

# MECHANIX: SOFTWARE FOR SHAPE DRAWING AND PROGRAMMING

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In the current paper, a computer program was developed to teach the fundamentals of programming to learners interested in computer science. The strategy used is to let the learners draw their own paintings by writing algorithms. The program's environment allows the end user to import source codes, or alternatively, script files, that can be used to draw diverse shapes on a graphical container known as the canvas. In runtime, the drawing process is made possible by moving the brush, characterised by a kangaroo using its tail, around the canvas in accordance with the special commands specified in the compiled script file.

Under the hood, Mechanix consists of two proper key components: the Tian programming language and the Ciocchina virtual machine. Tian is a procedural programming language used to write importable source codes, and it features variables, functions, procedures, structure types, pointers, operator overloading, etc. The keywords specified in Tian's grammar are in Romanian, effectively making Mechanix targeted to the Romanian-speaking audience. The Ciocchina virtual machine acts as the bridge between Tian and the runtime. When importing a source code, it is processed for the absence of Tian-related errors (e.g., syntax errors). Afterwards, the generated syntax tree compiles into bytecode so it can be executed directly by the virtual machine at runtime.

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The scientific novelty of Mechanix is to implement functionalities that are not featured in its inspiration, Cangur. Cangur is educational software developed in 1998 [1], and is featured in a textbook for Moldovan secondary schools [2]. At the time, Cangur's internal programming language was insufficient to cover most of the programming fundamentals, as it supported only conditionals, procedures, and loops. The language used in Mechanix, Tian, is meant to solve the problem by inheriting most of the crucial language constructs featured in general-purpose programming languages such as C++, Pascal, and Python. Tian's rich grammar allows the learner to create full-blown scripts with the capability of drawing complex shapes, as opposed to "reinventing the wheel" in Cangur.

#### References:

1. Centre of New Informational Technologies. Concepts about algorithms. Interpreters, <https://pdfcoffee.com/notiuni-despre-algoritmi-pdf-free.html>, 2000. (In Romanian.)
2. A. Gremalschi et al. *Informatics. Textbook for the 8th grade*. Știința, Chișinău, 2020. (In Romanian.)