

Survey Questions

Thank you for your time today!

This 5-10 minute survey is part of a research study conducted by Ph.D. student Daniella Tola at Aarhus University in collaboration with Distinguished Professor Peter Corke at Queensland University of Technology.

The goal of this study is to gain insight in the extent of use of ([Unified Robot Description Format URDF files](#)) in robotics and identify current challenges/barriers in their use.

Since the data collection is anonymous, *once you participate in the study, it is not possible to withdraw your participation and remove your data.*

Would you like to continue?

[Yes/No]

If you have questions pertaining to your rights as a research participant; or to report concerns about this study, you should contact the Legal advisors at Aarhus University. Email: legal@au.dk.

We would like to thank Dr. Christopher Timperley at Carnegie Mellon University for allowing us to adapt the introduction and demographic questions from an earlier survey he conducted on simulation for testing of robots.

Procedures

You will be asked to fill out a short survey describing your experiences with URDF files and simulation for robotics, and asking for your perspective.

Participant Requirements

Participation in this study is limited to individuals aged 18 and older. You are being invited to participate because we believe you have worked with robotics in some capacity.

Risks

The risks and discomfort associated with participation in this study are no greater than those ordinarily encountered in daily life or during other online activities. We will only store and work with the results in an anonymized manner.

Benefits

There is no personal benefit from your participation in this study, other than the possibility to get early access results from the study.

Compensation & Costs

There is no monetary compensation for participation in this study. There will be no cost to you if you participate in this study.

Future Use of Information

In the future, we may use the data for our future research studies, or we may distribute the data to other researchers for their research studies. We would do this without getting additional informed consent from you (or your legally authorized representative). Sharing of data with other researchers will only be done in such a manner that you will not be identified.

Right to Ask Questions & Contact Information

If you have any questions about this study, you should feel free to ask them by contacting Daniella Tola, Department of Electrical and Computer Engineering, Aarhus University, Denmark. Phone: (removed), email: dt@ece.au.dk. If you have questions later or desire additional information please contact Daniella Tola by phone or e-mail in accordance with the contact information listed above.

Voluntary Participation

Your participation in this research is voluntary. You may discontinue participation at any time during the research activity. You may print a copy of this consent form for your records. **By opting to continue below, I confirm that I am age 18 or older; that I have read and understand the information above; and that I do want to participate in this research and continue with the survey.**

Demographic Questions:

1. For how long have you used simulation tool(s) to simulate a robot and/or used URDF files? **[barrier question.] [Radio buttons]**
 - a. Less than 1 year.
 - b. Between 1 and 5 years.
 - c. Between 6 and 10 years.
 - d. More than 10 years.
 - e. Never **[Terminate survey.]**
2. In which of these types of environments have you used simulation tool(s) to simulate a robot and/or used URDF files? **[Checkboxes]**
 - a. Academia.
 - b. Industry.
 - c. Government.
 - d. Unaffiliated groups (e.g., Open Source Robotics Foundation, a drone hobbyist group, a school club.)
 - e. Individual. **(Skip to Survey questions.)**
 - f. Other.
3. **(If not only answered 'Individual' to question 2.)** If you have used simulation tool(s) to simulate a robot and/or used URDF files at any organization, how large was the most recent organization? **[Radio buttons]**
 - a. 1-10

- b. 11-50
- c. 51-100
- d. 100+
- e. I haven't used simulation tool(s) to simulate a robot and/or used URDF files at an organization **(Show only if answered 'Other' to question 2.)**

Survey Questions:

1. If you have simulated a robot before, when was the last time you did this? **[Radio Buttons]**
 - a. In the last month.
 - b. In the last year.
 - c. In the last 5 years.
 - d. More than 5 years ago.
 - e. I have not simulated a robot before.
 - i. Why not? **[Radio Buttons]** **(Continue to question 3.)**
 1. Not applicable
 2. Too difficult
 3. Other **[Textbox]**
2. If you have simulated a robot with 3D visualizations, which tools have you used to do this? **[Checkboxes]**
 - a. CoppeliaSim (formerly V-Rep)
 - b. FlexSim
 - c. Gazebo
 - d. MATLAB/MathWorks
 - e. Peter Corke's Robotics Toolbox for MATLAB or Python
 - f. RoboDK
 - g. RViz
 - h. Unity
 - i. Unreal Engine
 - j. Visual Components
 - k. Webots
 - l. Custom simulator
 - m. Other **[Optional text box]**
 - n. I have not simulated a robot with 3D visualizations.
 - i. Why not? **[Radio Buttons]**
 1. Not applicable
 2. Too difficult
 3. Other **[Textbox]**
3. Have you heard of (Unified Robot Description Format) URDF before? **[Radio Buttons]**
 - a. Yes. **(Continue with normal path.)**

