Using Open Technology to Bring Computational Thinking Activities to the Outdoors



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Computer Science

Motivation

- Learn-to-code movement in recent years
- Many resources for computational thinking
 - Unplugged activities
 - Commercial toys
 - Simple robotics
 - Complex robotics
 - Visual programming platforms
 - A mix of the above
- Young children learn in relation to their physical environment
- No related work to bring computational thinking to an outdoor setting



We propose: Computational Puzzles for Kids

https://cmps-people.ok.ubc.ca/bowenhui/hunt/landing.html



🚴 Computational Puzzles for Kids

What is this?

As part of the Computational Thinking for Kids initiative, Computational Puzzles for Kids is a semi-online scavenger hunt that brings learning about computational thinking to the outdoors!

This set of challenges is designed to lay the groundwork for various aspects of computational thinking, while also providing a great family outdoor activity in the process!

As a hunter, you'll be searching for hidden boxes in the real world that lead you to various online challenges.

How to play

Hunt in Person if you...

- . Want to enjoy a nice day out with the family.
- Love outdoors adventures.
- Have a QR code scanner on your smartphone.

Hunt Online if you...

- · Are short on time to participate.
- · Are not located in Kelowna, BC, Canada.



Interested? Join In!

Hunt in Person

Hunt Online

Developed by Opey Adeyemi and Dr. Bowen Hi

Gifs via G

Hunting In-Person



- Modeled after geocaching activity
- Make use of map, GPS, poetic hints

Puzzle 1 Colourful!

∂ Link to GPS Map

Cross the bridge to see the kokanee spawn, Head towards the stairs for the turtle pond, Stop and look around for a QR code, Hidden beneath where the wind might blow.



Hunting Online

• Direct access to the puzzles

🚴 Hunt Online

Instructions

Below is a map for an online scavenger hunt. Right now, the map has 3 puzzles for you to solve. By clicking on the puzzles below, you will be given more information about them and tasked with finding a solution!

When you've finished all of the puzzles, scroll to the bottom of the page and click "I'm all done!"

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Good luck!



This map is currently not clickable, but it might be in the future!

Puzzles

Puzzle 1 Colourful!								
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Puzzle 2								
Pathfinder!								
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								'n
Puzzle 3								
Routes!								
								J
I'm all done!								

Gifs via GIPHY Developed by Opey Adeyemi and Dr. Bowen Hui

Puzzle Structure





Example solution

Illustrative example



 Reformulation of traditional problem into multiple choice format



Puzzle #1: Colorful

- Based on the four-color theorem:
 - Any map in a plane can be colored using no more than four different colors such that no two neighboring regions have the same color



Incorrect! Orange touches orange and pink touches pink!



Perfect! This is a specially coloured image!



This is Zom.



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Good luck!

<u>Map</u>



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Puzzles

Puzzle 1 Colourful!					
Puzzle 2 Pathfinder!					
Puzzle 3 Routes!					

🔮 I'm all done!

Puzzle #2: Pathfinder

- Maze traversal:
 - Given a set of possible moves, find an exit or a path to a destination block



🚴 Hunt Online

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Puzzles

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Puzzle 1 Colourful!					
Puzzle 2 Pathfinder!					
Puzzle 3					

Routes!

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Gifs via GIPHY Developed by Opey Adeyemi and Dr. Bowen Hu

Puzzle #3: Routes

- Based on the shortest path problem:
 - Find the shortest path between two nodes in a weighted undirected graph



🚴 Hunt Online

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Good luck!

Map



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Puzzles

Puzzle 1 Colourful!					
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Puzzle 2 Pathfinder!					
Puzzle 3 Routes!					

V I'm all done!

Gifs via GIPHY Developed by Opey Adeyemi and Dr. Bowen

After Puzzle Completion

🚴 Congrats!

Hurray!

Nice work completing all of our puzzles! Here's a star just for you - 🗦

Thanks for Playing

We sincerely hope that you enjoyed our scavenger hunt! If you'd like to do more challenges like the ones in this hunt, let us know	and we'll link
you to more resources.	
Please make sure that all the QR codes are nicely hidden in the same spot when you are done so others can have fun hunting, to	0
Contact Us	
Let us know if we should continue these scavenger hunts, and feel free to provide any and all feedback you may have via email.	
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Feedback and Future Work



- Disseminated website as part of school district's Science Odyssey week in May 2021 and May 2022
 - Also some online visitors across Canada, U.S., South Korea, etc.
 - 150+ users (as of Jan. 2023)
- Challenges and future work
 - Difficulty in continued maintenance of QR codes in the park
 - Extend replay value of puzzles
 - More puzzles
 - Better integration of puzzles with physical environment
 - Detailed data collection of puzzles to evaluate engagement

