University related activities

David Škaroupka 12. 2. 2025

let's turn challenges into opportunities
and opportunities into values

INSTITUTE OF MACHINE
AND INDUSTRIAL DESIGN

Institute of Machine and Industrial Design,
Faculty of Mechanical Engineering, Brno University of Technology

Content of presentation

Personal range of activities RAF, strojLAB, DiSTT, lectures, PR

Vision-mission-goals (VALUES)

RAF Team intro

Achievements - obstacles

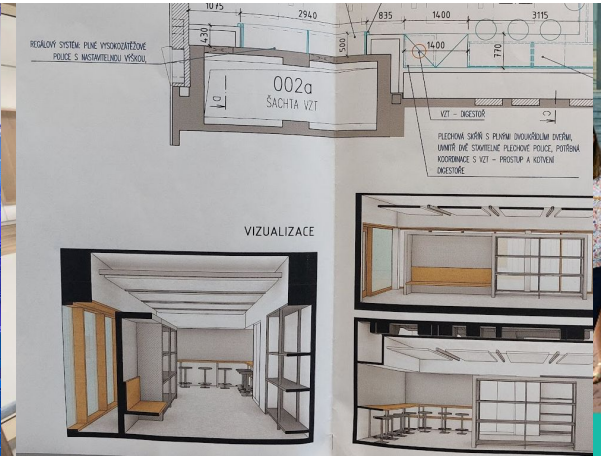
Call to Action

Let's stay on Earth for a while :)

Range of activities

Core: leading of the RAF team

Minor: strojLAB strategy, strojLAB student team garant, team and department PR, DiSTT, teaching



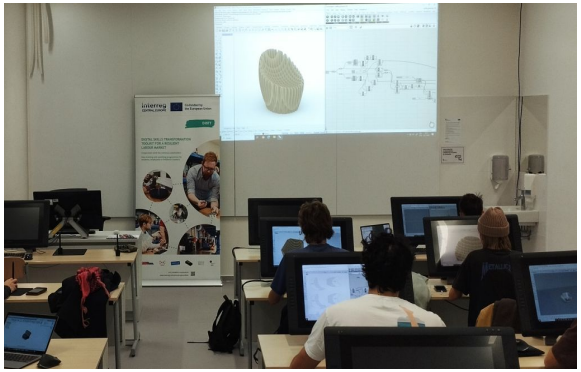
Running projects

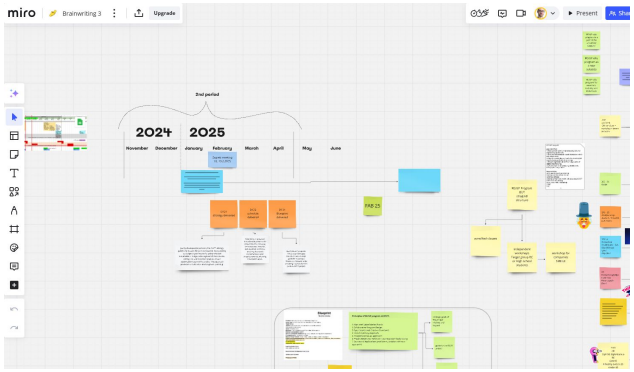
International: DiSTT Interreg CE

National, TA ČR with:

