



## **BLENDED INTENSIVE PROGRAMME: „Assistive Technology in Medicine“ (ATIM)**

**Liberec - Žilina - Bautzen**

**Prof. Dr. Daniel Raabe**

**Liberec, ACC conference, 4th Sept. 2025**

## Blended Intensive Programmes (BIPs)

- ... are short, intensive programmes that use innovative ways of learning and teaching
- combine physical mobility with a virtual part.
- for students and staff.
- at least three higher education institutions take part

<https://wikis.ec.europa.eu> (accessed August 19th 2025)

## Our BIPs since 2024

1. BIP 2024 “Assistive Technology in Medicine” (5 days workshop 8<sup>th</sup> – 12<sup>th</sup> April in Liberec)
2. BIP 2025 “Robotics” (5 days workshop March 31<sup>st</sup> – April 4<sup>th</sup> in Liberec)
3. BIP 2026 “Data Interfaces in Healthcare & Industries” (5 days workshop March 23<sup>rd</sup>–27<sup>th</sup> in Bautzen)

TECHNICAL  
UNIVERSITY  
OF LIBEREC

Faculty of Health Studies  
Faculty of Mechatronics, Informatics and  
Interdisciplinary Studies



Cooperative State University of Saxony  
Department of Medical Engineering,  
Campus Bautzen



UNIVERSITY OF ŽILINA  
Faculty of Electrical Engineering  
and Information Technology



