering -- 3 Applications in Manual Assembly Systems -- 3.1 Guidance in Assembly Tasks - Optical and Video See-Through Approaches -- 3.2 Guidance in Assembly Tasks - Image Projection Approaches -- 3.3 Guidance in Complex Assembly Tasks -- 3.4 Order Picking -- 3.5 Quality Control and Inspection -- 3.6 Integration with Sensing Devices -- 3.7 Training -- 4 Applications in Collaborative Assembly Systems -- 5 Other Potential Areas of Application -- 6 Open Issues and Future Perspectives -- 6.1 Hardware and Software Performance -- 6.2 Tracking Methods -- 6.3 User's Acceptance -- 6.4 Authoring Procedure -- 7 Conclusions -- References -- Assembly Design and Planning -- Application of a Standardized Design Procedure in the Development of Automated Micro-assembly Processes -- 1 Introduction -- 2 A Function-Based Design Procedure -- 3 The Design Procedure in Practice -- 3.1 Identify Customer Needs -- 3.2 Establish

Target Specifications -- 3.3 Generate Process Concepts -- 3.4 Select Process Concepts -- 3.5 Test Process Concepts -- 3.6 Specify Final Targets -- 3.7 Plan Development -- 4 Conclusion -- References -- Towards the Automated Coverlay Assembly in FPCB Manufacturing: Concept and Preliminary Tests -- 1 Introduction -- 2 The Proposed Assembly Approach -- 2.1 Requirements -- 2.2 Gripping -- 2.3 Peeling Strategy -- 2.4 Assembly Procedure -- 3 Assembly System Architecture -- 3.1 Workcell Description -- 3.2 Gripper Architecture -- 4 Peeling Tests -- 4.1 Experimental Setup -- 4.2 Results and Discussion -- 5 Conclusions -- References.

Resource Interface Matchmaking as a Part of Automatic Capability Matchmaking -- 1 Introduction -- 2 Capability Matchmaking Process -- 2.1 Information Models Involved -- 2.2 Overview of Capability Matchmaking Process -- 3 Interface Matching Process -- 4 Case Examples -- 4.1 Screwdriving Solution -- 4.2 Pick and Place Solution -- 5 Verification of Capability and Interface Matchmaking Results -- 6 Discussion and Conclusions -- References -- Investigation on the Convergence of the Genetic Algorithm of an Aerodynamic Feeding System Due to the Enlargement of the Solution Space -- 1 Introduction -- 2 The Aerodynamic Feeding System -- 3 Implementation of the Nozzle Position as Fifth Parameter -- 4 Effect of the Nozzle Position on the Orientation Process -- 5 Convergence of the Genetic Algorithm -- 6 Conclusion and Outlook -- References -- Assembly Operations -- Indirect System Condition Monitoring Using Online Bayesian Change-point Detection -- 1 Introduction -- 2 Methodology -- 2.1 Test Bench Setup -- 2.2 Data Collection from the Test Bench -- 2.3 Online Bayesian Change-point Detection -- 3 Results and Discussion -- 4 Conclusions -- References -- Strategies for Dealing with Problems in Robotised Unscrewing Operations -- 1 Introduction -- 2 Automated Unscrewing Method -- 2.1 A Human-Robot Collaborative Disassembly Cell -- 2.2 Automated Unscrewing Process -- 3 Mitigating Strategies for Failure Modes -- 3.1 Strategies for Dealing with Failure Modes -- 3.2 Detection Methods for Failure Modes -- 4 Experimental Tests and Results -- 4.1 Tests and Results for Dealing with Failure Mode 1 -- 4.2 Tests and Results for Dealing with Failure Mode 2 -- 4.3 Tests and Results for Dealing with Failure Mode 3 -- 5 Conclusion -- Appendix -- References -- Improving Automated Insertion Task in Robotics by Reducing Registration Error -- 1 Introduction -- 2 Related Work.

3 Description of the RRBC Method -- 4 Description of Experiments -- 4.1 Equipment -- 4.2 General Procedure and Concept of Experiments -- 5 Results and Discussion -- 5.1 Failed Insertions: Uncorrected vs. Corrected Target Locations -- 5.2 Relationship Between Failures and TRE -- 5.3 Tighter Tolerances -- 6 Conclusions -- 7 Disclaimer -- References -- Assembly Cells and Systems -- Development of a Sensitive Winding Application Based on a Serial Robot and Integrated Torque Sensors -- 1 Introduction and Approach of the Problem -- 2 State of the Art of the Winding Application -- 3 Process Development -- 3.1 Winding Process -- 3.2 Feedback Control System -- 3.3 Measurement Concept -- 4 Implementation and Validation -- 5 Summary and Outlook -- References -- High-Load Titanium Drilling Using an Accurate Robotic Machining System -- 1 Introduction -- 2 Related Works -- 3 Accurate Robot Architecture -- 3.1 Kinematic Model -- 3.2 Spindle -- 3.3 Pressure Foot -- 3.4 Additional Sensors/Data Sources/Systems -- 3.5 Programmable Drilling Parameters -- 4 Industrial Applications -- 5 Experimental Methods -- 6 Results and Discussion -- 6.1 Dynamometer Results -- 6.2 Hole Quality -- 7 Conclusions -- References -- Application of Advanced

Simulation Methods for the Tolerance Analysis of Mechanical Assemblies -- 1 Introduction -- 2 Tolerance Modelling -- 2.1 Case Study -- 2.2 Assembly Models -- 2.3 Probability of Defected Products and Limit State Function -- 3 Advanced Simulation Methods -- 3.1 Crude Monte Carlo -- 3.2 Latin Hypercube Simulation Method -- 3.3 Quasi Monte Carlo Simulation Based on Sobol' Sequence -- 3.4 Subset Simulation Method -- 4 Results and Discussion -- 5 Conclusions -- References -- Development of a Low-Cost, High Accuracy, Flexible Panel Indexing Cell with Modular, Elastic Architecture -- 1 Introduction -- 2 Objectives.