- Profibaustoffe
- 3Deposition
- Infram

DiSTT - the power of cooperation and communication

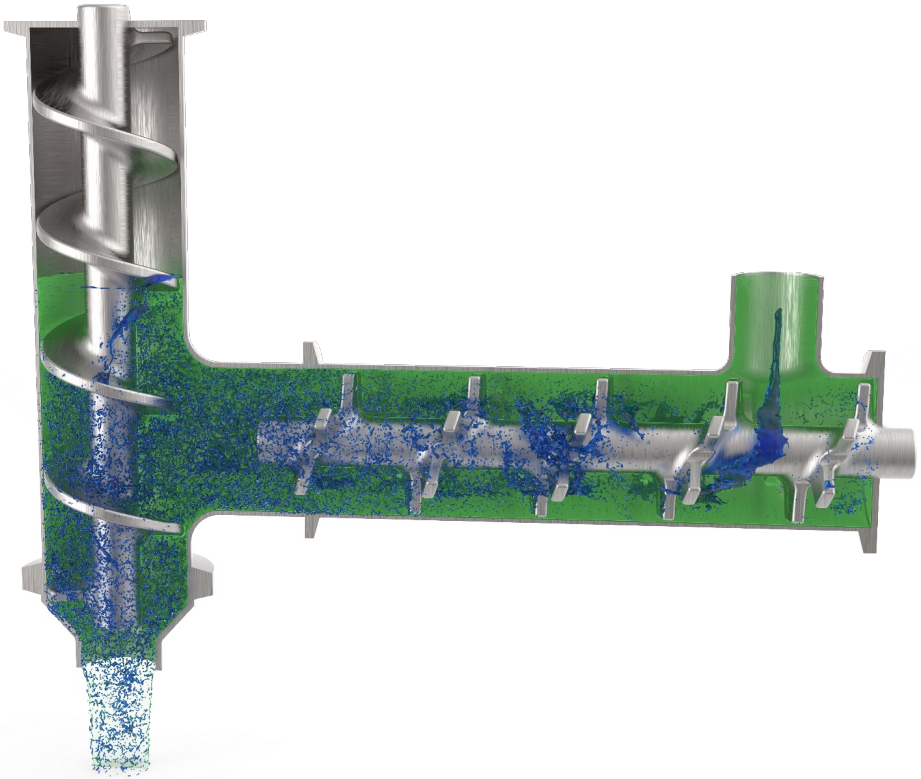




3DCP project with Profibaustoffe

Multicomponent Mixture and Application Technology
for 3D Printing in Construction

3DCP project with Profibaustoffe - simulations



Daniel Vícha:

Simulation of mixing effectivity in Particleworks

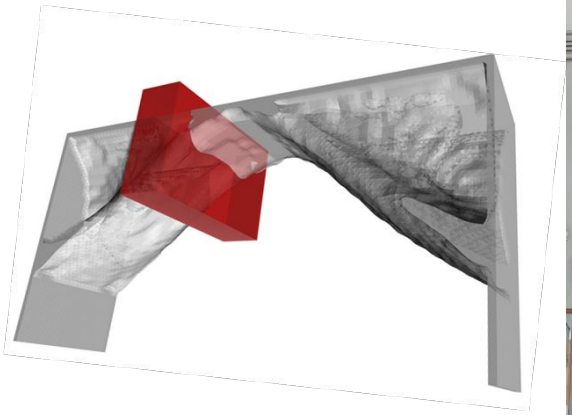
Future:

Comsol?

