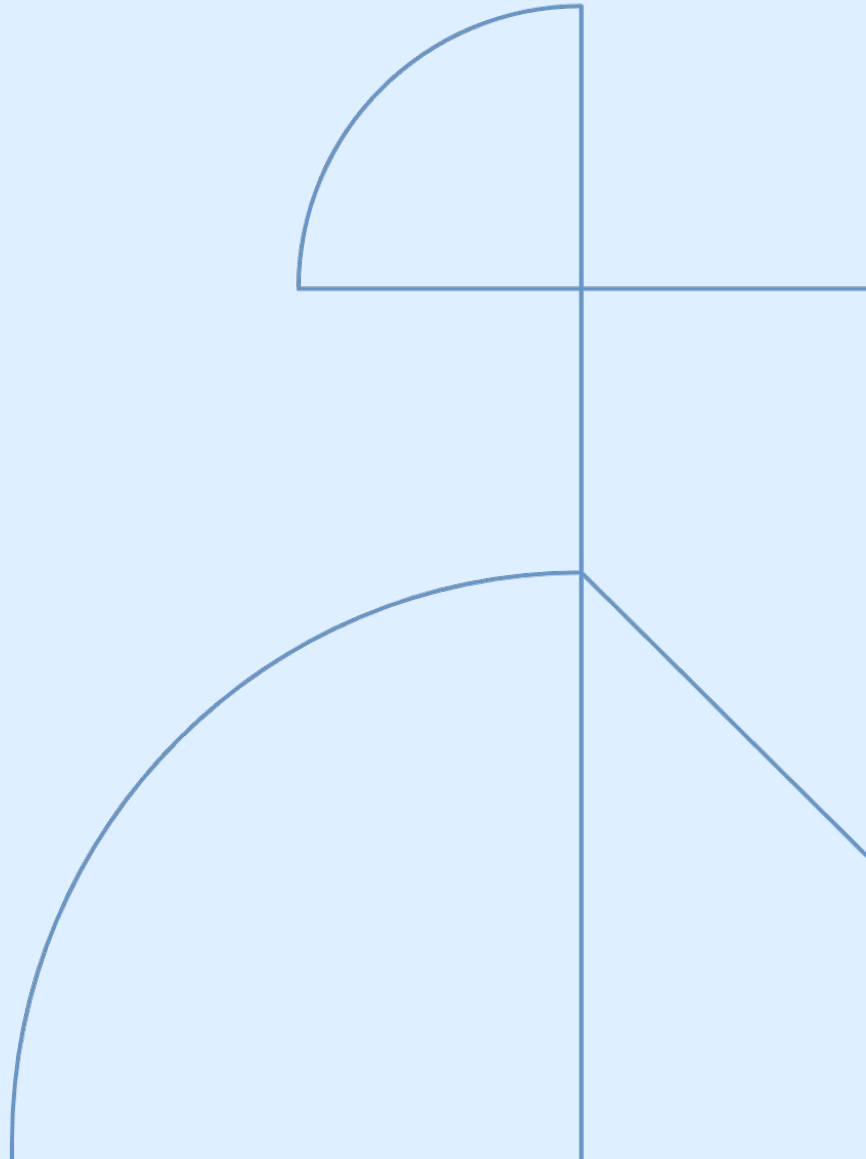
DD2419 Project Course in Robotics and Autonomous Systems

Lecture 2: TF, etc

TF



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What is a transform?

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- Timestamp

TF Buffer

- Stores known frames and transforms between them
- If we take a look at the constructor:
  - tf2_ros.buffer.Buffer(cache_time=None)
    - cache_time is how long transforms should be stored in the buffer. Default is 10 seconds
- Note that the buffer needs some time before it has received the transforms
  - If you call buffer.can_transform(...) right after you have constructed the buffer or transform it will not be able to retrieve it

