Problem 1: What topics are available?

```
/battery_state
/camera_relay/camera_info
/camera_relay/image/compressed
/clicked_point
/cmd_vel
/cmd_vel_rc100
/detector/objects
/diagnostics
/firmware_version
/imu
/initialpose
/joint_states
/magnetic_field
/map
/map_metadata
/motor_power
/move_base_simple/goal
/odom
/raspicam_node/camera_info
/raspicam_node/image/compressed
/raspicam_node/image_raw
/raspicam_node/parameter_descriptions
/raspicam_node/parameter_updates
/reset
/rosout
/rosout_agg
/scan
/sensor_state
/sound
/tf
/tf_static
/turtlebot3_slam_gmapping/entropy
/velodyne_nodelet_manager/bond
/velodyne_nodelet_manager_cloud/parameter_descriptions
/velodyne_nodelet_manager_cloud/parameter_updates
/velodyne_nodelet_manager_driver/parameter_descriptions
/velodyne_nodelet_manager_driver/parameter_updates
/velodyne_nodelet_manager_laserscan/parameter_descriptions
/velodyne_nodelet_manager_laserscan/parameter_updates
/velodyne_packets
/velodyne_points
```

Problem 2:
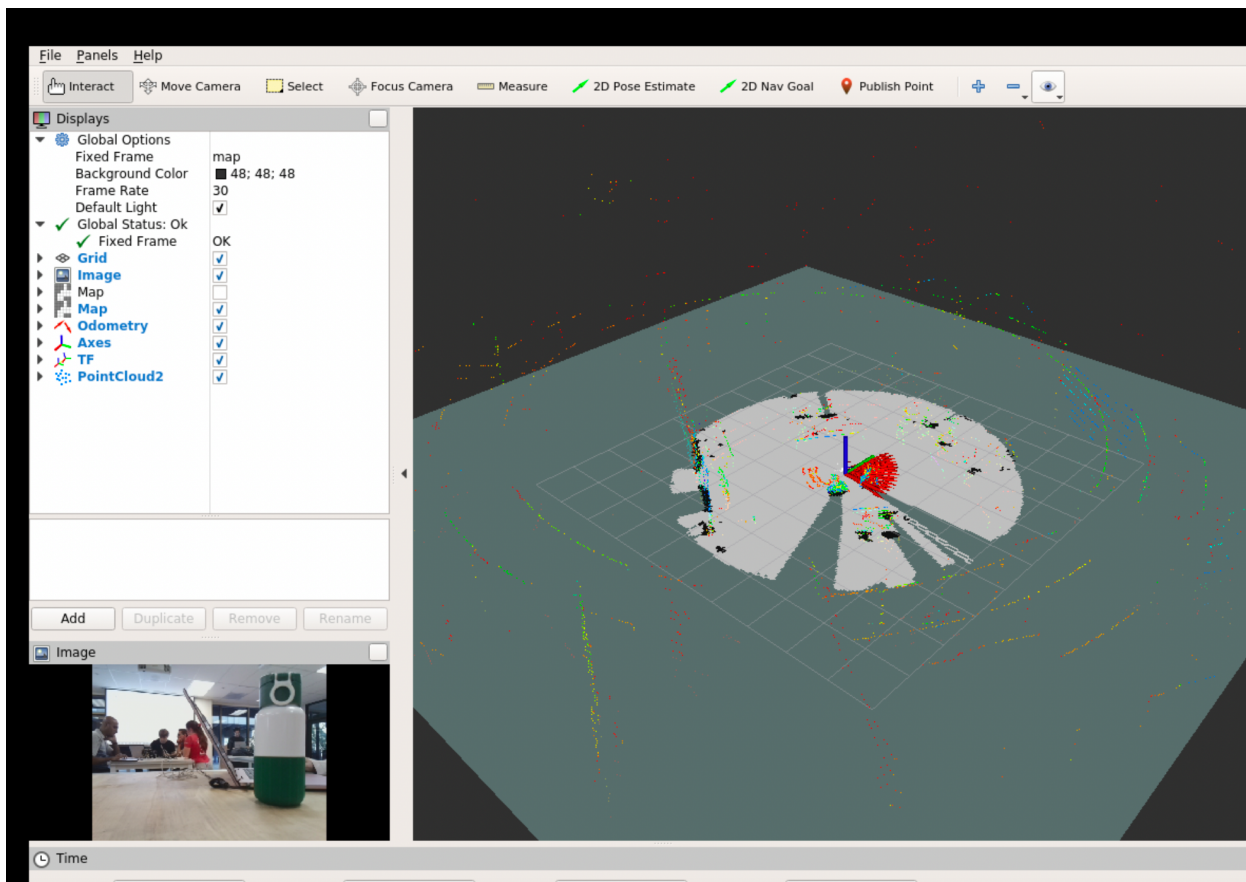
Problem 3:
Panels:
  - Class: rviz/Displays
    Help Height: 78
    Name: Displays
    Property Tree Widget:
      Expanded:
        - /Global Options1
        - /Status1
      Splitter Ratio: 0.5
    Tree Height: 363
  - Class: rviz/Selection
    Name: Selection
  - Class: rviz/Tool Properties

```
    Expanded:
      - /2D Pose Estimate1
      - /2D Nav Goal1
      - /Publish Point1
    Name: Tool Properties
    Splitter Ratio: 0.588679016
  - Class: rviz/Views
    Expanded:
      - /Current View1
    Name: Views
    Splitter Ratio: 0.5
  - Class: rviz/Time
    Experimental: false
    Name: Time
    SyncMode: 0
    SyncSource: Image
Toolbars:
  toolButtonStyle: 2
Visualization Manager:
  Class: ""
  Displays:
    - Alpha: 0.5
      Cell Size: 1
      Class: rviz/Grid
      Color: 160; 160; 164
      Enabled: true
      Line Style:
        Line Width: 0.0299999993
        Value: Lines
      Name: Grid
      Normal Cell Count: 0
      Offset:
        X: 0
        Y: 0
        Z: 0