Vojtěch Florián

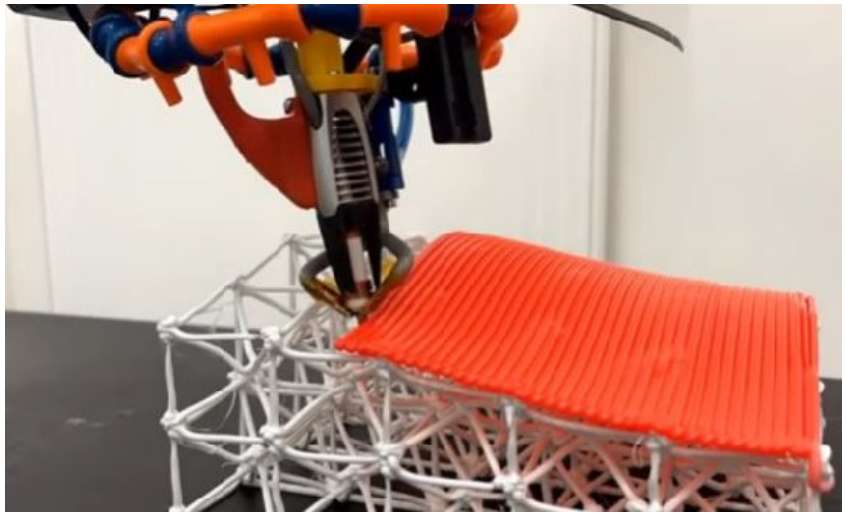
Project with FCE and Infram

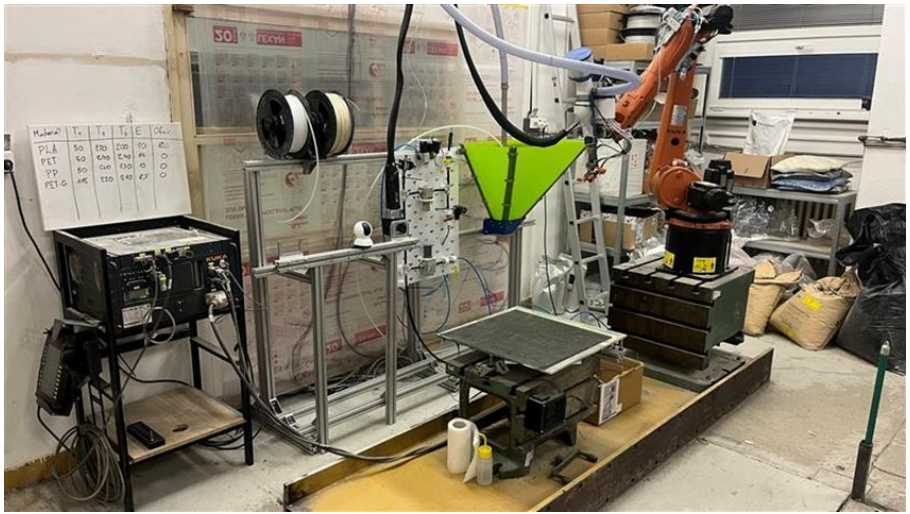
Development of cement composites and process parameters for 3D printing of elements complying the requirements of traffic constructions



Project with 3Deposition

Robotic Cell for Hybrid Manufacturing in Industry 4.0





The RAF team

Vision - to become a key R&D partner in the LFAM industry, helping to face challenges based on systematic research work, experience and knowledge of LFAM production processes, interdisciplinary linking fundamental knowledge of the material, its additive processing capabilities and the ability to design and operate application technology up to TRL4

Mission - using experimental procedures, prototyping and verification, to discover new technical solutions and approaches to LFAM production that address the challenges currently limiting its wider application

Goals - to commercialize our inventions (through projects, IP, articles and PR)

The team, Robotic additive fabrication (R&D)

David

Petr

Petr

Vojta

Arnošt

Kuba

Eva

Dan

Martin

Projects in evaluation

- TACR TREND12 with DAKO Brno 4,8mil CZK (3years, results in feb. 2025,) Automated technology for spraying glass fiber reinforced concrete

- Aplikace Deep TECH with ASIO NEW 4,1mil CZK (3years, results hopefully in the summer 25) Robotic application for printing water management products

- HORIZON-RIA Robotic Earth Construction (RECON), 288 000 EUR for the BUT team (5,6mil EUR total for 15partners) (4years, results in the summer 25, Earth mat. processing)

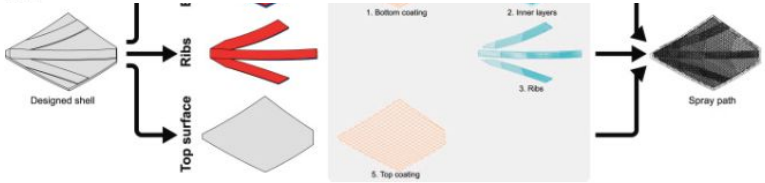
Project Trend 12 with DAKO BRNO

Shotcrete automation, inspiration from the article:

NUH M., et al. Digital fabrication of ribbed concrete shells using automated robotic concrete spraying, Additive Manufacturing, Volume 59, Part B, 2022, 103159, ISSN 2214-8604

(a) Central segment with 2.5 m long ribs

(b) Assembled nine segment shell demonstrator on columns



Project Tova

Our introduction to the topic of 3DCP from earthen materials

Experience from internship at IAAC, cooperation with WASP

Horizon (in evaluation from 4. 2. 2025)

- HORIZON-RIA Robotic Earth Construction (RECON), 288 000 EUR for the BUT team (5,6mil EUR total for 15partners)
- 4years, results in the summer 25, Earth mat. Processing
- Our team is leader of two tasks regarding HW, processes and system integration

Unaccepted projects 2023,2024:

- Production system for robotic additive manufacturing of metal materials (Slavíček, Sigma 2VS)
- Slicing for nonplanar 3D printing using neural networks (Krčma, Sigma 2VS)
- Technology of XL3D Printing of Spatial Struct. for Innovative Form Fillings (Křivohlavý, Sigma 7VS)
- Production system for robotic additive man. of difficult-to-process metal mat. (Slavíček, Sigma 7VS)

