Workshop 2:
Conveyor & Sensor Integration

Follow this step-by-step guide during the session.

Step 1 – Understand the Goal

In this workshop, you will:

1. Pick an object from the slope.
2. Place it on the conveyor.
3. Start the conveyor.
4. Wait until the IR sensor detects the object.
5. Pick the object at the end stopper.
6. Place it back on the slope.

Step 2 – Test the Conveyor

1. In **NiryoStudio**, go to the **Equipment** tab.
2. Scan the tools.
3. Test the conveyor: run it forward, backward, and at different speeds.

Step 3 – Test the IR Sensor

1. Check the IR sensor mounted on the conveyor.
2. In NiryoStudio, open **Inputs/Outputs** and monitor **DI5**.
    - DI5 = HIGH → no object detected.
    - DI5 = LOW → object detected.
3. Place an object in front of the sensor to see the change.

Step 4 – Start a New Blockly Program

1. In NiryoStudio, create a **new Blockly program**.
2. Clear the workspace so it’s empty.

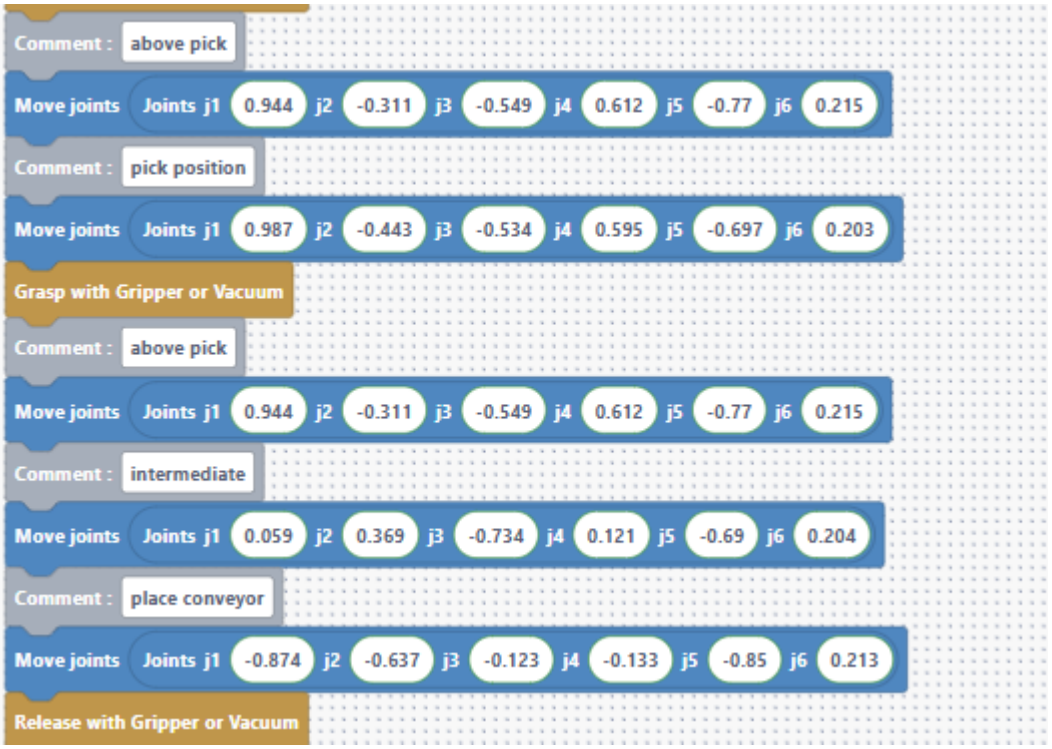
Step 5 – Pick and Place from Slope to Conveyor

1. Using **FreeMotion**, move the robot and press **Save** for these positions:
    - Above the object (bottom of slope)
    - On the object (grasp position)
    - Copy-paste the “above object” position (for lifting)
    - Intermediate high position (safe path)

- Above the conveyor (start position)

