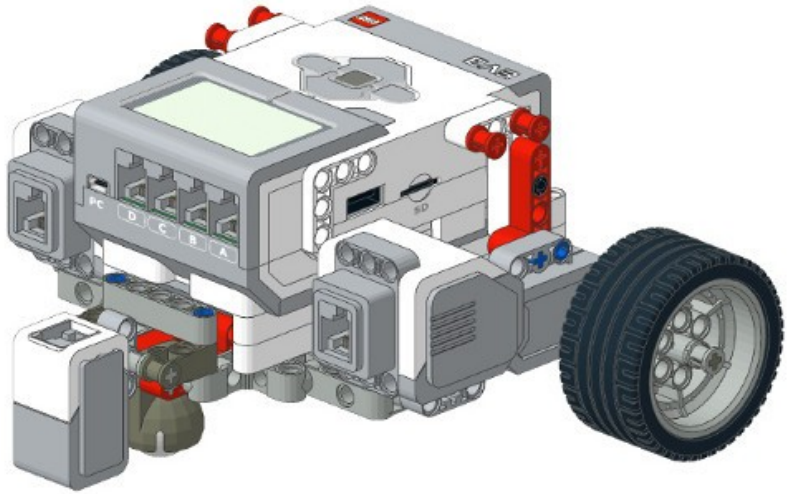
LEGO MINDSTORMS EV3

Mission Workflow



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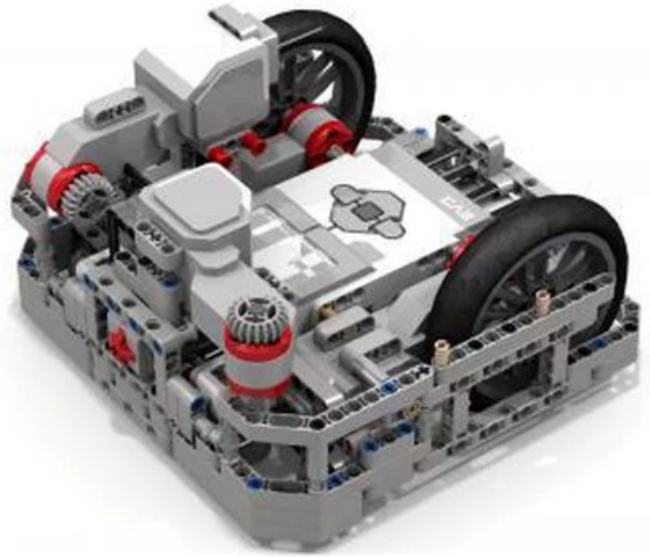
Mission Workflow

- Don’t jump straight into doing the mission!
- Follow these workflow instead…

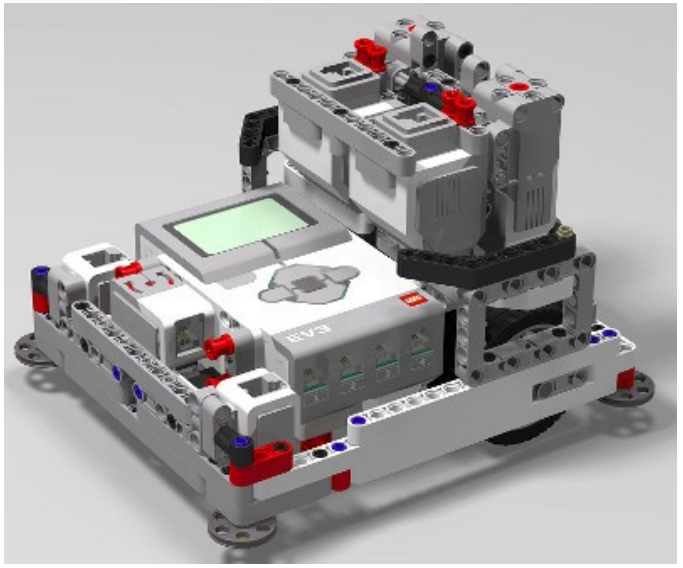
1) Build Robot Base
2) Plan Run Routes
3) Test Attachments
4) Prepare Detailed Plan
5) Program

1) Robot Base

- Follow the Robot Base guide
- Build your base robot
- Don’t add your attachments yet



Fllying Tortoise (David Luder)

