



---

# Empowering Robots for Smart Real-Time Decision Making

## Description

In 2018, Google DeepMind created a program called AlphaZero. This program learned to play chess, shogi, and Go by itself. Now, a team of researchers at Caltech has made a new algorithm for robots. This algorithm helps robots make the best movements as they move around in the real world.

Soon-Jo Chung, a professor at Caltech, explains that their algorithm looks at many possible movements. It uses simulations, which are like practice games for robots, to find the best moves. The researchers named their method Spectral Expansion Tree Search (SETS).

SETS is smart. It can help many different types of robots decide how to move without a designer telling them what to do. It uses math to find natural-looking movements that robots can make safely.

The researchers tested SETS with different robots. One test involved a drone that avoided obstacles while flying. Another test helped a vehicle navigate a narrow track. The last test involved two spacecraft working together.

A group of Caltech students is now using SETS to help an Indy car in a competition in Las Vegas. This work got support from different research agencies.

---

## Vocabulary List:

1. **Algorithm** /'ælgə,rɪðəm/ (noun): A process or set of rules to be followed in calculations or other problem-solving operations usually by a computer.
2. **Simulations** /,sɪmjʊ'leɪʃənz/ (noun): The act of imitating a situation or process for testing or training purposes.
3. **Navigate** /'nævɪ,geɪt/ (verb): To plan and direct the route or course of a vehicle or aircraft.
4. **Obstacles** /'ɒbstəklz/ (noun): Things that block one's way or prevent or hinder progress.
5. **Spectral** /'spektrəl/ (adjective): Of or relating to a spectrum; often used in mathematical and engineering contexts.
6. **Movements** /'mu:vmənts/ (noun): The act of changing physical location or position.

## Comprehension Questions

### Multiple Choice



- 
1. What is the name of the program created by Google DeepMind in 2018?
    - Option: AlphaBeta
    - Option: AlphaZero
    - Option: BetaGo
    - Option: MindPlay
  2. Which games did AlphaZero learn to play by itself?
    - Option: Chess, Checkers, and Reversi
    - Option: Chess, Shogi, and Go
    - Option: Scrabble, Poker, and Bridge
    - Option: Sudoku, Crossword, and Trivia
  3. What is the method developed by the researchers at Caltech for robots to make optimal movements?
    - Option: Spectral Expansion Tree Search (SETS)
    - Option: RoboSim Algorithm
    - Option: Caltech Movement Optimization (CMO)
    - Option: RobotIQ Method
  4. Who explained the algorithm SETS developed by Caltech researchers?
    - Option: Elon Musk
    - Option: Soon-Jo Chung
    - Option: Mark Zuckerberg
    - Option: Satya Nadella
  5. What type of robots can SETS assist in making movement decisions?
    - Option: Domestic robots only
    - Option: Robots with wheels only
    - Option: Robots with manipulator arms only
    - Option: Many different types of robots
  6. Which vehicle was involved in the test of the SETS algorithm for navigation?
    - Option: Submarine
    - Option: Rocket
    - Option: Drone
    - Option: Helicopter

**True-False**



7. AlphaZero was developed by a team of researchers at Caltech.
8. SETS uses simulations to help robots make optimal movements.
9. The researchers tested SETS with different types of robots, including vacuum cleaners.
10. Caltech students are using SETS to help an Indy car in a competition in New York.
11. The algorithm SETS was named after its lead developer at Caltech.
12. The SETS algorithm does not require any mathematical computations.

### Gap-Fill

13. Soon-Jo Chung is a professor at \_\_\_\_\_.
14. The researchers named their robot movement method as Spectral Expansion Tree Search ( \_\_\_\_\_ SET \_\_\_\_\_ ).
15. The testing of SETS involved a \_\_\_\_\_ that avoided obstacles while flying.
16. A group of Caltech students is using SETS to assist an Indy car in a competition in \_\_\_\_\_.
17. The SETS algorithm uses math to find natural-looking movements for robots to make \_\_\_\_\_.
18. The researchers tested SETS with different robots, one of which involved two \_\_\_\_\_ working together.