Leipzig



Riesa



Bautzen



Glauchau



Dresden



Plauen



Breitenbrunn



Cooperative State  
University of Saxony

**7**  
locations





## ECONOMIC SCIENCES



## ENGINEERING SCIENCES

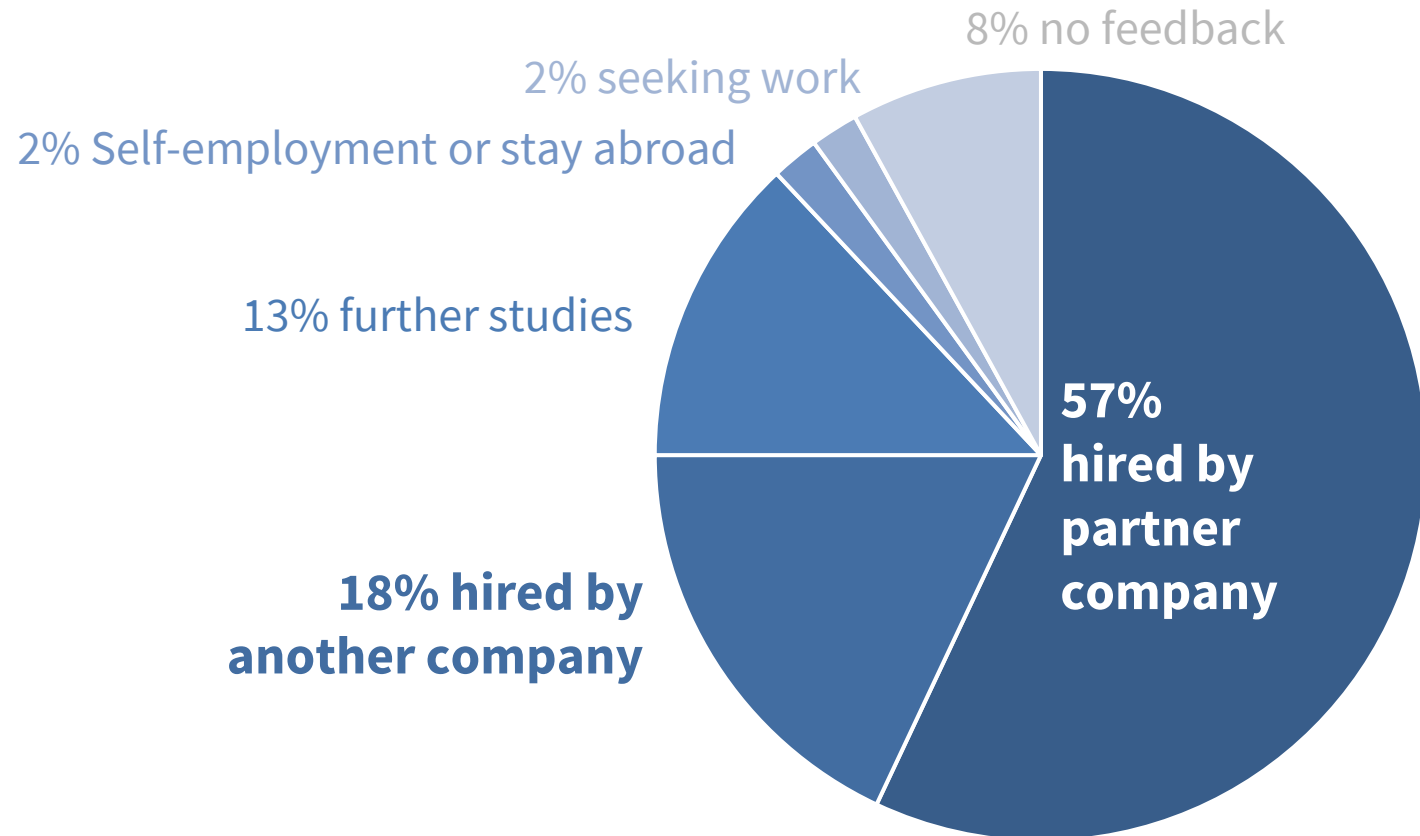


## SOCIAL AND HEALTH SCIENCES



**~60 degree programs  
~4.500 students**

## Parameters of success:



**90%**  
**placement**  
**immediately**  
**after graduation**

Status 2024-10-31

# Agenda

## 1. TEAM

## 2. BIP 2024 Assistive Technology in Medicine (ATIM)

- a. Planing period
- b. Virtual Part
- c. Physical Part

## 3. Evaluation



## Team



Prof. Ing. Aleš Richter  
(TUL)

Prof. Ing. Daniel Jiráček, Ph.D. (IKEM)  
Ing. Jan Koprnický, Ph.D.

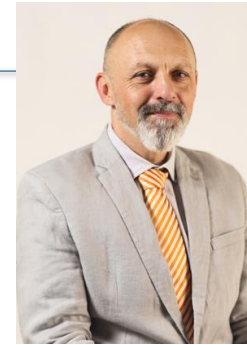
**Ing. Simona Kuncová**  
**Hana Křovinová**  
**Katerina Prstková** (all TUL)



Prof. Ing. Josef Černohorský  
(TUL)



Ing. Tomáš Souček  
(TUL)



Prof. Ing. Ladislav Janoušek  
(UNIZA)



doc. Ing. Mariana Beňová, PhD  
Ing. Maroš Šmondrk, PhD.  
(both UNIZA)

DHSN colleagues:

Prof. Dr. Daniel Raabe  
Prof. Dr. Alex Flory  
Dipl. Ing. Mahdi Abdel-Haq





# BIP 2024 Assistive Technology in Medicine

Planing period

- **Start 2021**
- **Various meetings in Liberec and Bautzen to discuss potential international activities in the cross-border region**
- **Blended Intensive Programme**
  - **Proposals of Hands-On Workshops**
  - **Date and schedule of virtual and physical part**
  - **Selection of students**
  - **Student Online Learning Agreement (OLA)**
  - **Mobility Agreement**

# BIP 2024 Assistive Technology in Medicine

## Virtual part

### VIRTUAL PART

1	Robot-assisted percutaneous needle insertion (March 7th)	Dr Antonia Tzemanaki (Bristol/UK)
2	Introduction to Surgical Robotics (March 14th)	Daniel Raabe (DHSN)
3	Introduction to Motion Control for Medical Devices (March 21st)	Josef Černohorský (TUL)

