



## Cover page

Project title: "Tinker Blocks"

Academic Year: 2024/2025

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Department Name: Computer Engineering

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Project Type Hardware

Supervisor Name: Dr. Ashraf Armoush

### Format:

- Single space, Times New Roman.
- 12 pt,
- Maximum 1 page.

### Abstract Body:

#### Items must be provided in the Abstract:

- Why do you think this project is important? Please explain the significance of this Project in brief.
- In your point of view what are the important aspects that should be covered in the project?
- Objective(s): In your view, please explain the main objectives of the project.
- project been done before? Are there any similar applications available today?
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- **Note:** Please deliver this abstract early to ensure that your Project has been approved by the department's projects committee. **Registration will not be done without this approval.**



Tinker Blocks is an educational tool designed to introduce children to programming concepts in an engaging and interactive way. By placing coding blocks (MOV, IF, LOOP) on a grid board, children create sequences that control a programmable car. A camera captures the grid's layout, and a Raspberry Pi processes the image, interprets the program, and executes the commands— allowing the car to move, turn, or draw. This hands-on approach helps children understand programming concepts like branches and loops while improving problem-solving skills.

The project includes three game modes: Race Mode, where children program the car to navigate a path efficiently; Shape Drawer, where they use a pen-equipped car to draw shapes and receive accuracy scores via machine learning; and Free Mode, which allows open-ended exploration. The car is equipped with sensors, encoders, and a servo-controlled pen for precise movement. An LCD screen provides real-time feedback and controls.

The development process combines hardware and software integration. Image processing detects block positions, microcontrollers handle motion, and machine learning assesses shape accuracy. Unlike Scratch or LEGO-based tools, which rely on digital interfaces or structured kits, Tinker Blocks provides a fully physical coding experience, bridging the gap between abstract programming and real-world execution. Children see their code directly translated into movement, offering a more intuitive and engaging way to learn programming.

Tinker Blocks makes coding accessible and fun by turning programming into a game, helping young learners develop logical thinking through interactive challenges.