

Short-Term Scientific Mission Grant

- APPLICATION FORM¹ -

Action number: CA20111

Applicant name: Rishikesh Vaishnav

Details of the STSM

Title: Translating from Lean to Dedukti

Start and end date: 15/01/2024 to 21/01/2024

Goals of the STSM

Purpose and summary of the STSM.

(max.200 word)

The goal with this STSM is to collaborate with my host Sebastian Ullrich working remotely in Germany for [Lean FRO](#) (formerly at Karlsruhe Institute of Technology) on my tool for translating Lean proofs to Dedukti, lean2dk (<https://github.com/Deducteam/lean2dk/>). My work on lean2dk could benefit greatly from the perspective of a Lean expert such as Sebastian. Firstly, Sebastian could inform me with respect to some of the theoretical aspects of the translation from Lean, for example, in considering the important/edge cases of Lean's typing as well as its special constructs and reduction rules. Secondly, Sebastian could help me with the implementation itself (as lean2dk is implemented in Lean), especially with regard to the use of Lean's metaprogramming capabilities to make my code more readable and maintainable.

Working Plan

Description of the work to be carried out by the applicant.

(max.500 word)

I will introduce Sebastian to my work on this tool so far, and we will discuss ways in which the code can be improved, in particular considering the facilities that Lean provides in support of metaprogramming and building/testing Lean programs. We will then discuss some important aspect of Lean's type theory that I will have to consider when implementing my translation, for example the issues of quotient reduction, reduction rules for mutual and nested inductive types, proof irrelevance, and eta equivalence. Considering these issues, we will construct a library of test cases that cover some important and tricky cases of typing in Lean.

Expected outputs and contribution to the Action MoU objectives and deliverables.

Main expected results and their contribution to the progress towards the Action objectives (either research coordination and/or capacity building objectives) and deliverables.

(max.500 words)

Expected output: A refactored implementation of lean2dk with greater readability and maintainability, and a library of test cases for translation from Lean to Dedukti.

This STSM is in support of WG1: Tools on Proof Systems Interoperability.

Research Coordination Objectives:

1. Express new proof systems in the Dedukti logical framework.

Capacity Building Objectives:

1. Bring together members of the different communities working on proofs in Europe.

3. Create an excellent and inclusive network of researchers in Europe with lasting collaboration beyond the lifetime of the Action.

^[1] This form is part of the application for a grant to visit a host organisation located in a different country than the country of affiliation. It is submitted to the COST Action MC via e-COST. The Grant Awarding Coordinator coordinates the evaluation on behalf of the Action MC and informs the Grant Holder of the result of the evaluation for issuing the Grant Letter.