Not submitted: Horizon Pathfinder

Spin-off and university - how it works

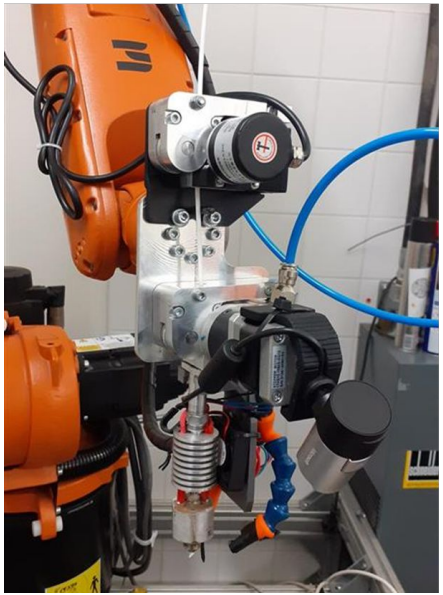
Create opportunities connecting the university team and industry. Establish tools and procedures for commercializing own inventions.

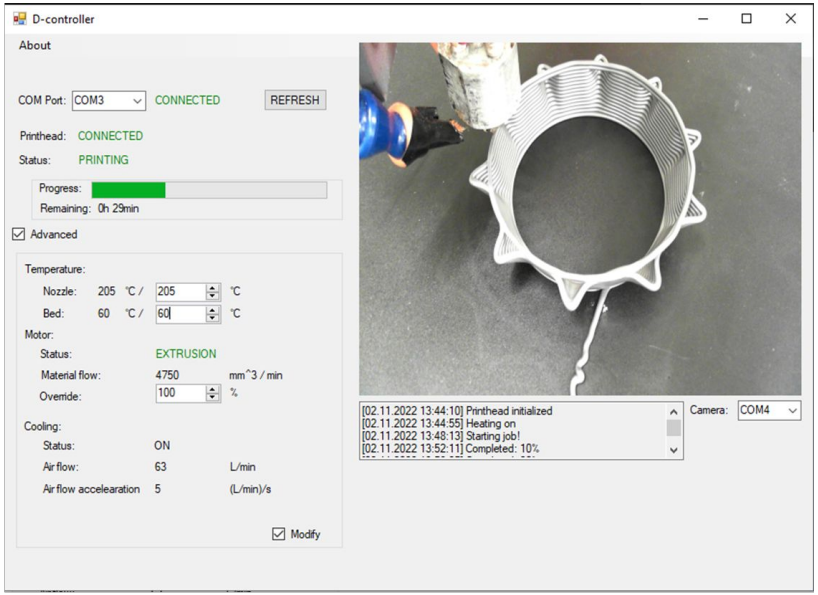
Source: g.cz

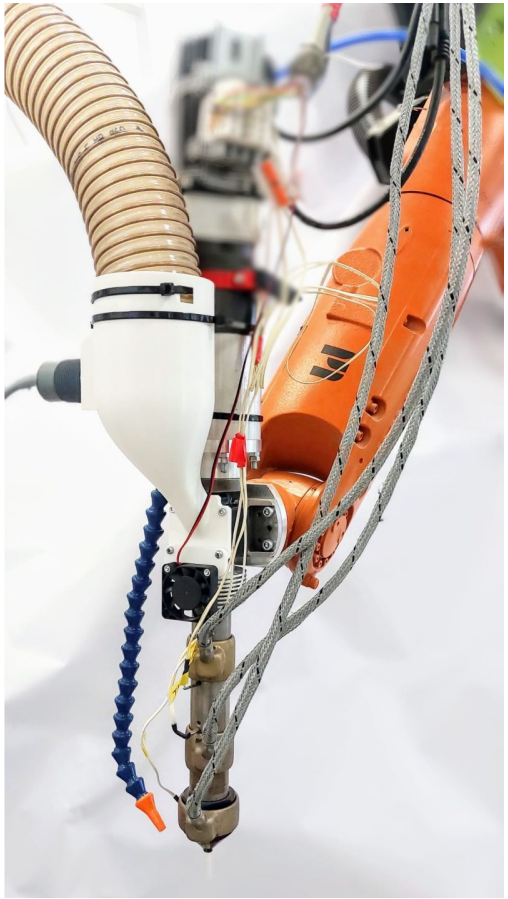
D-FINE and D-PRO printhead

Filament printhead 3Deposition, Petr Krejčiřík

Licenced and commercialized output

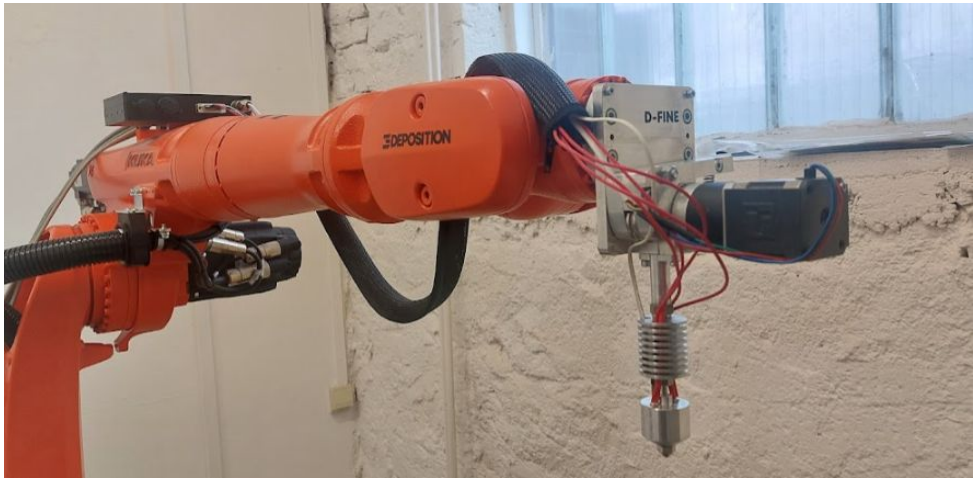






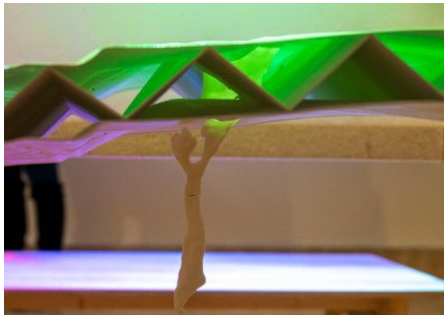
Product delivered by 3Deposition

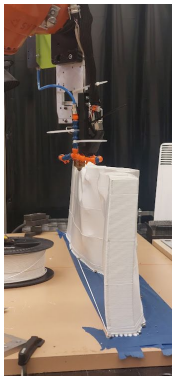
Robotic additive manufacturing workspace system integration 2023



Product delivered by 3Deposition

Prototypes printed





Achievements and obstacles

Achievements- Team established with network of local and foreign partners

Commercialized outputs - G-funk licensed, (US patent transferred)

2 Ph.D.s defended, spin-off established

