



Intelligent and Autonomous Technologies in Aeronautics -Software Engineering and Unmanned Aerial Systems

ICAS Workshop 2017 Shinji SUZUKI, PC Chair, the University of Tokyo





Computer Intelligent Activities Become a Reality

Comparable Machines Brain Equivalent MIPS per \$1000 Organisms Billion G4 eta 2050 (reasoning) G3 eta 2040 (imagination) Monkey Million G2 eta 2030 (adaptation) G1 eta 2020 (skills) Del 340/20 Mac G3/266 1000 Utility Robot eta 2010-2015 PowerMac 8100/80 Gateway 486DX2/66 Mac G4 dual 500 3D perception 2000 in use 2005 Power Tower 180e 2D mapping Macintush-128K AT&T Globalyst 600 robots 1990 Apple II Stanford Cart 1970-1960 CDC 7600 Hopkins Beast IBM 7090 10⁻³ Bacterium Million Whitmeind IBM 704 Grey Walter UNIVACI Tortoise ENIAC Million Burmughs 5000 IBM 1620 Burroughs Class 16 Billion Monnoe Calculator ASCC (Mark 1)

https://www.frc.ri.cmu.edu/~hpm/talks/revo.slides/power.aug.curve/power.aug.html



Impact for Aircraft and Air Transportation?

- Design
 - **CAD**
 - Simulation
 - **Optimization**

- Manufacturing
 - CAM&NC
 - Robot
 - 3D Printing



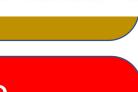
- Autopilot
- Flight Management
- **Unmanned Aircraft**



- Data Base
- Network
- Big Data Analysis











Automatic to Autonomous

- Perception
 - Sensor
 - camera

Logical Decision

- AutomaticControl
 - Rule Based
 - Autonomous Control
 - Learning and Evolution
 - Prediction



- Engine
- Actuator



Big Data Analysis

Predictive Control

Intelligent and Autonomous Technologies

MERITS

- Increase Safety
- Solution for Shortage of PILOTS and Skilled Engineers
- Reduction of Cost and Time
- Improvement of Service and Performance

• DEMERITS

- Increase Complexity
- Certification for Safety
- Responsibility for Accidents
- Security
- Take Away of Human Work
- Privacy





09:00 - 09:50	Software Engineering in Aeronautics
	Dr. Paul Nielsen, CEO of SEI (Software Engineering Institute), Carnegie Mellon University, USA
09:50 - 10:10	Coffee Break
10:10 - 10:40	What ANA expects for the Progress on Intelligent Data Analysis for Aircraft Maintenance
	Mr. Toshihiko Noguchi, All Nippon Airways, Vice President, Engineering & Maintenance Center, Tokyo, Japan
10:40 - 11:10	Digital Flight Engineer: Autonomy for Pilot Assistance
	Dr. Jae-Woo Choi, Aurora Flight Sciences, Lucerne, Switzerland
11:10 - 11:40	H2020 VISION : EU-Japan collaborative research on intelligent flight control systems
	Dr. Yoko Watanabe, ONERA, France
11:40 - 12:10	Can AI pass CPL(H) Skill Test
	Mr. Luuk van Dijk, Founder and CEO, Daedalean AG, Zurich, Switzerland





14:00 - 14:30	From Industrial Big Data to Artificial Intelligence at Airbus Mr. Ronny Fehling, head of data-driven technologies, AirBus, Germany
14:30 - 15:00	On the Horizon for the Global Drone Ecosystem – from concept to practicality
	Mr. Sebastian Babiarz, Head of Strategic Business Development, CTO Office, Airmap, USA
15:00 - 15:30	Collision Avoidance for Remotely Piloted Systems Mr. Johan Pellebergs, SAAB
15:30 - 16:00	Integrating Drones into Civil Air Traffic – Challenges and Concepts
	Dr. Peter Lenhart, Head of Human Factors Engineering, Center of Aviation, zhaw, Switzerland
16:00 - 16:20	Coffee Break
16:20 - 16:50	Meteodrones – Moving Towards an Operational Drone Network for Weather Measurements
	Dr. Martin Fengler, CEO Meteomatics, Switzerland
16:50 - 17:20	Aerial Object Tracking from an Airborne Platform
	Dr. Daniel Ambuehl, RUAG Aviation, Switzerland
17.20 - 18:00	Discussion, Moderator: Dr. Gunnar Holmberg, SAAB, Sweden





08:40 - 09:20	High Fidelity Small UAS Collision Damage Modeling Strategies and Frangibility Studies
	Dr. Javid Bayandor, Associate Professor, Virginia Tech, College of Engineering, USA
09:20 - 09:50	FAA UAS Regulation
	Mr. Ian ROSS, FAA, USA
09:50 - 10:10	Coffee Break
10:10 - 10:40	The Development of the Future European Rules on Unmanned Aircraft –a Risk Based and Proportional Approach
	Mr. Antonio Marchetto, RPAS Technologies Expert EASA, Germany
10.40 - 11.10	Remotely Piloted Aircraft System (RPAS) Regulations in Australia
	Dr. Cees Bil, Associate Professor, RMIT University, Melbourne, Australia
11:10 - 11:40	SORA – Risk Assessment for Unmanned Airborne Mobility
	Mr. Markus Farner, manager innovation and advanced technology, Swiss Federal Office for Civil Aviation, Switzerland
11:40 - 12:20	Discussion, Moderator: Dr. Cees Bil, RMIT, Australia



SCHWEIZERISCHE VEREINIGUNG FÜR FLUGWISSENSCHAFTEI ASSOCIATION SUISSE DES SCIENCES AERONAUTIQUES SWISS ASSOCIATION OF AERONAUTICAL SCIENCES













