Determining Ari Velocity with an LLM Bot and Camera

Ozobot Editor Challenge—Teacher's Guide

Grades 9-12

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What Some Students Feel About AI

Oxford University Press recently published a study regarding the use of AI by students in schools in the United Kingdom. 2000 students aged 13-18 were surveyed in August 2025. 62% of students in the study indicated that AI is eroding their ability to study. Many feel that AI makes doing school homework too easy. Most importantly, some say that AI limits their creativity and prevents them from learning new technical skills. The full study, which is well worth reading, can be found at the following URL:

https://fdslive.oup.com/www.oup.com/oxed/secondary/Teaching_the_AI_Native_Generation.pdf

An Example Technical Problem and a Large Language Model's Solution

The problem quoted below appears in chapter 2 of the 12th Edition of a well-known Physics textbook by Cutnell and Johnson and published by Wiley.

> *Due to continental drift, the North American and European continents are drifting apart at an average rate of about 3 cm per year. At this speed, how long (in years) will it take for them to drift apart by another 1500 m (a little less than a mile)?*

Let's take a look at a typical *Open AI (Standard)* LLM response based on using the LLM block in the Ozobot Editor. It is shown in Figure 1. The response is correct, and the solution is clearly explained. But how will the student use the response? Will the student simply copy the response without trying to understand the solution, or will the student carefully study the response and learn something about the equation $t = d/v$. Hopefully the latter, but we can't be certain of this.

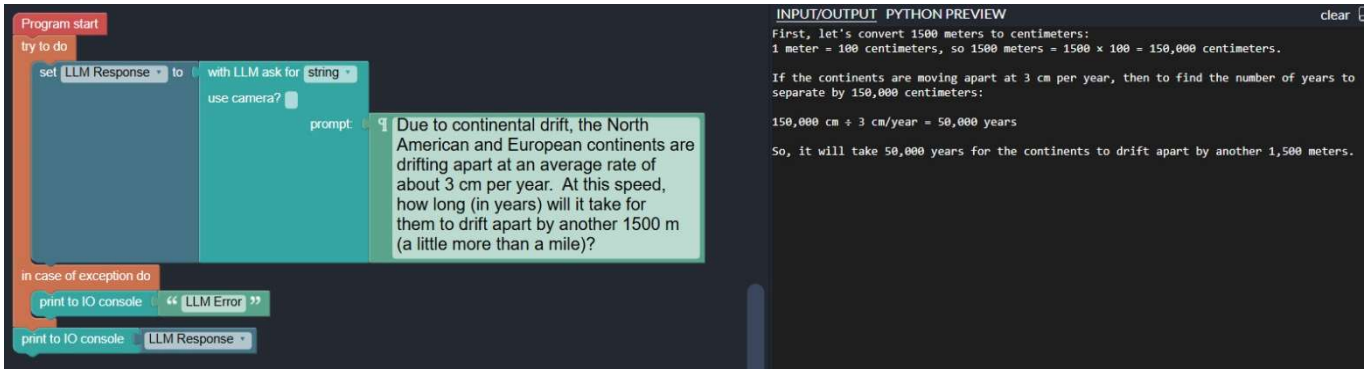


Figure 1

Time to Read the Student Guide

As a teacher interested in addressing the educational issues presented in the previous section of this Teacher Guide, it is important that you take the time to read the Student Guide if you have not already done so. The remainder of this Teacher Guide assumes that you have read the Student Guide and have a thorough understanding of the challenge facing the student.

Some Important Comments Regarding the Challenge

Task #1 *encourages students to be* ***creative***. Having the LLM study a photo to solve a problem is much more complicated than presenting a problem similar to the example technical problem discussed previously in the Teacher Guide. Students will likely have to try out several different iterations of a prompt before coming up with one that works well for all six of the photo pairs A, B, C, D, E, and F.

Task #2 encourages students to *learn new* ***technical skills***. The student is provided with an exercise in which artificial intelligence is used to drive software and physical systems, as per the Computer Science Teachers Association objective CSTA 3B-AP-08. The software requires the use of blockly coding in the Ozobot Editor and the physical system is Ari or Evo indicating velocity while moving on an Ozomap.

In conclusion, this challenge overcomes the two main disadvantages of AI that were pointed out in the Oxford University Press study. With this challenge, student creativity is actively encouraged and learning new technical skills is required.