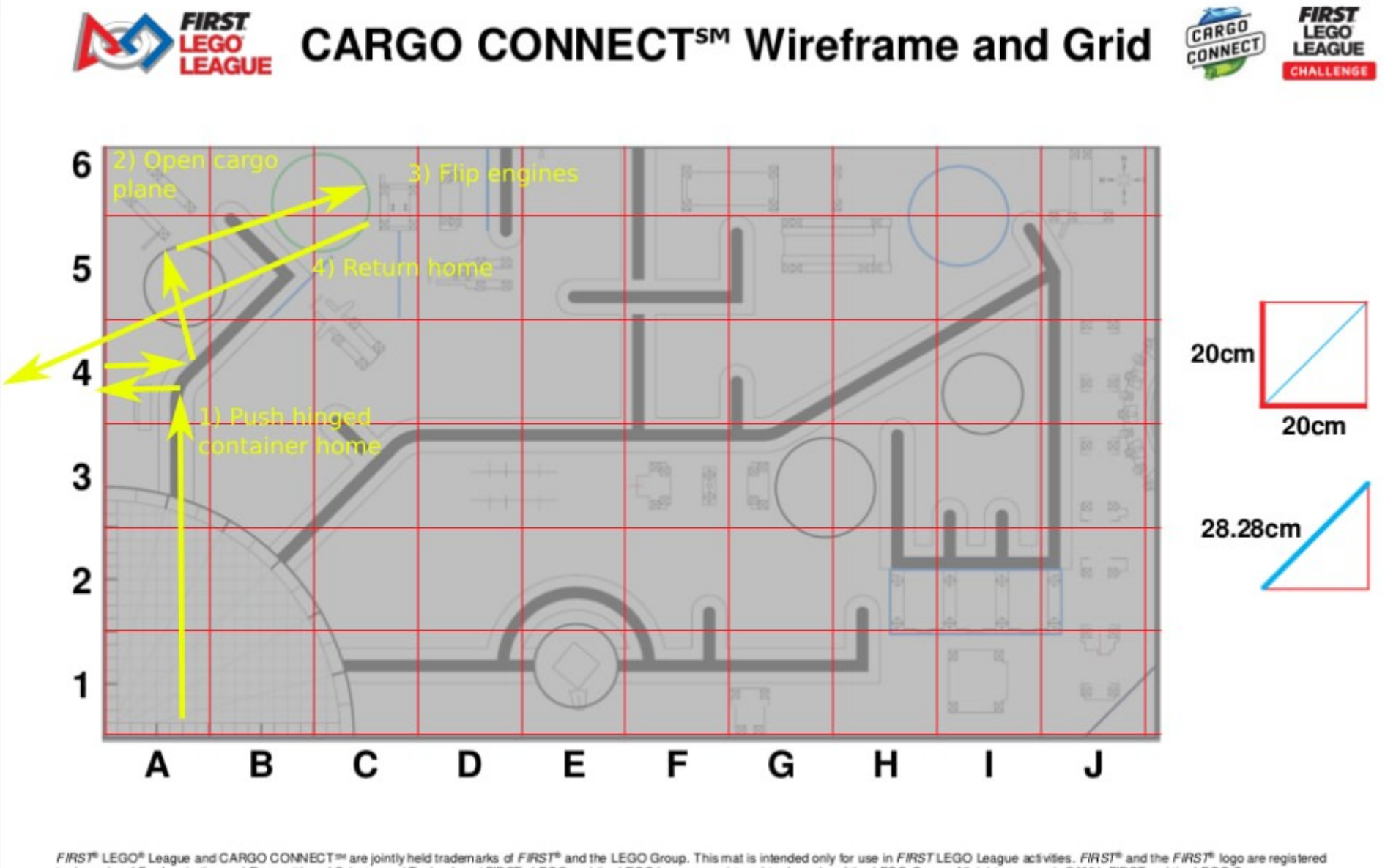


DroidBot Model C (Seshan Brothers)

