Australian National University

LAB REPORT COVER SHEET

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All assessment items submitted in hard copy are due at 5pm unless otherwise specified in the course outline.

Student ID	U 6366102		
For group assignments, list each student's ID			
Course Code	ENGN 6423		
Course Name	Robotics		
Assignment number			
Assignment Topic			
Lecturer	Dr. Viorella Ila / Dr. Rob Mahony		
Tutor			
Tutorial (day and time)			
Word count		Due Date	12/08/2018
Date Submitted	11/08/18	Extension Granted	

I declare that this work:

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Questions:

1. The process of creating a package involves the following steps,

   a. Initialise a directory using ‘mkdir’ command.
   b. Create a ‘catkin’ workspace
   c. Source the terminal for changes to take effect.
   d. Create a package using ‘catkin_create_pkg’.

   This creates a package of given name. To compile launch/ python files in the package, move to the location of the launch/python file and use roslaunch/ rosrun respectively to execute the file[1]. In case of error in rosrun command, use ‘chmod +x /path/filename.py’ which gives permissions to execute file[1].

   ```
   $ cd ~/catkin_ws/src
   $ catkin_create_pkg <package_name> rospy roscpp std_msgs
   ```

2. The call-back functions are called in occurrence or non-occurrence of an event (for example, sensor detection). In the event of sensing of bump sensor, the topic ‘bumpSensor’ calls the call-back function which in turn tells the system what to do like to print “Bump sensor is sensed” or to stop the robot. In short, the call-back function describes the system what needs to be done and is called whenever a function is called[1].

3. Bumper and cliff sensors are to be monitored/ pinged continuously to ensure the safety of the bot. Bumper sensor senses obstacles (considerably large) in robot’s path and stops the bot when the sensor is pressed[2]. Cliff sensor warrants that the bot does not fall off a cliff which could potentially disrupt/ discontinue the operation of the robot.

4. Leg – based locomotion[3]:
   Pros:
   - Manoeuvrability
   - More degrees of freedom
   - Multi-purpose (picking/kicking/moving objects)

   Cons:
   - Complex control algorithm
   - Maintenance of stability
   - Difficult to build

   Wheel – based locomotion[3]:

   Pros:
   - Highly stable
   - Simpler control as the degrees of freedom is low
   - Easy to build

   Cons:
   - Traction/friction which can affect the choice of motors and suitable for flat surfaces
   - Manoeuvrability since the axis of the wheels are fixed
   - Low degrees of freedom

5. Four basic types of wheels
    - Standard wheel
    - Castor wheel
    - Swedish wheel
    - Ball/ spherical wheel

    Swedish wheel, castor wheel and ball/spherical wheel can generate omnidirectional motion[3].

References:

[1] *ROS Documentation*.

[2] D. R. Mahony, "Lecture Notes / slides," *ENGN 6623 Robotics,*

[3] Roland Siegwart, Illah R Nourbaksh, *Introduction to Autonomous Mobile Robots*. MIT Press, 2004.