Robot requirements

1. The robot should be able to follow a line on the ground.

   The line should be in high contrast to the rest of the environment (like black on white), at least 2cm and at max. 5cm thick and start in the range of 8 to 43 cm in front and within $\pm$ 13° of the robot to be in the viewing range and angle of the used camera (ZTE Axon 7 mobile phone).
   Following the line means, the line will at least be in between the outer rims of the tank tracks of the robot, which are 11cm apart. This will result in the robot being right above the track all the time.

2. The robot should be able to drive at different speeds.

   The robot has to drive in 256 different speed settings, as the motor is controlled with a 8-bit PMW signal. Based on the robot's weight and the used gearbox ratio, this will result in 256 different speeds (which may or may not be distinguishable due to motor strength).

3. The robot should stop when an obstacle is in front of it, so it doesn't collide with the obstacle.

   The ultrasonic sensor gives the range to the next obstacle. As it is 7cm above the ground, low objects can be detected only from a distance of 26cm in front of the sensor. For safety reasons the robot needs to stop at a distance of 40cm from the obstacle to take into account large angles of reflection at the obstacle.

4. For safety, the robot must stop when no new commands have been received from the laptop for some time.

   After a timeout of 1 second, the robot will stop. This means, that it won't have to stop, if the transmission success rate is more than 10% at a transmission frequency of 10 hertz. Nevertheless this is within a reasonable range (max. 18cm at max. speed) in case of a lot of package loss or high ping.

5. The ROS line-follow node should be independent of the robot implementation.

   The robot can be used without using a line follower implementation. The ROS node of the robot is not dependent on a line follower node.

X. Additional requirements:

   When stopped from encountering an obstacle, the robot constantly checks for updates in the position of the obstacle. If the obstacle is beyond 40cm the robot starts moving again.