      Plane: XY
      Plane Cell Count: 10
      Reference Frame: <Fixed Frame>
      Value: true
    - Class: rviz/Image
```

```
      Enabled: true
      Image Topic: /camera_relay/image
      Max Value: 1
      Median window: 5
      Min Value: 0
      Name: Image
      Normalize Range: true
      Queue Size: 2
      Transport Hint: compressed
      Unreliable: false
      Value: true
    - Alpha: 0.699999988
      Class: rviz/Map
      Color Scheme: map
      Draw Behind: false
      Enabled: false
      Name: Map
      Topic: ""
      Unreliable: false
      Use Timestamp: false
      Value: false
    - Alpha: 0.699999988
      Class: rviz/Map
      Color Scheme: map
      Draw Behind: false
      Enabled: true
      Name: Map
      Topic: /map
      Unreliable: false
      Use Timestamp: false
      Value: true
    - Angle Tolerance: 0.100000001
      Class: rviz/Odometry
      Covariance:
        Orientation:
          Alpha: 0.5
          Color: 255; 255; 127
          Color Style: Unique
          Frame: Local
          Offset: 1
```

        Scale: 1
        Value: true
      Position:
        Alpha: 0.300000012
        Color: 204; 51; 204
        Scale: 1
        Value: true
      Value: true
    Enabled: true
    Keep: 100
    Name: Odometry
    Position Tolerance: 0.100000001
    Shape:
      Alpha: 1
      Axes Length: 1
      Axes Radius: 0.100000001
      Color: 255; 25; 0
      Head Length: 0.300000012
      Head Radius: 0.100000001
      Shaft Length: 1
      Shaft Radius: 0.0500000007
      Value: Arrow
    Topic: /odom
    Unreliable: false
    Value: true
  - Class: rviz/Axes
    Enabled: true
    Length: 1
    Name: Axes
    Radius: 0.100000001
    Reference Frame: <Fixed Frame>
    Value: true
  - Class: rviz/TF
    Enabled: true
    Frame Timeout: 15
    Frames:
      All Enabled: true
      base_footprint:
        Value: true
      camera:

```
      Value: true
    map:
      Value: true
    odom:
      Value: true
    raspicam:
      Value: true