### Answer

**Multiple Choice:** 1. AlphaZero 2. Chess, Shogi, and Go 3. Spectral Expansion Tree Search (SETS) 4. Soon-Jo Chung 5. Many different types of robots 6. Drone

**True-False:** 7. False 8. True 9. False 10. False 11. False 12. False

**Gap-Fill:** 13. Caltech 14. SETS 15. drone 16. Las Vegas 17. safely 18. spacecraft



## Vocabulary quizzes

### Multiple Choice ( Select the Correct answer for each question. )

1. Who are individuals responsible for producing content or ideas?  
Option: Experts  
Option: Creators  
Option: Support  
Option: Findings
2. What is essential for improvement and progress based on reactions and comments?  
Option: Gather  
Option: Feedback  
Option: Atmosphere  
Option: Security
3. What process involves systematic investigation to establish facts or reach new conclusions?  
Option: Argued  
Option: Algorithm  
Option: Research  
Option: Simulations
4. Which type of compounds contain carbon and are typically found in living organisms?  
Option: Obstacles  
Option: Minerals  
Option: Sulfides  
Option: Organic
5. What term describes the linkage or relationship between two or more elements?  
Option: Findings  
Option: Connection  
Option: Understanding  
Option: Ban
6. What process involves the circulation of hot water through rock formations?



- Option: Sulfur
- Option: Hydrothermal
- Option: Methanol
- Option: Security

7. Which term implies that something is proposed or recommended as a course of action?

- Option: Support
- Option: Sulfur
- Option: Suggests
- Option: Available

8. What refers to measures taken to ensure safety and protection?

- Option: Inaugurated
- Option: Security
- Option: Support
- Option: Gather

9. What is a step-by-step procedure used to solve mathematical problems or complete tasks?

- Option: Navigate
- Option: Information
- Option: Sulfur
- Option: Algorithm

10. What pertains to the overall mood or feeling in a particular environment?

- Option: Movements
- Option: Obstacles
- Option: Atmosphere
- Option: Creators

**Gap-Fill ( Fill in the blanks with the correct word from the vocabulary list. )**

- 11. \_\_\_\_\_ are individuals with specialized knowledge or skills in a particular field.
- 12. \_\_\_\_\_ is assistance or encouragement provided to help someone or something.
- 13. A \_\_\_\_\_ is an official restriction prohibiting certain actions or behaviors.
- 14. The new facility was \_\_\_\_\_ last week with a ceremonial opening.
- 15. The artist's painting captured the fluid \_\_\_\_\_ of the dancers.
- 16. The research project concluded with unexpected \_\_\_\_\_ that challenged existing



theories.

17. Effective communication is key to building mutual \_\_\_\_\_ between individuals.
18. The panel \_\_\_\_\_ over the best approach to address the issue at hand.
19. The company's website provides detailed \_\_\_\_\_ about their products and services.
20. Pilots undergo extensive training using flight \_\_\_\_\_ to prepare for various scenarios.

**Matching Sentences ( Match each definition to the correct word from the vocabulary list. )**

21. The scientist used a spectrometer to analyze the composition of the light.
22. In the lab the researchers synthesized _____ to use as a solvent in the reaction.
23. The volcanic eruption released large amounts of dioxide into the atmosphere.
24. The geologist identified several valuable _____ in the rock samples collected.
25. The metallurgist studied the properties of different metal to optimize production.
26. The film credits acknowledged the _____ of the movie for their vision and artistry.
27. Before the meeting the team will all relevant data to prepare for discussions.
28. The mentor provided valuable advice and emotional _____ to the new employee.
29. The forensic investigation required the expertise of _____ to analyze the evidence.
30. Customer _____ is crucial for businesses to improve their products and services.

**Answer**

**Multiple Choice:** 1. Creators 2. Feedback 3. Research 4. Organic 5. Connection 6. Hydrothermal 7. Suggests 8. Security 9. Algorithm 10. Atmosphere

**Gap-Fill:** 11. Experts 12. Support 13. Ban 14. Inaugurated 15. Movements 16. Findings 17. Understanding 18. Argued 19. Information 20. Simulations

**Matching sentence:** 1. Spectral 2. Methanol 3. Sulfur 4. Minerals 5. Sulfides 6. Creators 7. Gather 8. Support 9. Experts 10. Feedback



---

**CATEGORY**

1. Sci/Tech - LEVEL1

**Date Created**

2024/12/05

**Author**

aimeeyoung99

ESL-NEWS.COM