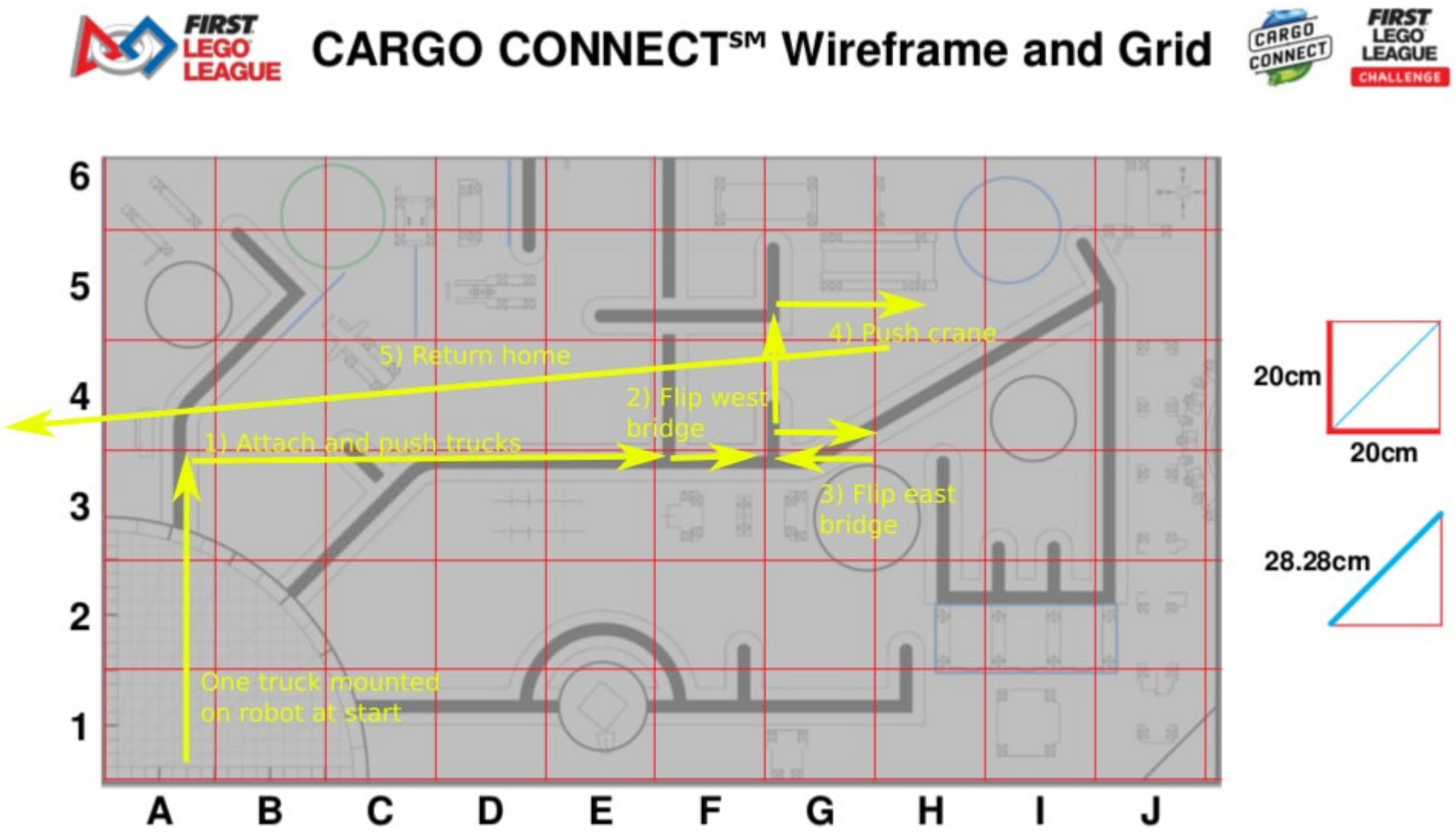
2) Plan Run Routes

- Move your robot by hand and plan out...
  - Which missions to do
  - Order of the missions
- Recommend to have 2 to 3 runs
- More runs if…
  - Runs are short
  - No attachment changes or fast attachment changes
- Sketch it out (...you can print and use the wireframe PDF for this)