### PHYSICAL PART- Hands on modules (8th – 12th April)

1	ROBOTIC ASSISTED MINIMALLY INVASIVE SURGERY - MODELLING WORKSHOP	Daniel Raabe & Mahdi Abdel-Haq
2	ELECTROMAGNETIC BIOCOMPATIBILITY WORKSHOP	Maroš Šmondrk & Ladislav Janoušek
3	Imaging Methods	Daniel Jiráček, Andrea Galisova, Dominik Havlicek & David Cervený
4	MOTION CONTROL FOR MEDICAL DEVICES	Josef Černohorský
5	ELECTROMYOGRAPHY CONTROL OF ROBOTIC SYSTEMS	Jan Koprnický Tomáš Souček

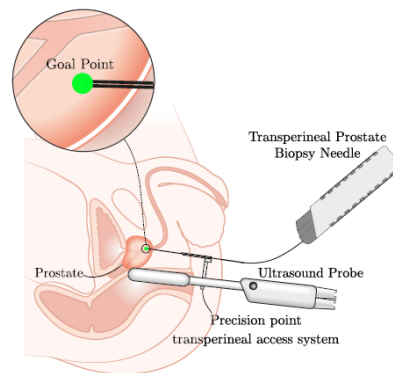
# BIP 2024 Assistive Technology in Medicine

## Virtual part

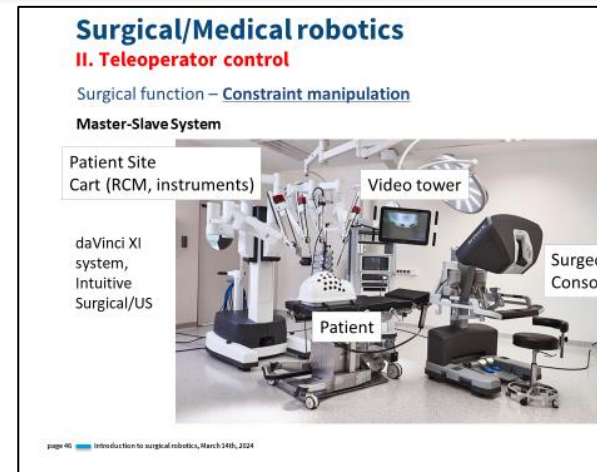
**Keynote speech:** Dr. Antonia Tzemanaki, University of Bristol & Bristol Robotics Lab/UK –  
*Robot-assisted percutaneous needle insertion*



**Abstract**— Robot-assisted percutaneous needle insertion is expected to significantly increase targeting accuracy in minimally invasive operations. For this, it is necessary to provide mathematical models that can accurately capture the underlying dynamics of medical needles. Here, we present a novel nonlinear mathematical model of flexible medical needles based on the Absolute Nodal Coordinate Formulation. The model allows the description of large needle deflections and arbitrarily large rigid body motions. Tailored to the requirements of transperineal prostate biopsy and brachytherapy, it can correlate both the translational and rotational coordinates of the needle's base with its deflection, provide force feedback and accept arbitrary loading conditions. The model is optimised in terms of computational efficiency in order to allow real-time simulation and control. Experiments show that the proposed model allows for submillimeter precision in both static and dynamic needle deflection settings. Due to its accuracy and computational