2. Add **Grasp** after the “on the object” position.

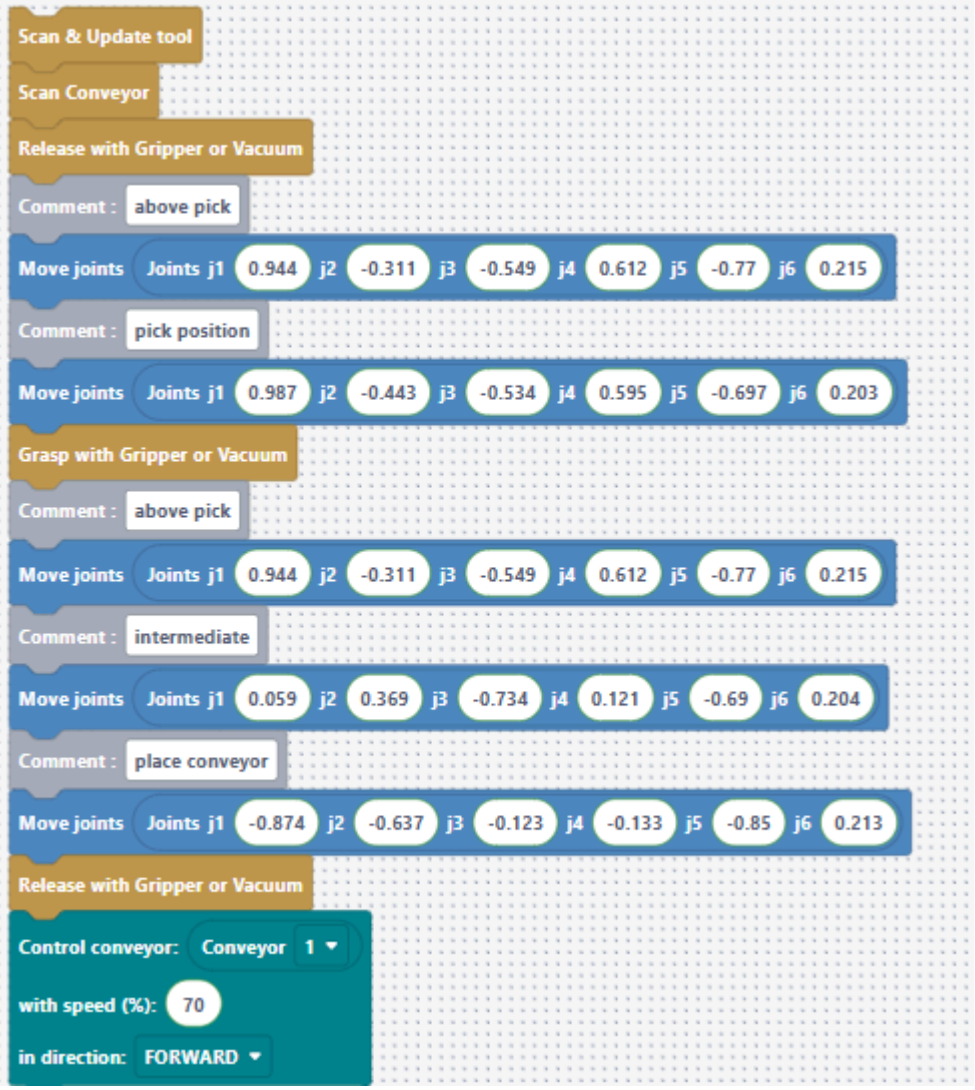
3. Add **Release** after the “above conveyor” position.



Step 6 – Add Conveyor Control

1. At the very start of the program, add:
    - **Release** block (ensure gripper starts open)
    - **Scan & Update Tool** block
    - **Scan Conveyor** block
2. After the release above the conveyor, add a block to:
    - Start the conveyor in the correct direction.

- Set a moderate speed.



Step 7 – Test the Program So Far

1. Run the program.
2. The robot should:
    - Pick the object from the slope
    - Place it on the conveyor
    - Start the conveyor
3. Stop the conveyor manually from the **Equipment tab** when done.