A Prompt that Works for All Six Photo Pairs A, B, C, D, E, and F

Figure 2 shows the prompt that was used by the author along with the INPUT/OUTPUT region of the Ozobot Editor and the picture of the image (B) captured by the camera.

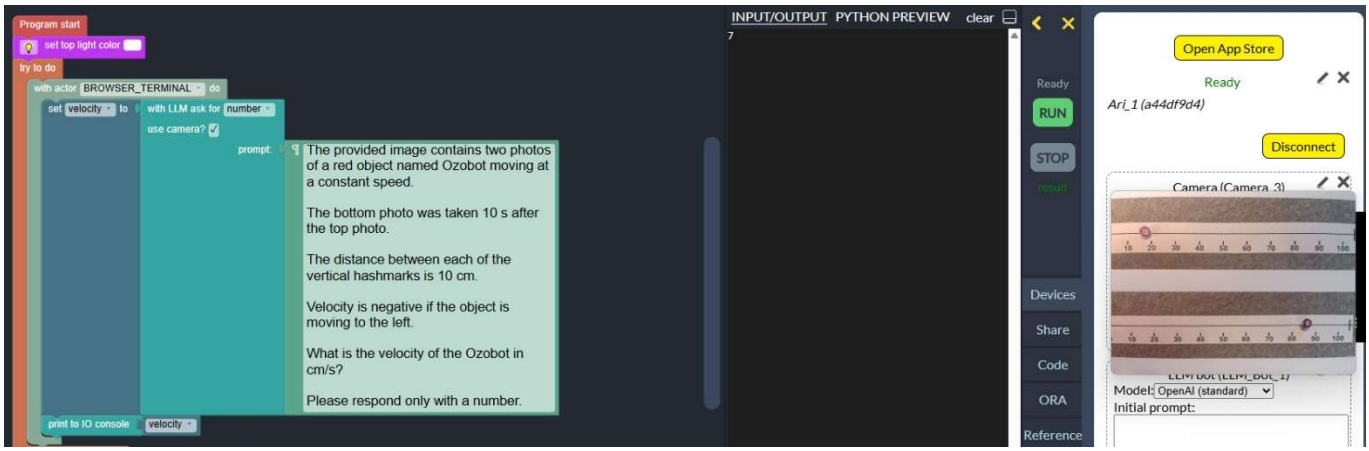
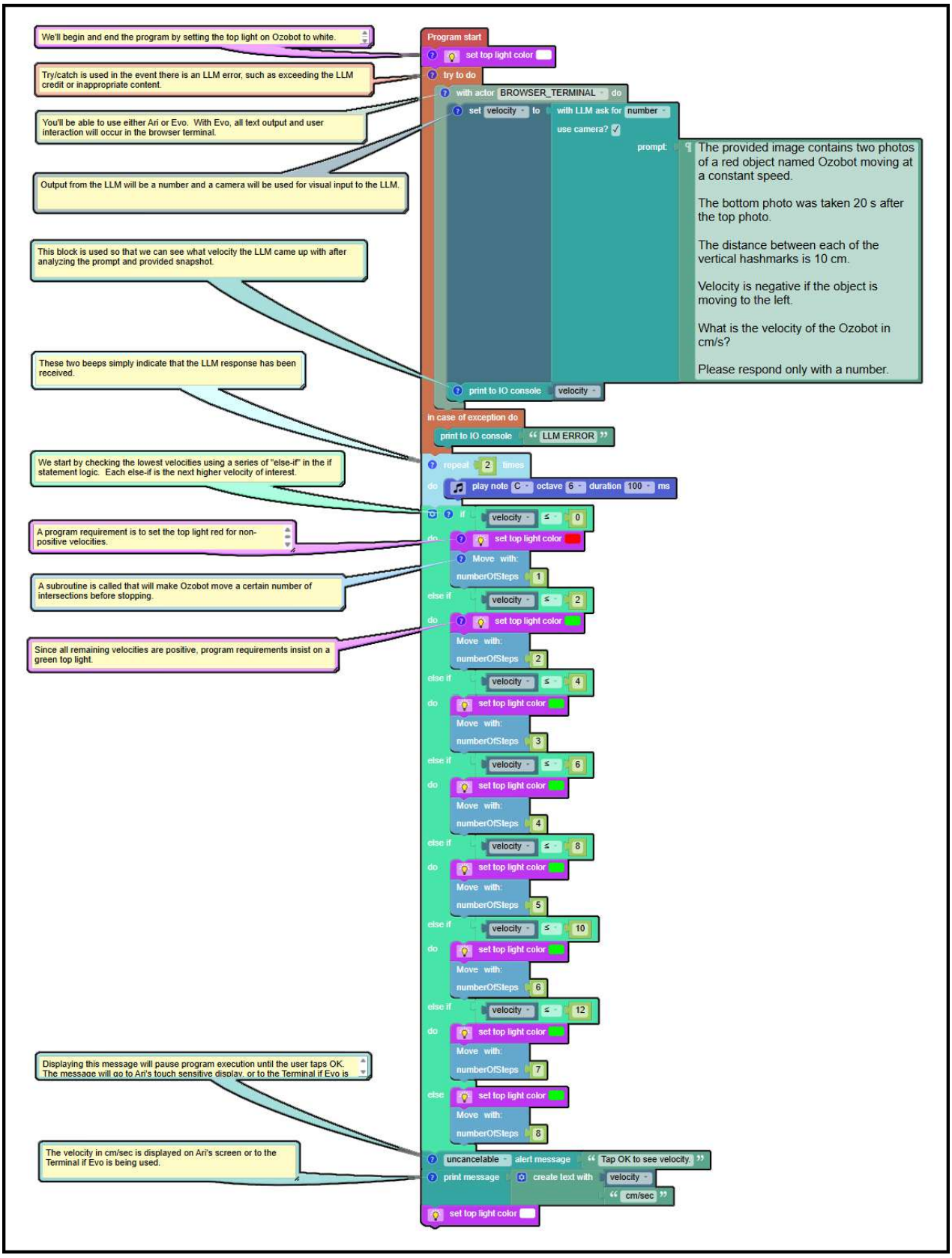
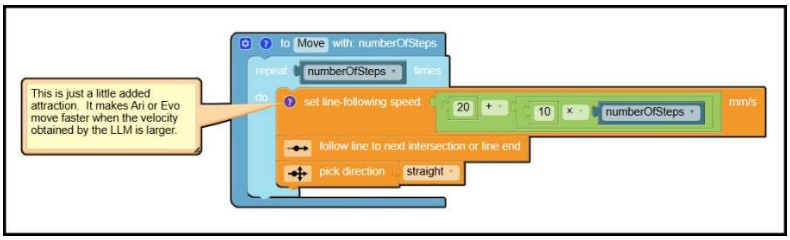