- b. No. **[Terminate survey.]**
- 4. **(If answered YES to 3)** If you have used URDFs before, for how long have you been using them? **[Radio Buttons]**
 - a. Less than 1 year.
 - b. Between 1 and 5 years.
 - c. Between 6 and 10 years.
 - d. More than 10 years.
 - e. I have not used URDFs before. **(Continue to question 17)**
 - i. Why not? **[Radio Buttons]**
 - 1. Not applicable
 - 2. Too difficult
 - 3. Other **[Textbox]**
- 5. When was the last time you used a URDF? **[Radio Buttons]**
 - a. In the last month.
 - b. In the last year.
 - c. In the last 5 years.
 - d. More than 5 years ago.
- 6. How experienced do you feel you are with URDFs? **[Radio Buttons]**
 - a. Beginner
 - b. Intermediate
 - c. Expert
- 7. In which application domains have you used URDFs? **[Checkboxes]**
 - a. Agriculture
 - b. Cleaning
 - c. Defense
 - d. Manufacturing
 - e. Marine
 - f. Medical
 - g. Transportation
 - h. Other: _____. **[Textbox, optional]**
- 8. Which manufacturers of robots or end effectors have you used URDFs of? **[Checkboxes]**
 - a. ABB
 - b. Boston Dynamics
 - c. Clearpath Robotics
 - d. Fanuc
 - e. Franka Emika
 - f. Kinova Robotics
 - g. Kuka
 - h. Robotiq
 - i. Universal Robots
 - j. Willow Garage
 - k. Yaskawa Motoman Robotics
 - l. Others **[Textbox]**

9. Which types of robots have you used URDFs of? **[Checkboxes]**
- a. Robotic arm (single arm)
 - b. Dual arm robot
 - c. Delta robot
 - d. Humanoid robot
 - e. Mobile robot
 - f. Quadrupedal robot
 - g. End effectors
 - h. Drone
 - i. Other **[Textbox]**
10. How have you used URDFs? **[Radio Buttons]**
- a. Always in combination with ROS.
 - b. Always in combination with ROS, but would prefer not to require ROS.
 - c. Without ROS.
11. Are you aware of any of the following or other tools for creating URDFs? **[Checkboxes]**
- a. Fusion2URDF
 - b. OnShape to URDF exporter
 - c. Phobos (Blender extension)
 - d. PTC Creo to URDF exporter
 - e. Solidworks URDF exporter
 - f. xacro
 - g. Other **[Textbox]**
12. **(Only if 'xacro' answered in 11)** Have you ever used the tool 'xacro' to generate URDFs? **[Radio Buttons]**
- a. Yes.
 - b. No.
13. Have you ever used URDF models (xml file + meshes) with geometrical meshes of the robot (i.e., not just boxes or cylinders, etc.)? **[Radio Buttons]**
- a. Yes.
 - b. No. **(Skip to 17)**
14. **(Only if answered Yes to 13)** How did you obtain the URDF model? Please mention the specific tools. **[Checkboxes]**
- a. From simulation tool **[Textbox]**
 - b. From CAD tool **[Textbox]**
 - c. From ROS package **[Textbox]**
 - d. From website of the robot manufacturer **[Textbox]**
 - e. Developed the URDF by hand **[Textbox]**
 - f. Other **[Textbox]**
15. **(Only if answered Yes to 13)** If you have earlier created/modified a URDF model, what level of difficulty would you rate the process? **[Radio Buttons]**
- a. Easy
 - b. Medium
 - c. Difficult
 - d. Don't know **(Skip to question 17.)**

- e. I have not created/modified URDF models before. **(Skip to question 17.)**
16. **(Only if answered 'easy', 'medium' or 'difficult' to question 15.)** What would you say is the most painful part of creating/modifying a URDF model? (Optional) **[Open-ended textbox]**
17. Have you faced any challenges or limitations with URDFs? **[Checkboxes]**
- a. Incorrect forward kinematics.
 - b. Difficulty importing the URDF into simulation tool.
 - c. Difficulty creating a URDF.
 - d. Difficulty adding end effector model to robotic arm model.
 - e. Could not find a URDF with the specific version of the robot I want to simulate.
 - f. Limitation in URDF did not allow creating model of robot with parallel linkages.
 - g. Other **[Textbox]**
18. Are there any improvements you would like for URDF? **[Checkboxes]**
- a. A versioned standard, i.e., URDF v1.0, URDF v1.1, ... etc.
 - b. Easier methods or tools to create URDFs
 - c. Better tools for combining and manipulating URDFs
 - d. Better tools for validating URDFs
 - e. Standardized metadata like originator, date, version, etc.
 - f. Better documentation
 - g. Other **[Textbox]**
19. Do you think that URDF will be more commonly used in the future? Please justify if possible. **[Radio Buttons]**
- a. Yes. **[Textbox]**
 - b. No. **[Textbox]**
 - c. Don't know. **[Textbox]**
20. **(Survey terminates here.)** Thank you for taking the time to respond to this questionnaire. We appreciate your input. If you would like to receive a copy of any research papers or results drawn from this study or if you would allow us to contact you via email if we have further questions, please enter your email address (Optional): **[CharField]**
- The email address will be saved in a secure database on SurveyXact until December 2023.
21. If you have any comments or questions about this study, or would like to provide more feedback on URDFs, please let us know: **[open-ended Textbox]**
- a. If you have additional comments or questions after you have completed this study, please contact dt@ece.au.dk