Multiple projects finished, running and in the process of evaluation

Shortcomings - Publications- their number. The strategy is to publish in journals that support our credibility, achieving the highest goals in the bonused quartiles is not a priority.

Obstacles - communication and creating of common values on institute level

Need for space

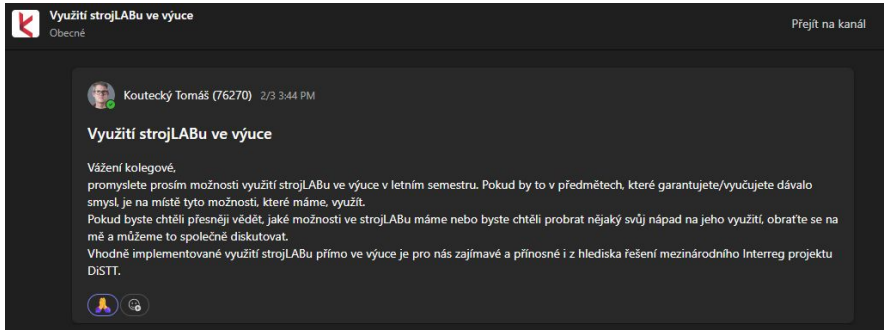
For large scale 3D printing we need proper laboratory on the ground floor, thankfully we can still use lab B2/106.

Picture below: Installation of the 3DCP printer

CALL TO ACTION

DiSTT

Let’s connect accredited subjects with strojLAB



FAB25 conference, presentation of pilot projects, gathering feedback from international audience

CALL TO ACTION

Values setting and Communication:

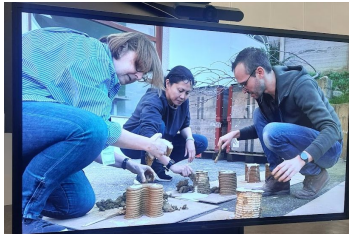
I would like to see a joint debate about the common values with which we publish, write theses, do research and development and building our careers.