Figure 2

The actual line-following speed set for Air in this pair of images is 60mm/s or 6 cm/s. The value obtained by the LLM Bot and camera was 7 cm/s, as can be seen at the top of the INPUT/OUTPUT region. This is an error of about 17%. Possible sources of error include distortion of the camera's snapshot and possible blurriness in the captured snapshot. It is also important to remember to reset the time between photos in the prompt when a new image pair among A, B, C, D, E, and F is used.

A Possible Blockly Solution to the Challenge with Detailed Comments





The solution to this challenge involves the use of several computer science programming concepts:

- The use of variables to hold the values of program constants
- Subroutines to break up code into logical segments
- The use of loops to handle tasks that must be repeated several times
- The use of conditionals, as needed, to control the flow of logic
- Subroutine and variable names that support self-documentation
- Nesting of structures
- The use of LLM (Large Language Models)

Share Codes for the Blockly Solution to the Challenge

mzh3hea (without comments) **o5gvad3** (with comments)

Applicable CSTA (Computer Science Teachers Association) Standards

2-CS-02	Design projects that combine hardware and software components to collect and exchange data.
2-AP-11	Create clearly named variables that represent different data types and perform operations on their values.
2-AP-12	Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals.
2-AP-13	Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.
2-AP-19	Document programs in order to make them easier to follow, test, and debug.
3A-DA-11	Create interactive data visualizations using software tools to help others better understand real-world phenomena.
3A-AP-17	Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects.
3B-CS-02	Illustrate ways computing systems implement logic, input, and output through hardware components.
3B-AP-08	Describe how artificial intelligence drives many software and physical systems
3B-AP-14	Construct solutions to problems using student-created components, such as procedures, modules and/or objects