2.1 Innovative Design Methodology -- 2.2 Functional Requirements -- 2.3 Commercial and Schedule Constraints -- 2.4 Modular Architecture -- 2.5 Cost Analysis -- 3 Architecture -- 3.1 Overview -- 3.2 Structure -- 3.3 Drive Systems -- 3.4 Indexing -- 3.5 Metrology -- 3.6 Force Sensing Clamps -- 4 Next Steps -- References -- Context-Aware Plug and Produce for Robotic Aerospace Assembly -- 1 Introduction -- 2 Flexibility in Manufacturing Systems -- 2.1 Flexible and Reconfigurable Manufacturing Systems -- 2.2 Evolvable Assembly Systems, Context Awareness, and WingLIFT -- 3 Use Case -- 3.1 High-Level Use Case Motivation -- 3.2 Specific Use Case Scenarios -- 4 Reference Architecture Concept -- 4.1 Generic Process Flow -- 4.2 Architectural Concept -- 4.3 Data Communications Concept -- 4.4 Hardware/Software Stack -- 5 Validation -- 5.1 Demonstration Scenario -- 5.2 Outline Solution -- 6 Summary -- References -- Data Capture and Visualisation on a Shoestring: Demonstrating the Digital Manufacturing on a Shoestring Project -- 1 Introduction -- 2 Architecture -- 3 Demonstrator Functionality -- 3.1 Cloud Database and Visualisations -- 3.2 Tool Condition Monitoring (TCM) -- 3.3 Job and Machine Status Tracking -- 3.4 Robotic Process Monitoring -- 4 Discussion -- 5 Conclusions -- References -- Digital Innovation Hubs for Enhancing the Technology Transfer and Digital Transformation of the European Manufacturing Industry -- 1 Introduction -- 1.1 Emerging Robotics Trends -- 1.2 Ecosystems -- 1.3 Future Skills -- 2 Review of Digital Innovation Hubs in Robotics -- 3 Trinity DIH - Concept and Approach -- 3.1 Use-Case Demonstrations -- 3.2 Concept for Approaching the Industrial Partners -- 4 Conclusions -- References -- Plenoptic Inspection System for Automatic Quality Control of MEMS and Microsystems -- 1 Introduction -- 1.1 MEMS and Typical Defects.

1.2 State of the Art (3D) Inspection Technology -- 2 3D Real-Time Imaging with Plenoptic Camera -- 2.1 Principle of Plenoptic Camera Technology -- 2.2 Application of Plenoptic Cameras for MEMS and Microsystems Inspection -- 3 Conclusion -- References -- Human Centred Assembly -- Automated Information Supply of Worker Guidance Systems in Smart Assembly Environment -- 1 Introduction: Background and Definitions -- 2 Related Work -- 2.1 Worker Guidance Systems -- 2.2 Information Supply of WGS -- 3 Conceptual Design for Automated Information Supply -- 3.1 Automated Information Supply of WGS -- 3.2 Authoring Process -- 3.3 Assisting Assembly Planning -- 3.4 Creation of Instruction Information -- 3.5 Entry of Instruction Information -- 4 Technical Implementation -- 4.1 Software-Based Proof-of-Concept Demonstrator -- 4.2 Integration in TU Wien Pilot Factory Industry 4.0 -- 5 Conclusion and Future Research Agenda -- 5.1 Conclusion and Recommendations -- 5.2 Limitation and Outlook -- References -- Towards Human and Robot Collaborative Ergonomic Handling of Long Parts with a Loose Grip -- 1 Introduction -- 2 Problem Formulation and Approach -- 3 Handling of Long Parts -- 3.1 Tracking System -- 3.2 Grasping the Part -- 3.3

Realtime-Control of Robot -- 3.4 Safety-Constraints -- 3.5 Discussion
-- 4 Ergonomic Handling of Long Parts -- 5 Conclusions and Future
Work -- References -- Human and Workcell Event Recognition and Its
Application Areas in Industrial Assembly -- 1 Introduction -- 2
Problem Statement -- 2.1 Quality Assurance -- 2.2 Worker Assistance
-- 2.3 Process Teaching and Configuration -- 3 State of the Art -- 3.1
Event Recognition -- 3.2 Object Recognition and Tracking -- 3.3 Smart
Tools in Assembly Settings -- 3.4 Semantic Knowledge Representation
and Processing -- 4 Methods -- 4.1 Events and Semantic
Representation of Domain Knowledge.
4.2 Conception of the Event Recognition System.

Sommario/riassunto

This open access book constitutes the refereed post-conference proceedings of the 9th IFIP WG 5.5 International Precision Assembly Seminar, IPAS 2020, held virtually in December 2020. The 16 revised full papers and 10 revised short papers presented together with 1 keynote paper were carefully reviewed and selected from numerous submissions. The papers address topics such as assembly design and planning; assembly operations; assembly cells and systems; human centred assembly; and assistance methods in assembly.