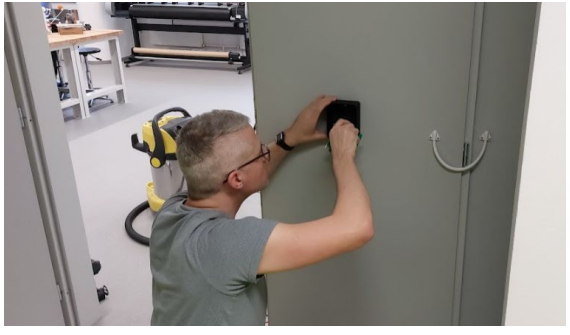
- We need publications to foster our R&D credibility, not only for excellency.
- We need to let Ph.D.s to follow and focus our core activities in projects
- We ask that candidates for habilitation be considered as individuals with their own specific mission and that this not be subordinated to binary criteria.

Open question: do we need a human resources specialist?

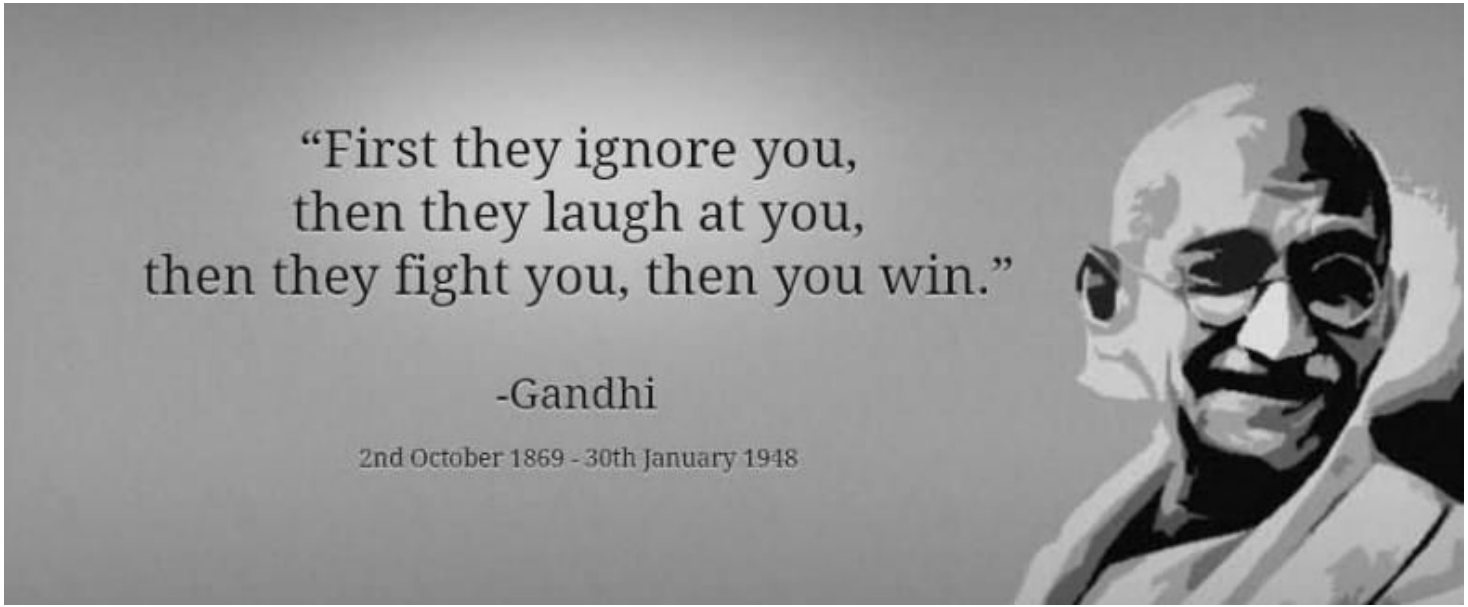
People

We need them.





Let's work together, not against each other, the arena is the world, not the university campus



Source: LinkedIn

Thank you for your attention

Ing. David Škaroupka, Ph.D.
Assistant professor
Leader of the Robotic Additive Fabrication team
david.skaroupka@vut.cz

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Institute of Machine and Industrial Design,
Faculty of Mechanical Engineering, Brno University of Technology