**Lecture:** Prof. Dr. D. Raabe-  
*Introduction to Surgical Robotics*

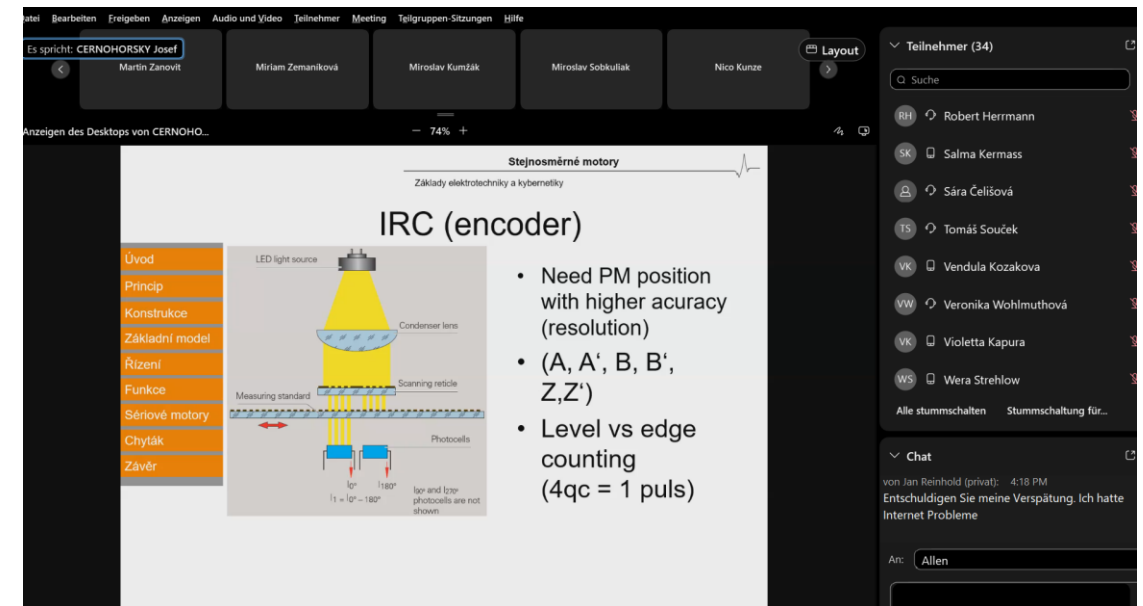


SoloAssist II,  
ActorMed/  
Germany

# BIP 2024 Assistive Technology in Medicine

## Virtual part (method)

- 30-40 students from UNIZA, TUL and DHSN attended the virtual lectures (each 1-2 hours)
- Keynote speech from the UK
- *WEBEX* was used as video platform
- The elearning environment *OPAL* was used to provide lecture notes and as a source for additional information
- English



WEBEX - Online lecture Prof. Černohorský

# BIP 2024 Assistive Technology in Medicine

## Physical part

### VIRTUAL PART

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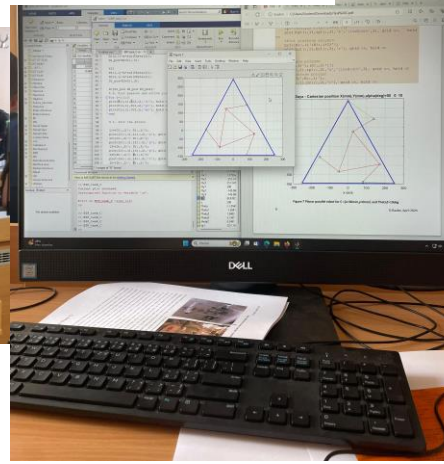
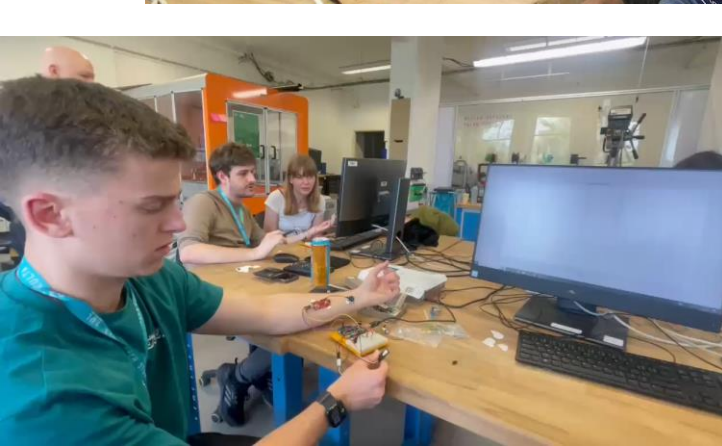
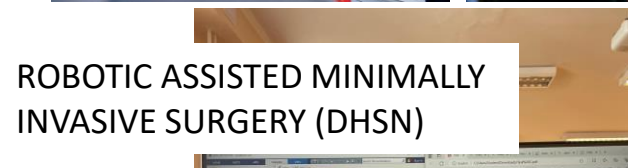
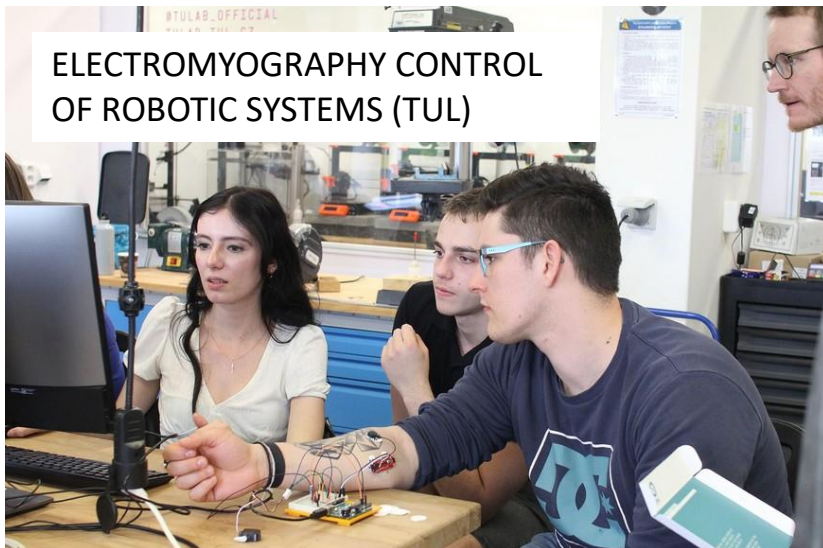
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# BIP 2024 Assistive Technology in Medicine