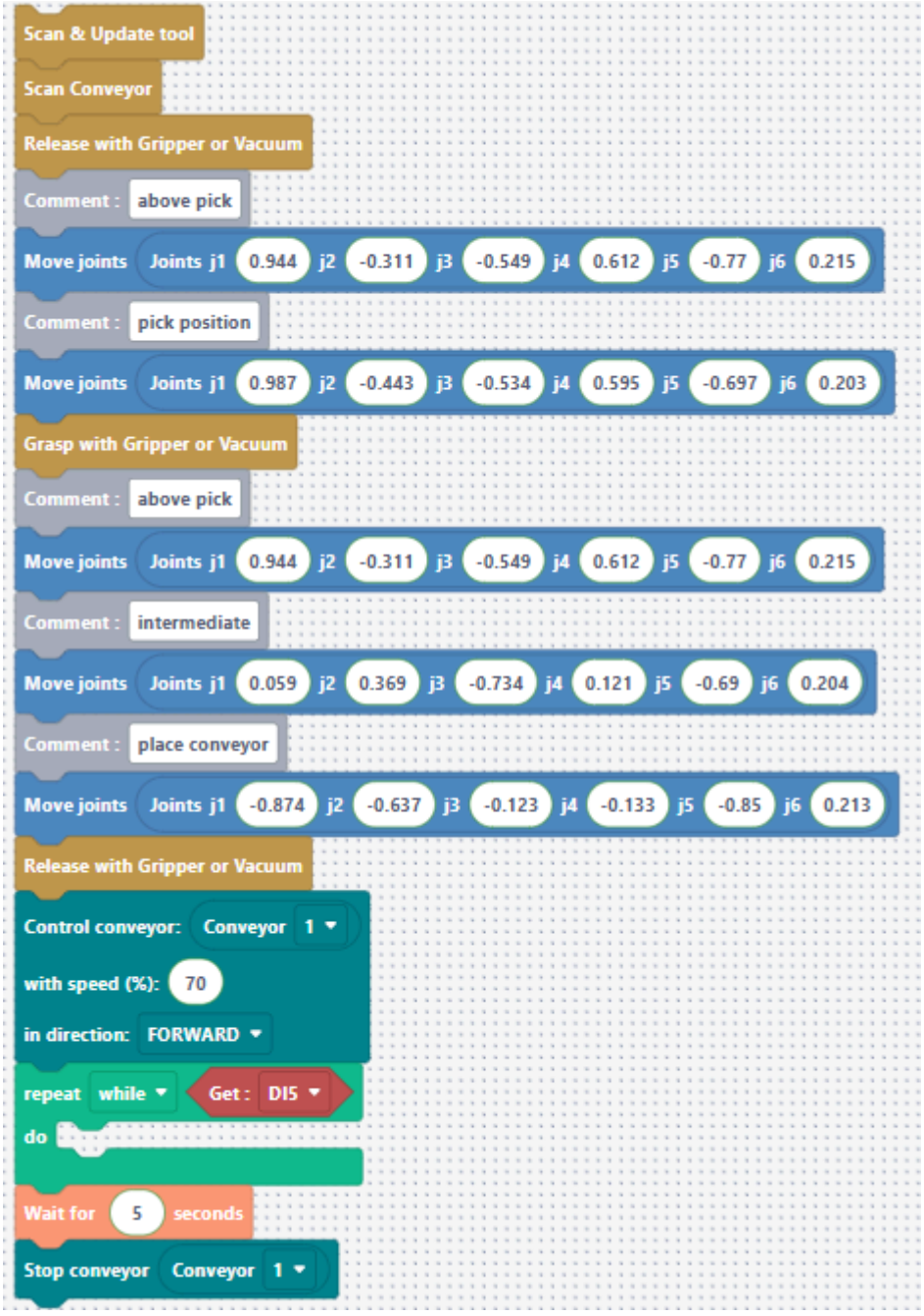
Step 8 – Add Sensor Logic to Stop the Conveyor

1. Add a **While** loop:
    - Condition: **While DI5 is HIGH** → keep conveyor on.
2. After the loop:
    - Stop the conveyor.

