SUMMER SCHOOL

Network for innovative training on rotorcraft safety

NITROS
ENGINEERING FOR ROTORCRAFT SAFETY

First Training Summer school Human factors in rotorcraft

Delft University of Technology
Faculty of Aerospace Engineering

https://www.nitros-ejd.org/
September, 12th - 17th, 2018

AGENDA DAY 1– Wednesday, September 12th, 2018
12.00 – 17.00 o'clock
Meeting room 1 NB2.51, 2nd floor, Faculty of Aerospace Eng.

12.00 – 13.00	***Lunch***
13.00 – 13.45	**Opening: NITROS programme – Updates and way forward (Dr. Giuseppe Quaranta, POLIMI, NITROS coordinator)**
13.45 – 14.15	**Welcome to TUDelft – overview of Aerospace Engineering (Dean L&R and/or Prof. Dr. Ir. Max Mulder, TUD)**
14.15 – 14.45	**The Group of Control and Operations at L&R (Prof. Dr. Ir. Max Mulder, TUD)**
14.45 – 15.00	***Coffee break***
15.00 – 15.30	**Goals Summer School NITROS – Human Factors in Rotorcraft (Dr. Marilena Pavel)**
15.30 – 16.15	**Use of Flight Simulator in Human Factors Research (Ir. Olaf Stroosma, SIMONA)**
16.15 – 17.00	**Tour of the Faculty of Aerospace. SIMONA simulator, Wind tunnels, Aerospace Structures & Materials Laboratory**
	Closure Day 1

AGENDA DAY 2 – Thursday September 13th, 2018
(8.45 – 17.00 o'clock)
Lecture room G, Ground floow near C&S, Faculty of Aerospace Eng.

8.45 – 9.30	Aerospace Human-Machine Systems (lecture Dr. Rene van Paassen)
9.30 – 10.15	Manual Control & Cybernetics (lecture Dr. Daan Pool)
10.15 – 10.30	*Coffee break*
10.30 – 11.15	Supervisory Control & Cognitive Systems (lecture Dr. Clark Borst)
11.15 – 12.00	Certification of fly-by-wire aircraft (Dr. Alexander in ' t Veld)
12.00 – 12.30	*Lunch*
12.30 – 13.15	Automatic Flight Control System Design (lecture Dr Erik-Jan van Kampen)
13.15 – 14.00	System Identification of Aerospace Vehicles System (lecture Dr. Coen de Visser)
14.00 – 14.15	*Coffee break*
14.15 – 17.00	SIMONA simulator session- Demonstrating helicopter flight dynamics (all PhD students, , Ir. Olaf Stroosma, Dr. Marilena Pavel, Ir. Ivan Miletovic)
	Closure Day 2

AGENDA DAY 3 – Friday September 14th, 2018
(8.45 – 17.00 o'clock)
Meeting room 1 NB 2.51, 2nd floor, Faculty of Aerospace Eng

08.45 – 9.30	Human Factors Research at Liverpool University (Dr. Mark White)
9.30 – 10.15	Aircraft-Pilot Couplings – an "ARISTOTEL" Perspective on Human Factors (Dr. Marilena D. Pavel)
10.15 – 10.30	*Coffee break*
10.30 – 11.15	Turning VTOL into eVTOL – Safety of future electric VTOL (Dr. Marilena D. Pavel)
11.15 – 12.00	Application of nonlinear flight control to rotorcraft (lecture Dr. Qiping Chu)
12.00 – 12.30	*Lunch*
12.30 – 14.30	EHOPS – Helicopter operations for offshore (presentations all NITROS PhD students 10 min/student)
14.30 – 17.00	SIMONA simulator session- Demonstrating helicopter handling qualities (all PhD students)
	Closure Day 3

AGENDA DAY 4 – Monday September 17th, 2018
(8.45 – 17.30 o'clock)
Meeting room 1 NB 2.51, 2nd floor, Faculty of Aerospace Eng.

8.45 – 9.30	Invited speaker: Mr. Ilan Arush, National Test Pilot School Mojave, CA
9.30 – 10.15	Invited speaker: Prof. David Abbink, TUD
10.15 – 10.30	*Coffee break*
10.30 – 11.15	Invited speaker: Ir. Jasper van de Vorst, NLR
11.15 – 12.00	Invited speaker: Ir. Sjaam Birjmohan, PAL-V
12.00 – 12.30	*Lunch*
12.30 – 13.15	Invited speaker: Dr. Michael Jones, DLR
13.15 – 14.00	Invited speaker: Ir. Michiel Schuurman, TUD
14.00 – 14.15	*Coffee break*
14.30 – 17.00	Forum: "From the past to the future on Human factors in rotorcraft- where do we go from here? "- a NITROS perspective (all)
14.30	
17.00 – 17.30	Closure summer school NITROS (Dr. Giuseppe Quaranta)

PROJECT OVERVIEW

Recent statistics show that, per flight hour, it is ten times more likely to be involved in an accident in a helicopter than in fixed-wing aircraft. The main cause for this lies primarily in pilot judgement and actions. But it is also related to safety culture management, i.e. the critical behaviours shared by helicopter operators in relation to safety. This also points to design solutions that can take greater account of safety of operations. NITROS is a multi-partner ITN which provides an interface between aerodynamics, structures, flight dynamics, stability, control, handling qualities and design and deals with innovative approaches to enhance the safety of present and future rotorcraft (helicopters and tiltrotors) from an engineering point of view.

The uniqueness of this project is that it will train future engineers to increase safety of rotorcraft operations by tackling this problem in an interdisciplinary way. At present, several key research programs financed by the European Union (EU) are exploring innovative vertical take-off vehicle configurations that may start the transport revolution long-sought by the pioneers of vertical flight and foreseen by ACARE's vision 2050 . In fact, helicopters, as well as other vertical flight vehicles, like tiltrotors, compound helicopters, hybrids, and the rapidly-expanding class of easy to fly vertical take-off personal vehicles, are expected to see widespread use in the future especially as means of transport.

POLITECNICO DI MILANO

UNIVERSITY OF LIVERPOOL

University of Glasgow

TU Delft

PROJECT OVERVIEW

The key goals of the NITROS training network are:

#1 — to train the next generation of European aeronautical scientists and engineers on this peculiar type of aircraft that have great potential to improve the effectiveness of the European transport network, developing the entrepreneurial attitude in them that is essential to introduce disruptive technological innovations;

#2 — to train the next generation engineers to avoid overlooking the impact that their design choices may have on flight safety, fostering the investigation of safety issues on innovative vertical take-off configurations that may assume an important role in the future European transport network;

#3 — to introduce innovations in rotorcraft design that will enhance the safety of helicopters, to obtain a significant reduction of the accident rate up to 20% especially for future rotorcraft designs and operations that will exploit the innovation generated by NITROS research;

#4— to create a network of excellence of European research establishments and industry organisations dedicated to rotorcraft safety.

All these goals can be reached by exposing the young researches to a dynamic network composed not only of some of the most renowned European engineering schools, research centres, industry and aviation regulators working in the field of rotorcraft.

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