## Physical part



# BIP 2024 Assistive Technology in Medicine

## Physical part (method)

- 10 selected students plus staff from each University attended the 5-day workshop
- Workshop host in 2024: Faculty of Health Studies, TUL
- 5 hands on modules in English
- Social events, Campus Tour, Uni presentation, ...
- Evaluation

MONDAY 8 April 2024		
8:00 – 10:00	Welcome	
	TUL F3 Building – F02	
	Brief Presentation of Universities	
	TUL F3 Building – F02	
10:00 – 10:30	TUL Campus Tour	
	Coffee Break	
	TUL IC Building - Conference Room	
10:30 – 12:00	GROUP A	GROUP B
	ROBOTIC ASSISTED MINIMALLY INVASIVE SURGERY	ELECTROMANETIC BIOCOMPATIBILITY
	MODELLING WORKSHOP I. (15 students)	WORKSHOP I. (15 students)
	Lecturers: Prof. Dr.-Ing. Daniel Raabe	Lecturers: Prof. Ing. Ladislav Janoušek, Ph.D.
12:00 – 13:00	Dipl.-Ing. Mahdi Abdel Haq	Ing. Maroš Šmondrk, Ph.D.
	(University of Cooperative Education, Bautzen)	(University of Žilina)
	TUL F3 Building – FZS13	TUL F3 Building – FZS6
	Lunch	
13:00 – 14:30	TUL Canteen	
	GROUP A	GROUP B
	ROBOTIC ASSISTED MINIMALLY INVASIVE SURGERY	ELECTROMANETIC BIOCOMPATIBILITY
	MODELLING WORKSHOP II. (15 students)	WORKSHOP II. (15 students)
14:30 – 15:00	Lecturers: Prof. Dr.-Ing. Daniel Raabe	Lecturers: Prof. Ing. Ladislav Janoušek, Ph.D.
	Dipl.-Ing. Mahdi Abdel Haq	Ing. Maroš Šmondrk, Ph.D.
	(University of Cooperative Education, Bautzen)	(University of Žilina)
	TUL F3 Building – FZS13	TUL F3 Building – FZS6
15:00 – 16:30	Coffee Break	
	TUL IC Building - Conference Room	
	GROUP A	GROUP B
	ROBOTIC ASSISTED MINIMALLY INVASIVE SURGERY	ELECTROMANETIC BIOCOMPATIBILITY
16:45 -	MODELLING WORKSHOP III. (15 students)	WORKSHOP III. (15 students)
	Lecturers: Prof. Dr.-Ing. Daniel Raabe	Lecturers: Prof. Ing. Ladislav Janoušek, Ph.D.
	Dipl.-Ing. Mahdi Abdel Haq	Ing. Maroš Šmondrk, Ph.D.
	(University of Cooperative Education, Bautzen)	(University of Žilina)
	TUL F3 Building – FZS13	TUL F3 Building – FZS6
	Social event – Liberec Sightseeing, Plaudit restaurant	

