

# Vision-and-Language Navigation: Interpreting visually-grounded navigation instructions in real environments

## SUPPLEMENTARY MATERIALS

<p>Go past the ovens and the counter and wait just before you go outside.</p> <p>Walk through the kitchen towards the living room. Walk around the island and step onto the patio near the two chairs and stop in the patio doorway.</p> <p>Exit the kitchen by walking past the ovens and then head right, stopping just at the doorway leading to the patio outside.</p>
<p>Go up the last few stairs and turn right. Go up the next two flights of stairs and wait.</p> <p>Walk up the rest of the stairs, then continue up the next set of stairs. Stop at the top of the stairs near the potted plant.</p> <p>Go up the stairs then turn right and go up the other stairs on the right then turn right and go up the other stairs on the right and stop at the top of the stairs.</p>
<p>Walk until your in the next room. Make a right into the room on the right. Stop in front of the water heater.</p> <p>Go across the room opposite the brown door, make a sharp right turn, and take a step into the laundry room and stop.</p> <p>Exit the room. Turn right and then right again into the room next door. Wait there.</p>
<p>Turn right and enter the bedroom. Cross the bedroom and turn right and stop at the door leading out of the bedroom.</p> <p>From shower room enter bedroom, walk across bedroom to hall and stop at window.</p> <p>Exit the bathroom toward the bedroom. Exit the bedroom using the door on the right.</p>
<p>Turn around a the blackboard, make a left at the water fountain and head through the doorframe. Angle left and move straight, keeping the table with the white tablecloth on your left side. Make a slight right and walk straight, waiting at the bottom of the stairwell.</p> <p>Walk towards the water dispenser and exit the doorway to the left. Walk straight left of the white circular table and towards the wooden staircase.</p> <p>Walk out of the bathroom, turn left, and wait at the bottom of the stairs.</p>
<p>Walk toward the bed. When you get to the bed. Turn right and exit the room. Continue straight and enter the room straight ahead. Wait near the sink.</p> <p>Turn to the left and enter the bedroom. Once inside, turn right and walk straight ahead and stop when you enter the bathroom.</p> <p>Exit the bathroom, then turn left. Wait in the office next to the desk.</p>
<p>Turn around and go up the stairs, turn right and go to right again towards the front door.</p> <p>Make your way up to the steps and then pull a hard right followed by another hard right after three steps. then continue until you've reached the first open door and stop.</p> <p>Walk up the stairs and turn hard right. Stop in the bathroom doorway on the left.</p>
<p>Turn and enter the living room area. Go past the table and sofas and stop in the foyer in front of the front door.</p> <p>Turn around and exit the room. Walk around the sofa and enter the hallway. Wait by the side table.</p> <p>Exit the room through the doorway nearest you, and continue into the adjacent room, exiting the room via the exit to your left.</p>
<p>Turn right towards kitchen. Go into hallway and walk into dining room.</p> <p>walk through the archway with the thermostat on the wall. Walk toward the piano and stop just before it.</p> <p>Turn toward the kitchen, and walk through the doorway to the right of the breakfast bar. Walk down the hall, passing the bathroom on your right side as you walk. Walk straight and stop when you get to the piano.</p>

Table 1. Examples of randomly selected R2R navigation instructions. Each cell contains three instructions associated with the same path.



Figure 1. Snapshot of the visual diversity in the Matterport3D dataset, illustrating one randomly selected panoramic viewpoint per scene.



Instructions: Give A Smart Robot Directions (Click to collapse)

You will see a series of panoramic photos taken while moving from a **start location** to a **goal location** in a building. **Your task is to write directions so that a smart robot can find the goal location after starting from the same start location.** The robot understands language and recognizes objects about as well as a typical person. However, you should assume that the robot is visiting this building for the first time.

For your reference, the path to the goal is indicated by color-coded markers (**green** for start, **red** for goal, and **blue** for intermediate markers).

- You won't see the **green** start marker at the beginning - because it's under your feet.
- You may not see the **red** goal marker until you move (often the goal is in the next room).
- **These markers are not visible to the robot**, and should not be mentioned in your directions.

Good directions will ensure that the robot arrives **within a few metres** of the red goal marker. Therefore, we suggest:

- **NEW! Spelling and punctuation is important.** Please use full sentences with punctuation (,) and correct spelling.
- **Focus on the goal, not the path.** It's not necessary for the robot to follow the exact path indicated by the markers.
- **Try to mention objects or landmarks.** This is clearer than saying 'turn slight left' or 'go forward'.

Mouse Controls:

1. **Left-click and drag the panoramic image** to look around.
2. **Right-click on a color-coded marker** to move to that position.
3. **Press the 'Play / Replay' button** at any time to watch a 15-20 second animated fly-through from the start to the goal.

Before you start, [please watch this short training video](#). It contains examples that will help you complete these tasks efficiently.

**Note: This task is not suitable for devices with small screens or touch screen devices.** Recommended browsers are Chrome, Firefox and Safari (not Internet Explorer).

These tasks relate to academic research conducted by Peter Anderson through the [Australian Centre for Robotic Vision](#), Brisbane, Australia. We estimate that on average each HIT to take around 1-1.5 minutes to complete. Please send your queries and feedback to [bringmeaspoon@gmail.com](mailto:bringmeaspoon@gmail.com). We will be continually releasing more HITs for this task.



Left-click and drag the panoramic image to start.  
Instructions have been updated from the first batch  
(please re-read).

Play / Replay

Write your Directions here (with correct spelling and punctuation):

Submit

Figure 2. AMT data collection interface for the R2R navigation dataset. Here, blue markers can be seen indicating the trajectory to the goal location. However, in many cases the worker must first look around (pan and tilt) to find the markers. Clicking on a marker moves the camera to that location. Workers can also watch a 'fly-through' of the complete trajectory by clicking the Play / Replay button.