

Design and Development of Karel's Enhanced Computational Learning Platform

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Programming and computational thinking skills are essential to thrive in today's world. OECD PISA is developing a new platform for teaching and measuring important 21st century skills, for which we have developed a first application called Karel (see Figure 1) to teach and assess computational thinking. We have already run an international study with the application, which has shown promising results in helping learners develop these skills. We now need to further develop Karel to create a more versatile learning and assessment tool with broader and more interesting applications and programming problems. This tool will be used in schools around the world!

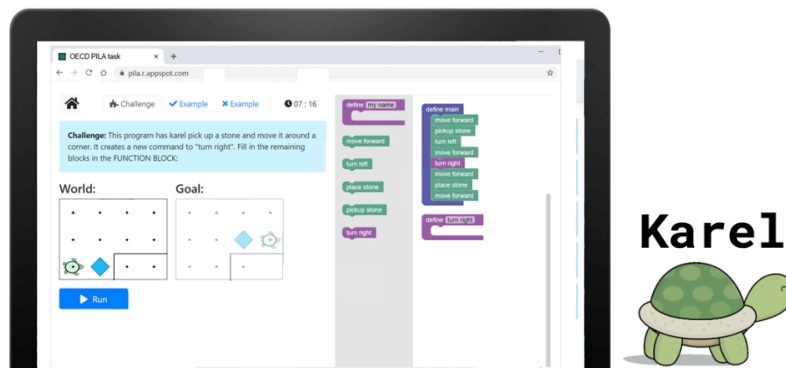


Figure 1: Example of one task with the current Karel

The student working on this project will be involved in the following tasks:

- Iteratively designing and developing the app in javascript (Vue.js) to expand upon the existing Karel app, with a focus on new functionalities and features, including:
 - Incorporating more diverse programming constructs and objects in the existing version of the Karel app.
 - Extending the Karel app to also support event-driven programming and multi-agent-based problem-solving. (Right now, students can only program one turtle moving through the environment without interacting with it once the program is running.)
- Developing a range of Learning activities to target the extended computational thinking skills.
- Time permitting, running user tests in workshops with multiple users.

This is a multidisciplinary and cutting-edge project that integrates CS and Learning Sciences, and has an international scope. You will be able to work with people with experience on similar projects for guidance and brainstorming. You will be given freedom in terms of proposing intuitive user interfaces, choosing the libraries, and designing the app. This is an ideal project for students interested in developing novel applications and user interfaces with real impact.

Helpful (but not mandatory) prerequisites for students:

- Good coding skills, ideally in javascript.
- Basic knowledge in app development (ideally Vue.js and web dev)
- A keen interest in education and a creative mindset.
- Proficiency in English, knowledge of French is a plus.