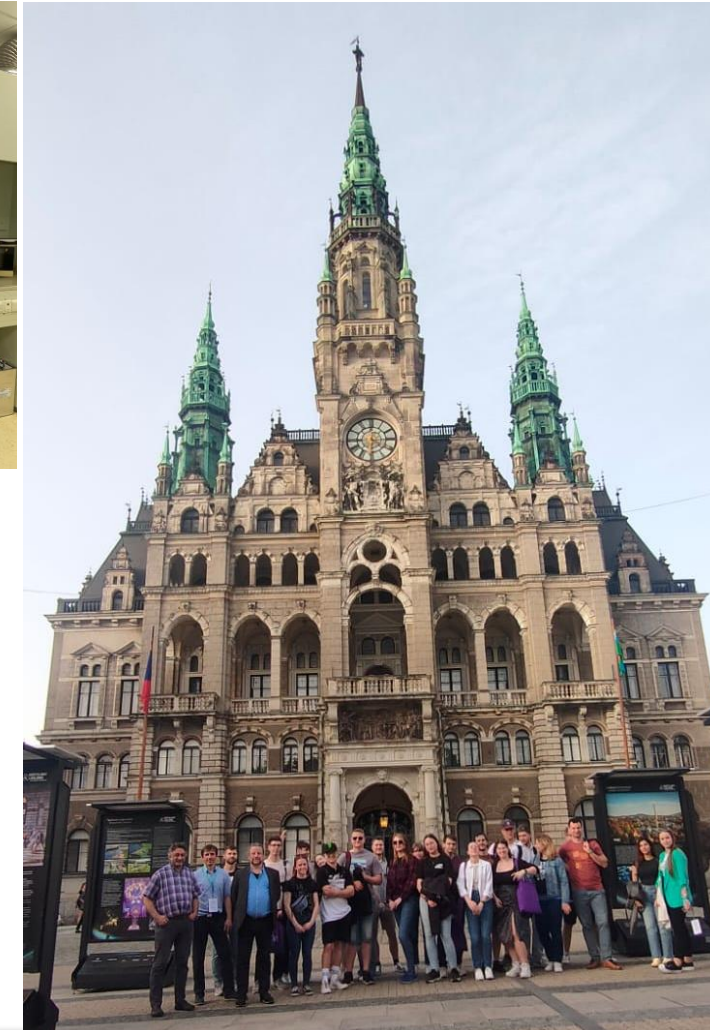
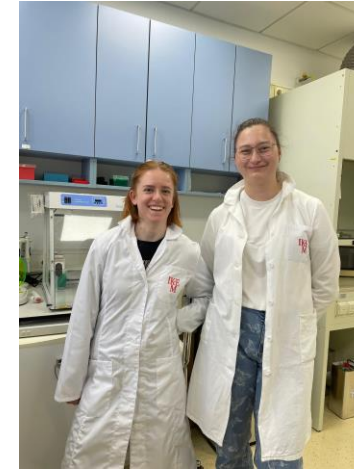
Physical programme outline Hana Křovinová



# Evaluation

HOW SATISFIED WERE YOU WITH THE PHYSICAL PART?

VERY DISSATISFIED	-
DISSATISFIED	-
NEUTRAL	-
SATISFIED	3
VERY SATISFIED	20



# Thank you