TF Buffer Different Methods

- can_transform(target_frame: str, source_frame: str, time: Time, timeout: Duration = Duration())
  - Check if it is possible to transform between two frames
- lookup_transform(target_frame: str, source_frame: str, time: Time, timeout: Duration = Duration())
  - Get a transform between two frames
- do_transform_point(point: PointStamped, transform: TransformStamped)
  - Apply a transform to a point
- do_transform_vector3(vector3: Vector3Stamped, transform: TransformStamped)
  - Apply a transform to a Vector3
- do_transform_pose(pose: Pose, transform: TransformStamped)
  - Apply a transform to a Pose
- do_transform_pose_stamped(pose: PoseStamped, transform: TransformStamped)
  - Apply a transform to a Pose

- https://github.com/ros2/geometry2/blob/humble/tf2_ros_py/tf2_ros/buffer.py
- https://github.com/ros2/geometry2/blob/humble/tf2_geometry_msgs/src/tf2_geometry_msgs/tf2_geometry_msgs.py

Timestamp

```
stamp = self.get_clock().now()

buffer.can_transform("camera_link", "map", stamp)
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- It not, this will fail most of the times
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  - For this to succeed, either
    1. the broadcasting of the dynamic transform has to happen between the two lines
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timeout = rclpy.duration.Duration(seconds=0.5)

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- Now it will wait up to timeout number of seconds for the transform to be available at time stamp

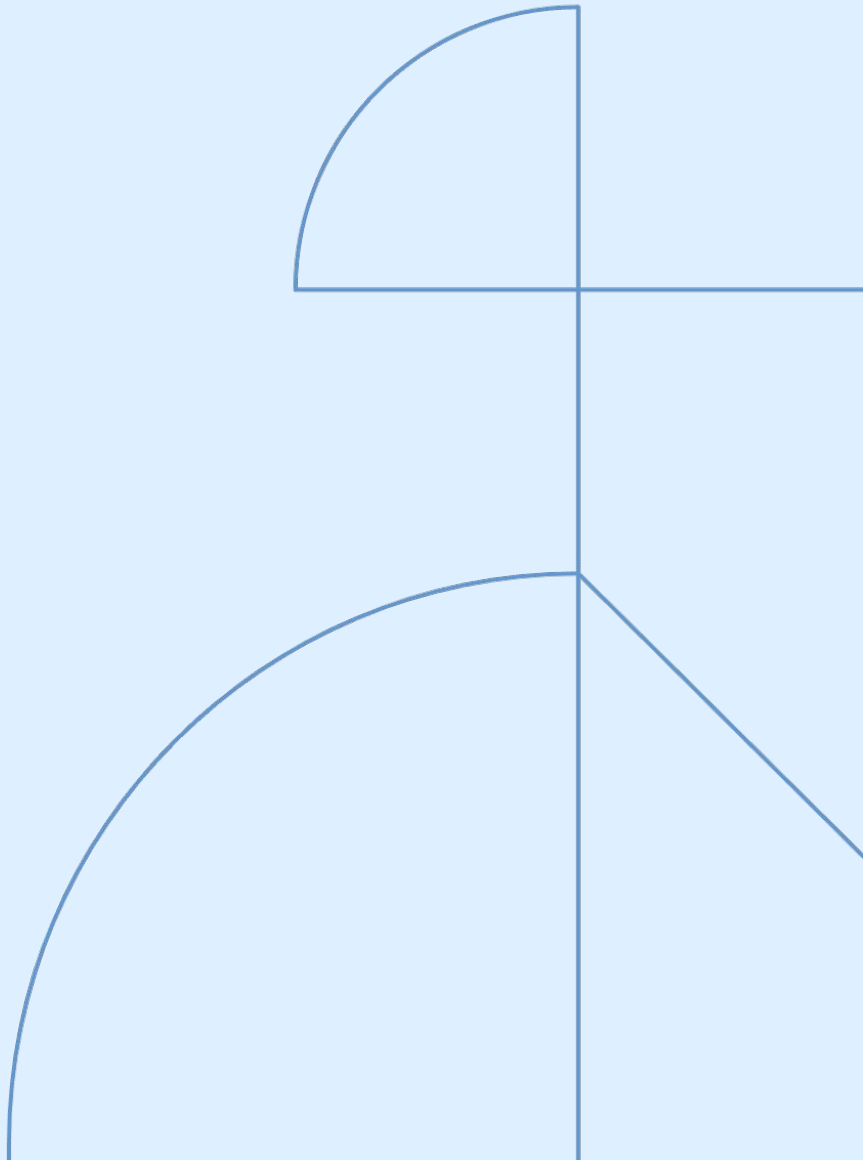
Always Include a Timestamp!

- If you do not include a timestamp when you broadcast a dynamic transform it is impossible to know at which time the transform is valid
  - It can be seen as a static transform in this case, since the timestamp is 0 if you do not set it
- This will cause a lot of problems for you after a while

Different Times

- self.get_clock().now()
  - Current time
- rclpy.time.Time() == rclpy.time.Time(seconds=0)
  - Input this into transform functions to get latest **available** transform
- *message*.header.stamp
  - Use the stamp of another message if it is important that you get the transform at that specific time

ROS Environment



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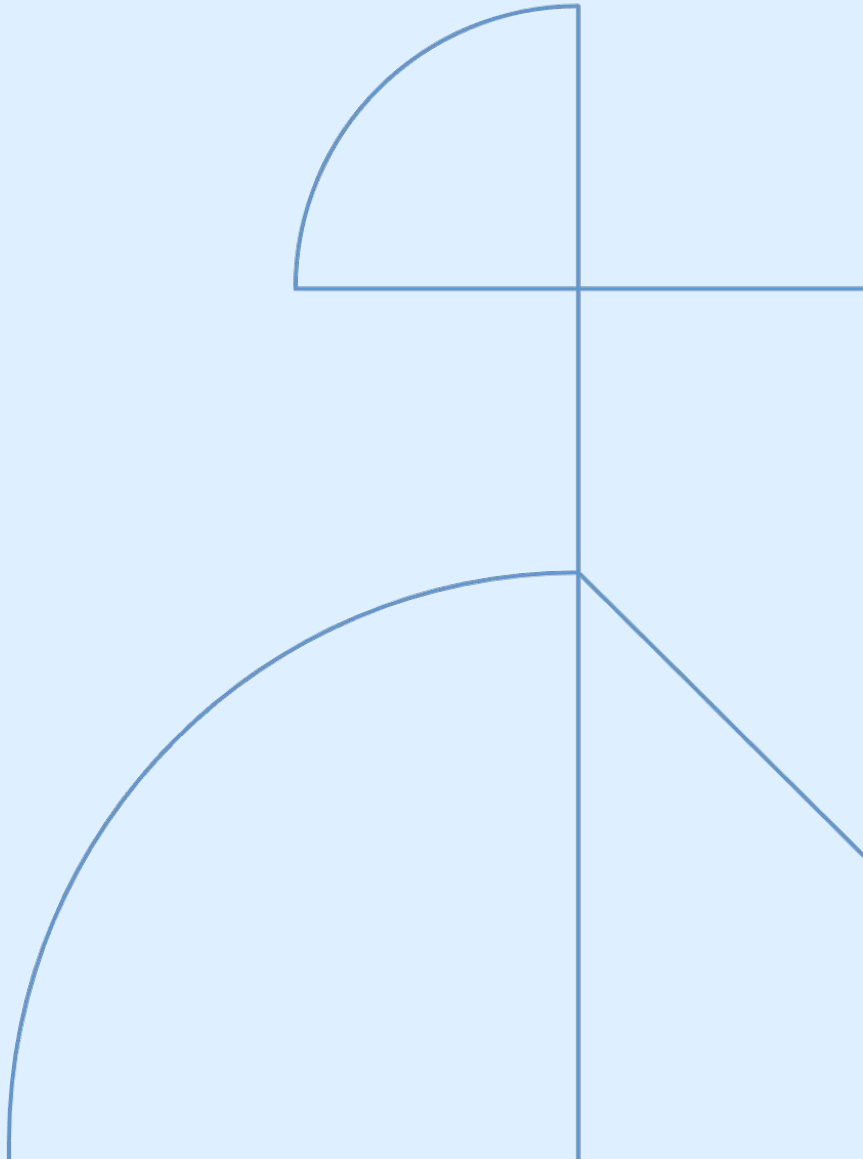
Probably during boot camp as well if you are in A:235

Etc



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Test cases:

- add_plus_2(1, 1) == 4
- add_plus_2(2, 1) == 5
- add_plus_2(3, 1) == 6