    velodyne:
      Value: true
  Marker Scale: 1
  Name: TF
  Show Arrows: true
  Show Axes: true
  Show Names: true
  Tree:
    map:
      odom:
        base_footprint:
          raspicam:
            camera:
              {}
          velodyne:
            {}
  Update Interval: 0
  Value: true
- Alpha: 1
  Autocompute Intensity Bounds: true
  Autocompute Value Bounds:
    Max Value: 10
    Min Value: -10
    Value: true
  Axis: Z
  Channel Name: intensity
  Class: rviz/PointCloud2
  Color: 255; 255; 255
  Color Transformer: Intensity
  Decay Time: 0
  Enabled: true
  Invert Rainbow: false
  Max Color: 255; 255; 255
```

```
      Max Intensity: 142
      Min Color: 0; 0; 0
      Min Intensity: 0
      Name: PointCloud2
      Position Transformer: XYZ
      Queue Size: 10
      Selectable: true
      Size (Pixels): 3
      Size (m): 0.00999999978
      Style: Flat Squares
      Topic: /velodyne_points
      Unreliable: false
      Use Fixed Frame: true
      Use rainbow: true
      Value: true
  Enabled: true
  Global Options:
    Background Color: 48; 48; 48
    Default Light: true
    Fixed Frame: map
    Frame Rate: 30
  Name: root
  Tools:
    - Class: rviz/Interact
      Hide Inactive Objects: true
    - Class: rviz/MoveCamera
    - Class: rviz/Select
    - Class: rviz/FocusCamera
    - Class: rviz/Measure
    - Class: rviz/SetInitialPose
      Topic: /initialpose
    - Class: rviz/SetGoal
      Topic: /move_base_simple/goal
    - Class: rviz/PublishPoint
      Single click: true
      Topic: /clicked_point
  Value: true
  Views:
    Current:
      Class: rviz/Orbit
```

```
      Distance: 20.5244045
      Enable Stereo Rendering:
        Stereo Eye Separation: 0.0599999987
        Stereo Focal Distance: 1
        Swap Stereo Eyes: false
        Value: false
      Focal Point:
        X: 0
        Y: 0
        Z: 0
      Focal Shape Fixed Size: true
      Focal Shape Size: 0.0500000007
      Invert Z Axis: false
      Name: Current View
      Near Clip Distance: 0.00999999978
