

Timetable and Program

We reserve the right to make changes to the program.

1. WEEK (34)

Date	MON 19.08.	TUE 20.08.	WED 21.08.	THU 22.08.	FRI 23.08.
Room	M101 & C2	M101	M101	M101	M101
Topic	Introduction, design	Design, waveguides	Manufacturing, materials	Industrial needs, eye tracking	Applications, games
9:00-10:00	Summer School info, practical matters (C2)	Irina Livshits: How is it designed: Camera part, Projector part, Illumination, Display	Karelia: Manufacturing methods for imaging and illumination optics	Program	Program
10:00-11:00	Jyrki Saarinen: Welcome words (M101)	Irina Livshits: Examples: Moverio, Oculus, HoloLens, Other			
11:00-12:00	Juha Purmonen: Introduction to the topic (M101)	Irina Livshits: Examples & Conclusion: Application, Development, Increasing FOV, contract, resolution, Optimization of size and weight, Manufacturability.	Petri Karvinen: Manufacturing and materials	3D Talo: Augmented reality and Virtual reality in industrial use	Teemu Tiainen: Design and implementation of AR/VR learning environments
12:00-13:00	Lunch	Lunch	Lunch	Lunch	Lunch
13:00-14:00	Irina Livshits: Optical design (M101)	Juuso Olkkonen: Diffractive waveguides for AR displays, introduction to AR displays, principals of diffractive photoconductor	Tapani Levola: Amazing optics towards perfect AR displays	Roman Bednarik: Eye-movement tracking: theory, systems and applications	Riku Suomela: AR technology meets game industry: Introduction to AR games, AR games history, What does AR mean in games, What AR games exist, What are the technology's advantages and disadvantages
14:00-15:00	Irina Livshits: What is it? Reality and virtuality spectrum. Introduction of AR, VR, MR devices. Optical design as the way to understand this hardware. Brief introduction on optical design. A place of AR/VR/MR in optical systems classification. Aberrations. Quality.				
15:00-16:00	Irina Livshits: How does it work? Technical specification and parameters. Consequent and non-consequent ray tracing. Introduction of HMD architecture and industrial platforms: Opaque, See through: Bird bath; Free space; Light guide; Waveguide.				
16:00-17:00	Irina Livshits: What are problems? Human eye optical model. Convergence and divergence. Accommodation. Eye-box. Navigation system. Illumination system.		Freetime		
	Social program at 6 pm Frisbeegolf	EOS students organize: Social program: at 6pm Joensuu city tour	Social program: at 6 pm Sauna evening		Social program: at 7 pm Dinner

2. WEEK (35)

Date	MON 26.08	TUE 27.08.	WED 28.08.
Room	Carelia parking lot, Kuopio campus	M101	M301
Topic	Medical applications	Human device interface	Architecture
9:00-10:00	Be at 7:45am ready in Carelia building's parking lot! Bus trip from Joensuu to Kuopio at 8 am - 10 am.	09:00 - 09:15 Steven LaValle: Welcome words, Human perception and its impact on VR/AR products and story of Oculus	Bernard Kress: Optical architectures and related technologies to enhance the visual experience and comfort in AR and MR headsets
10:00-11:00	Workshop 1: Microsurgery Center of Eastern Finland (In city of Kuopio): VR/AR medical applications	09:15 - 10:15 Steve LaValle: Industry perspective on XR 10:15 - 10:30 Break	
11:00-12:00	Live surgery and action planning (including virtual surgical environments, surgical videos, spectral imaging, and general action planning including AR), hands on surgery and familiarize him/herself with the technique using various synthetic and possibly human simulators.	10:30 - 12:00 Anna Yershova LaValle: Bird's eye view of XR systems	
12:00-13:00	Lunch	Lunch	Lunch
13:00-14:00	Workshop 1: Microsurgery Center of Eastern Finland: VR/AR medical applications	13:00 - 13:50 Katherine Mimnaugh: Human perception I	Bernard Kress: Optical architectures and related technologies to enhance the visual experience and comfort in AR and MR headsets
14:00-15:00		13:50 - 14:10 Break (possibly with some activity)	
15:00-16:00		14:10 - 15:00 Katherine Mimnaugh: Human perception II	Program
16:00-17:00		15:00 - 15:20 Break 15:20 - 16:10 Anna Yershova LaValle: Tracking systems	
	Bus trip Kuopio - Joensuu 4 pm - 6pm	EOS students organize: Social program: at 6pm Volleyball	EOS students organize: Social program: at 6pm MÖlkkö

Program to choose		Two groups	
THU 29.08.		FRI 30.08.	
Wärtsilä, Karelia	Tulliportti street, Riveria	Science park/M101	Science park/M101
Prototyping	OR	Using AR/VR	
360 technique		Group 1	Group 2
<p>Workshop 2: Karelia: Prototyping and product development of optical devices: illumination, imaging, measuring and sensory devices. Joint lectures with Nanocomp Ltd CTO Samuli Siitonen Possibly also with optical mold manufacturer company CEO</p>	<p>Workshop 3: Riveria: Doing interactive teaching materials with 360 technique and visiting Riveria's VR/AR learning environments</p>	<p>Workshop 4: Computing Department: Working in a brand-new AR/VR laboratory (Science park)</p>	<p>Workshop 5: Pasi Vahimaa: Smartlab (Metria)</p>
Lunch		Lunch	
<p>Workshop 2: Karelia: Prototyping and product development of optical devices: illumination, imaging, measuring and sensory devices. Joint lectures with Nanocomp Ltd CTO Samuli Siitonen Possibly also with optical mold manufacturer company CEO</p>	<p>Workshop 3: Riveria: Doing interactive teaching materials with 360 technique and visiting Riveria's VR/AR learning environments</p>	<p>Workshop 5: Pasi Vahimaa: Smartlab (Metria)</p>	<p>Workshop 4: Computing Department: Working in a brand-new AR/VR laboratory (Science park)</p>
EOS students organize: Social program: at 6pm Piknik and Swimming in Linnunlahti			