

Josef Urban

- ▶ <https://www.ciirc.cvut.cz/~urbanjo3/>
- ▶ Czech Technical University in Prague (before in Nijmegen)
- ▶ Prague Automated Reasoning Group (arg.ciirc.cvut.cz)
- ▶ AI/AR on top of large formal (math) libraries/corpora
- ▶ systems for automating support formal verification
- ▶ deductive AI: Automated/Interactive Theorem Proving etc.
- ▶ inductive AI: Statistical/Symbolic Machine Learning etc.
- ▶ inductive/deductive combinations: prove \rightarrow learn \rightarrow prove more \rightarrow learn more \rightarrow ...
- ▶ How can computers learn reasoning on large formal corpora?
- ▶ Learn formalization on aligned informal/formal corpora?
- ▶ Can we learn reasoning also from informal corpora (arXiv)?
- ▶ What will it take to make math/science semantic and to make useful math assistants?
- ▶ Intro talk: <https://slideslive.com/38899958/artificial-intelligence-and-theorem-proving>

Grant AI and Reasoning

- ▶ 3 work packages (WP1: Urban, WP2: Hanzalek, WP3: Marik)
- ▶ 2 national partners: VSB, ZCU (junior researchers)
- ▶ 2 international partners (junior researchers)
 - ▶ RU Nijmegen (prof. Geuvers)
 - ▶ U. of Innsbruck (dr. Kaliszyk)
- ▶ Senior Researchers: Zdenek Hanzalek, Mikolas Janota, Vladimir Kucera, Vladimir Marik, Miroslav Svitek
- ▶ WP1: AI in Automated Reasoning and Formal Verification
- ▶ WP2: Scheduling and Combinatorial Optimization
- ▶ WP3: Artificial Intelligence in Complex Systems and Big Data

WP1: AI in Automated Reasoning and Formal Verification

- ▶ Goal 1.1: AI and Theorem Proving and Conjecturing (Chvalovsky, Urban)
- ▶ Goal 1.2: New Algorithms for Satisfiability Modulo Theories (SMT) (Janota)
- ▶ Goal 1.3: Integration of Automated Theorem Provers (ATP) and SMT solvers (Janota, Urban)
- ▶ Goal 1.4: AI in Formalization and Auto-Formalization (Vyskocil, Urban)

WP2: Scheduling and Combinatorial Optimization

- ▶ Goal 2.1: Scheduling Algorithms for Time-triggered Systems (Hanzalek)
- ▶ Goal 2.2: Optimisation Algorithm for decision-making processes in Smart Cities (Svitek)

WP3: Artificial Intelligence in Complex Systems and Big Data

- ▶ Goal 3.1: Novel Methodology for Modelling Complex Systems
- ▶ Goal 3.2: Validation and Verification of Complex System Behaviour
- ▶ Goal 3.3: Semantic Knowledge in Complex Systems

Synergies

- ▶ SMT and ATP
- ▶ SMT and related applications in WP2 and WP3
- ▶ Collaboration on AI/reasoning methods in all WPs
- ▶ Linguistic processing
- ▶ Nijmegen, Innsbruck: formal verification, AI, reasoning
- ▶ and more – let's find out!