



ASTER

**SEEDS HackSciArt**

**SEED 11-IA**

## **RESEARCHERS**

Dr. Francisco Jesús Martín Mateos ([fjesus@us.es](mailto:fjesus@us.es))

Profesor de Ciencias de la Computación e Inteligencia Artificial

Puesto de trabajo: Formalización de matemáticas y razonamiento asistido por computador.

## **1. ESSENTIAL DIMENSION**

*(Objective descriptive information of the scientific seed)*

### **NAME**

“Formalization-of-knowledge”

### **KEYWORDS**

Automatic reasoning, formalization of mathematics

### **BRANCH**

Computer Science

### **ABSTRACT**

The formalization of mathematics is a field in which there is a lot of pending work, both to support the development of new results, as well as to verify existing ones and develop a base of knowledge of mathematical concepts. A future system that is capable of reasoning will need logical and mathematical foundations to support its reasoning.

### **METAPHOR**

A puzzle in which you have to decide how the pieces should be so that they fit correctly.

## PHASES OF THE USUAL SCIENTIFIC METHOD

1. Decide the language for formalization
2. Formalize the problem (hypothesis and conclusion)
3. Identify the reasoning process and adapt it to the system
4. Build the demo on the system

## TOOLS

An automatic reasoning system: ACL2, Isabelle, LEAN

## RESOURCES

- 1) Solution of the Robbins Problem  
<https://www.cs.unm.edu/~mccune/papers/robbins/jar.html>
- 2) Applying ACL2 to the Formalization of Algebraic Topology  
[https://link.springer.com/chapter/10.1007/978-3-642-22863-6\\_16](https://link.springer.com/chapter/10.1007/978-3-642-22863-6_16)



## 2. ADDITIONAL DIMENSIONS

*(The following sections add subjective information from the scientific seed, in order to inspire creatives in the creation of a SciArt work. Some of the sections may not have information if the researcher chose not to specify anything.)*

### SCIENTIFIC MOTIVATION

Mathematics is a field in which the level of formalization prevents misinterpretations. From a set of statements and following a reasoning mechanism, conclusions can be reached. But, what type of conclusions can be reached? Do they depend on the language used? Can they be obtained through automatic mechanisms? Can this type of system be creative? Assisted reasoning systems help develop the reasoning that allows us to reach conclusions from some statements.

I like the ability of language to express reasoning and the need to eliminate any type of ambiguity so that there are no misunderstandings. Logic and mathematical language are formal tools in which ambiguity has no place. In this way, the mathematical language is a form of universal communication that transcends countries, cultures and languages.

## **METAPHYSICS**

Human reasoning does not always follow logical rules. Could the day come when an automatic system, through formally defined reasoning systems, reaches conclusions that contradict human ones?

## **ETHICS**

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## **COLORS**

Turquoise, forest green, coral.

## **SOUNDS**

The Songs of Distant Earth by Mike Oldfield.

## **AROMAS**

Sea, herbal, wood.

## **FLAVORS**

Fruity, citric, sweet.