Step 9 – Adjust for End Stopper

1. Add a **short delay** after the IR sensor detects the object.

2. This ensures the token rolls to the end stopper for consistent pickup.

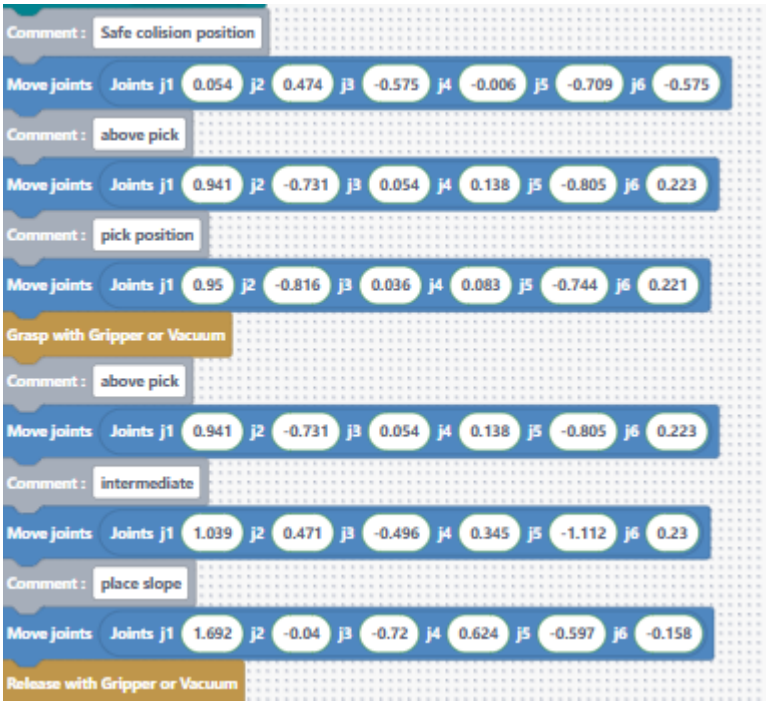


Step 10 – Pick and Place from Conveyor Back to Slope

1. Using **FreeMotion**, save positions:
    - Intermediate safe position
    - Above object at end stopper

- On the object (grasp)
- Above object again
- Intermediate safe position
- Above slope placement

2. Add **Grasp** when on the object.
3. Add **Release** at the slope placement.



Step 11 – Run the Full Program

1. Run the program.
2. The sequence should be:
   - Pick from slope
   - Place on conveyor
   - Conveyor stops at sensor detection
   - Pick from end stopper

- Place back on slope

Step 12 – Loop the Program

1. Wrap the entire program inside a **While True** loop.
2. Add a **safe collision position** at the start of the loop.
3. Run the program — it will now repeat until you stop it manually.


Scan & Update tool
Scan Conveyor
Release with Gripper or Vacuum
repeat while true
do
Comment : Safe collision position
Move joints Joints j1 0.054 j2 0.474 j3 -0.575 j4 -0.006 j5 -0.709 j6 -0.575
Comment : above pick dope
Move joints Joints j1 0.944 j2 -0.311 j3 -0.549 j4 0.612 j5 -0.77 j6 0.215
Comment : pick dope
Move joints Joints j1 0.987 j2 -0.442 j3 -0.534 j4 0.595 j5 -0.697 j6 0.202
Grasp with Gripper or Vacuum
Comment : above pick dope
Move joints Joints j1 0.944 j2 -0.311 j3 -0.549 j4 0.612 j5 -0.77 j6 0.215
Comment : intermediate
Move joints Joints j1 0.059 j2 0.368 j3 -0.734 j4 0.121 j5 -0.69 j6 0.204
Comment : place conveyor
Move joints Joints j1 -0.874 j2 -0.637 j3 -0.123 j4 -0.133 j5 -0.85 j6 0.213
Release with Gripper or Vacuum
Control conveyor: Conveyor 1
with speed (%): 70
in direction: FORWARD
repeat while Get : DI5
do
Wait for 5 seconds
Stop conveyor Conveyor 1
Comment : Safe collision position
Move joints Joints j1 0.054 j2 0.474 j3 -0.575 j4 -0.006 j5 -0.709 j6 -0.575
Comment : above pick
Move joints Joints j1 0.941 j2 -0.721 j3 0.054 j4 0.136 j5 -0.885 j6 0.222
Comment : pick position
Move joints Joints j1 0.95 j2 -0.916 j3 0.836 j4 0.083 j5 -0.744 j6 0.221
Grasp with Gripper or Vacuum
Comment : above pick
Move joints Joints j1 0.941 j2 -0.721 j3 0.054 j4 0.136 j5 -0.885 j6 0.222
Comment : intermediate
Move joints Joints j1 1.039 j2 0.471 j3 -0.496 j4 0.345 j5 -1.112 j6 0.23
Comment : place dope
Move joints Joints j1 1.682 j2 -0.04 j3 -0.72 j4 0.624 j5 -0.597 j6 -0.158
Release with Gripper or Vacuum