2) Plan Run Routes



2) Plan Run Routes

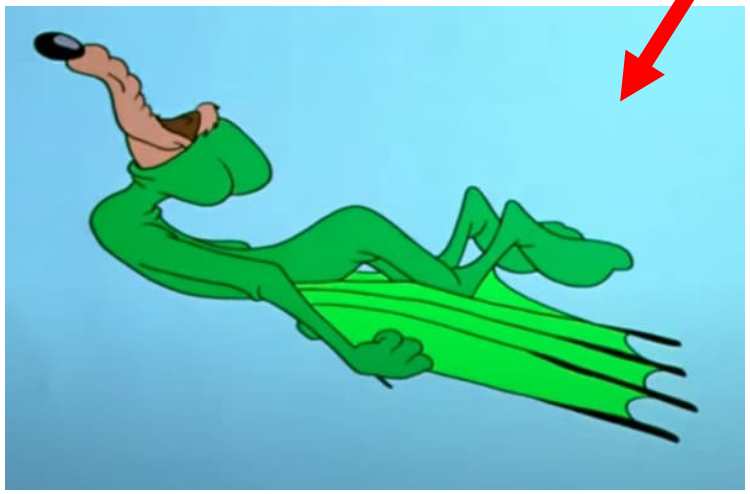


2) Plan Run Routes

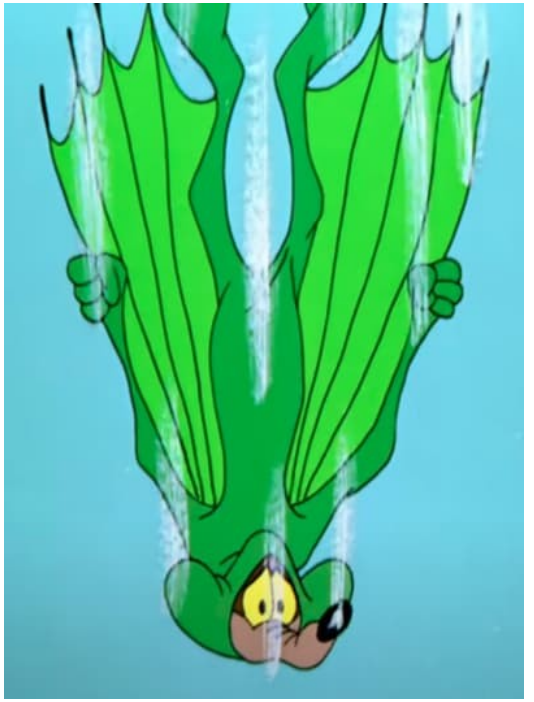
- Why Plan?
  - Decide what attachment(s) to use
    - You want to have one or a few attachments that can do many missions
  - Ensure correct order of mission because
    - Some missions may block others
    - Some missions depends on others to be completed first
  - Save time and maximize score

3) Test Attachments

Plan



What you expect



What you get

3) Test Attachments

- Attachments often do not work as you would expect
  - Not fast enough
  - Not strong enough
  - Can’t move far enough
  - Etc…
- Make sure they work before spending many hours programming your robot

3) Test Attachments

- How to test?
  - Build the attachment
  - Write a simple program to move attachment (...one line program)
  - Test it out on the mission model
  - Ideally attached to robot, but can do a first cut test without robot

4) Prepare Detailed Plan

- Move the robot by hand along planned route accurately
- Measure each move (...use a measuring tape)
- Write out the steps
  - Don’t need to do all, just 5 to 10 steps at a time

4) Prepare Detailed Plan

Route 1

1) Forward 45 cm
2) Spin turn left 90 degrees
3) Forward 10 cm
4) Reverse 10 cm
5) Spin turn right 90 degrees
6) Forward 32 cm
7) Left wheel pivot turn left 30 degrees
8) Lower arm

5) Program

- Program should resemble the plan

Plan	**Program**
Forward 45 cm	forward(45)
Back 10 cm	forward(-10)
Spin turn left 90 degrees	spin(-90)
Left wheel pivot turn right 30 degrees	left_pivot(30)

- If you don’t have the necessary functions, write it now

Tips

- Line following
  - Accurate when traveling long distances
  - Line following gives accurate position, but inaccurate rotation
  - Don’t go out of your way to follow every line, gyro often do well enough
- Gyro
  - If there are no suitable lines, use the gyro
  - Gyro gives accurate rotation, but increasingly inaccurate position the more it travels
- Moving without lines or gyro
  - Avoid as far as possible

Tips

- Alignment
  - Align to wall or to line
  - Look for opportunities to align within your route
  - Align close to target

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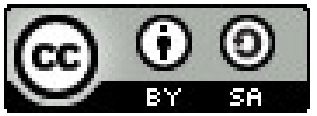

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