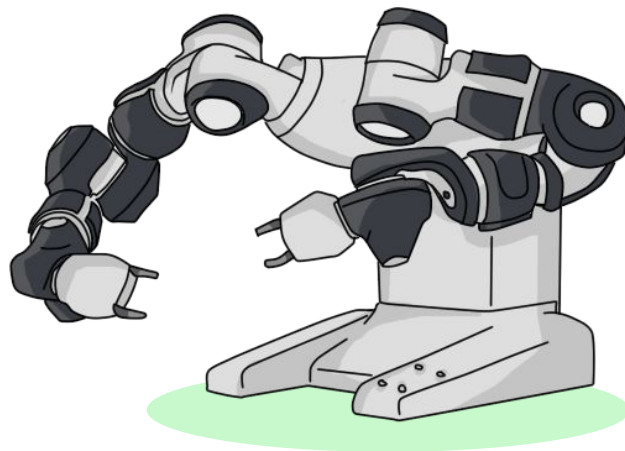


# Duplo

A programming language for two-armed robots



# Team

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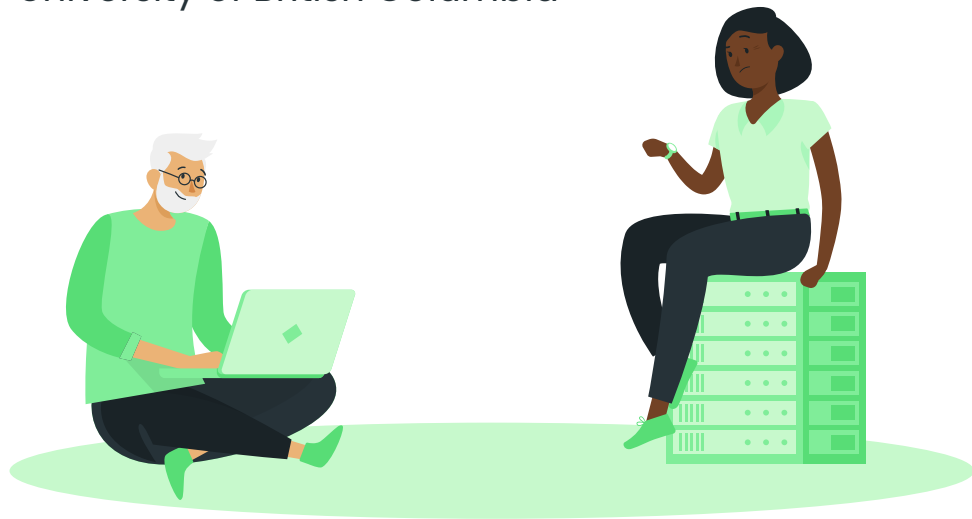
Undergraduate Student in C.S.  
Carnegie Mellon University

## Reid Holmes

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Ph.D. Student in C.S.  
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# Problem

- Novices cannot program two-armed robots
- Lack of visual parallel programming support
- They face difficult questions:
  - Can the arms move together?
  - Can the arms move separately?
  - Can one arm wait for the other?



# Solution

DUPLO – A block-based programming language designed for two-armed robots.

The screenshot displays the DUPLO programming environment, which is divided into two main sections: "Left Arm" and "Right Arm". On the left side, there is a vertical sidebar with a list of block categories: Move, Grip, Synchronize, and Loops. The "Left Arm" workspace contains a sequence of blocks: a green "When" block with a robot icon and the text "is pressed, robot does this:", followed by a yellow "Move arm quickly" block with a "to" dropdown, a blue "Open hand" block, a grey "Wait for each other" block, and another yellow "Move arm quickly" block with a "to" dropdown. The "Right Arm" workspace contains a green "When" block with a robot icon and the text "is pressed, robot does this:", followed by a yellow "Move arm quickly" block with a "[location]" dropdown, a grey "Wait for each other" block, and a yellow "Mirror other arm" block. At the bottom of the interface, there are two buttons: a blue "Save" button with a floppy disk icon and a green "Execute" button with a robot icon. A trash can icon is also visible in the bottom right corner of the workspace area.

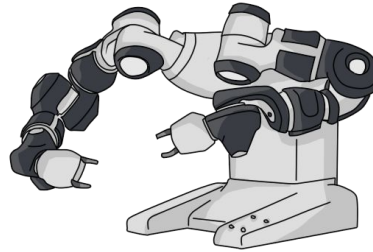
# Advantages

## Easy to program

Blocks are a proven method for beginners

## Separated

One program for each arm for clarity



**DUPLO**

## Intuitive

DUPLO's interface can be learned in minutes

## Coordinated

Coordination is handled via mirroring

# Competitors

Companies who attempt to create easy programming environments, such as:

- Franka Emika
- Rethink Robotics
- Universal Robots



## Why DUPLO is better:

Different from our competitors, we have a deep understanding of end-user programming and we perform in-depth field studies with different users.

# **Partners**

To make DUPLO the best solution, we have partners:

- The **Commonwealth Center for Advanced Manufacturing (CCAM)** is collaborating on our functional prototype;
- Students from the **Virginia Community College System (VCCS)** will evaluate our prototype in a future user study;
- The **Virginia Commonwealth University (VCU)** is providing funding and support for our project.



# Thanks!

Do you have any questions?  
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***We're open source!***

Visit our project on GitHub:  
<https://github.com/vcuse/duplo>