      Pitch: 0.585398138
      Target Frame: <Fixed Frame>
      Value: Orbit (rviz)
      Yaw: 5.43540001
    Saved: ~
Window Geometry:
  Displays:
    collapsed: false
  Height: 846
  Hide Left Dock: false
  Hide Right Dock: true
  Image:
    collapsed: false
  QMainWindow State:
```

000000ff00000000fd0000000400000000000000156000002b6fc0200000009fb000
000120053006c00650063007400690006f006e00000001e10000009b000000
5c00ffffffb0000001e0054006f006f006c002000500072006f00700065007200740
0690065007302000001ed000001df00000185000000a3fb0000001200560069006
500770073020000054006f006f02000001df000002110000018500000122fb00000
0200054006f006f006c002000500072006f0070006500720074006900650073003
2030000028800000011d000002210000017afb00000010004400690073007000
00610079007301000003a000001f3000000c600ffffffb000000200073006c0
0650063007400690006f006e00200062007500660066006500720200000138000
00aa0000023a00000294fb00000014005700690064006500530074006500720006
5006f02000000e6000000d2000003ee0000030bfb0000000c004b0069006e0065

006300740200000186000001060000030c00000261fb0000000a0049006d0061006700650100000233000000bd0000001600ffffff000000010000010f000002b6fc0200000003fb0000001e0054006f006f006c002000500072006f00700065007200740069006500730100000041000000780000000000000000fb0000000a005600690065007700730000000003a000002b60000009e00fffffffb0000001200530065006c006500630074006900006f006e010000025a000000b2000000000000000000000490000000a9fc0100000001fb0000000a005600690065007700730300000004e00000080000002e10000019700000030000004b00000003efc0100000002fb000000080054006f006f006c00650100000000000004b00000024400ffffffffb0000000800540069006d0065010000000000000450000000000000000000035400002b6000000040000000400000080000008fc000000010000002000000010000000a0054006f006f006c007300100000000ffffffff0000000000000000

Selection:
  collapsed: false
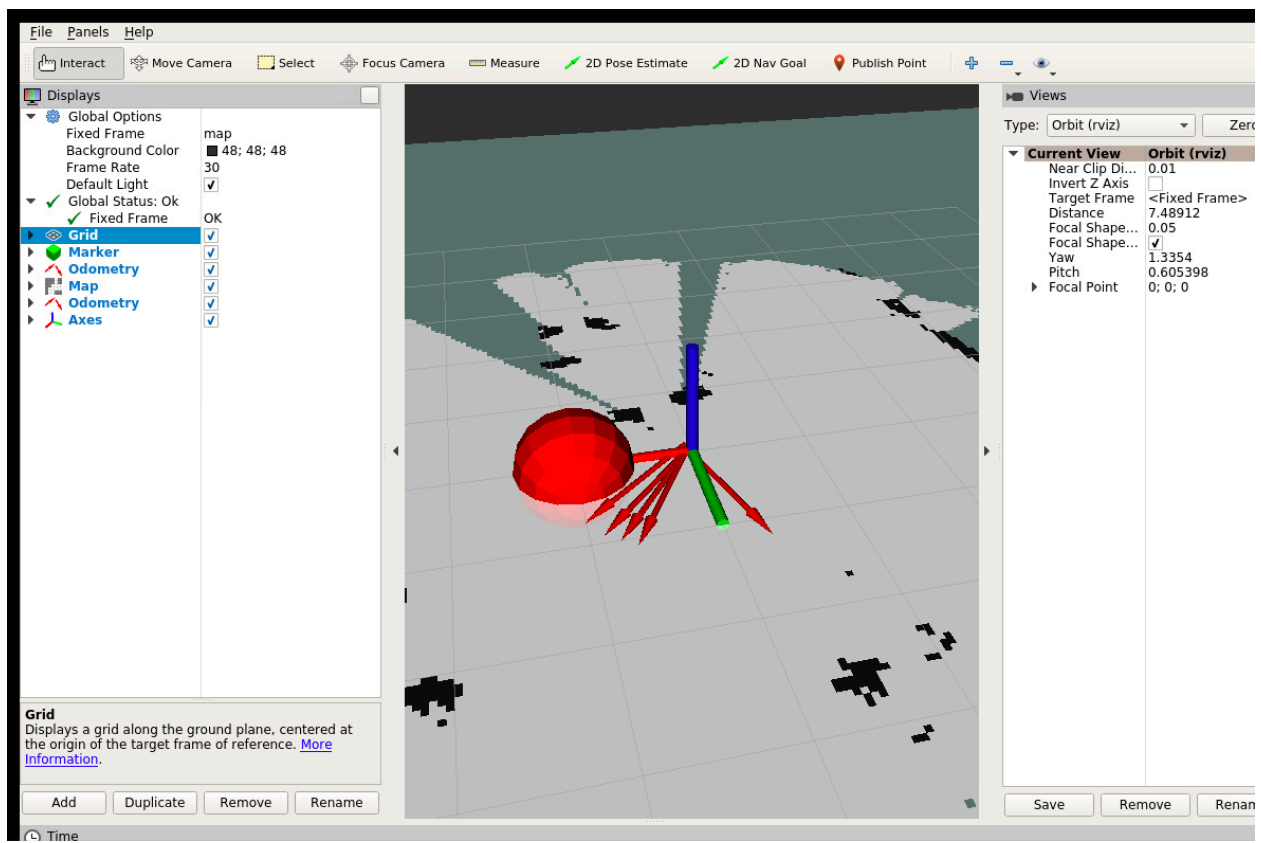Time:
  collapsed: false
Tool Properties:
  collapsed: false
Views:
  collapsed: true
Width: 1200
X: 60
Y: 60

Problem 4: