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Autonomous navigation system of the Mars rover

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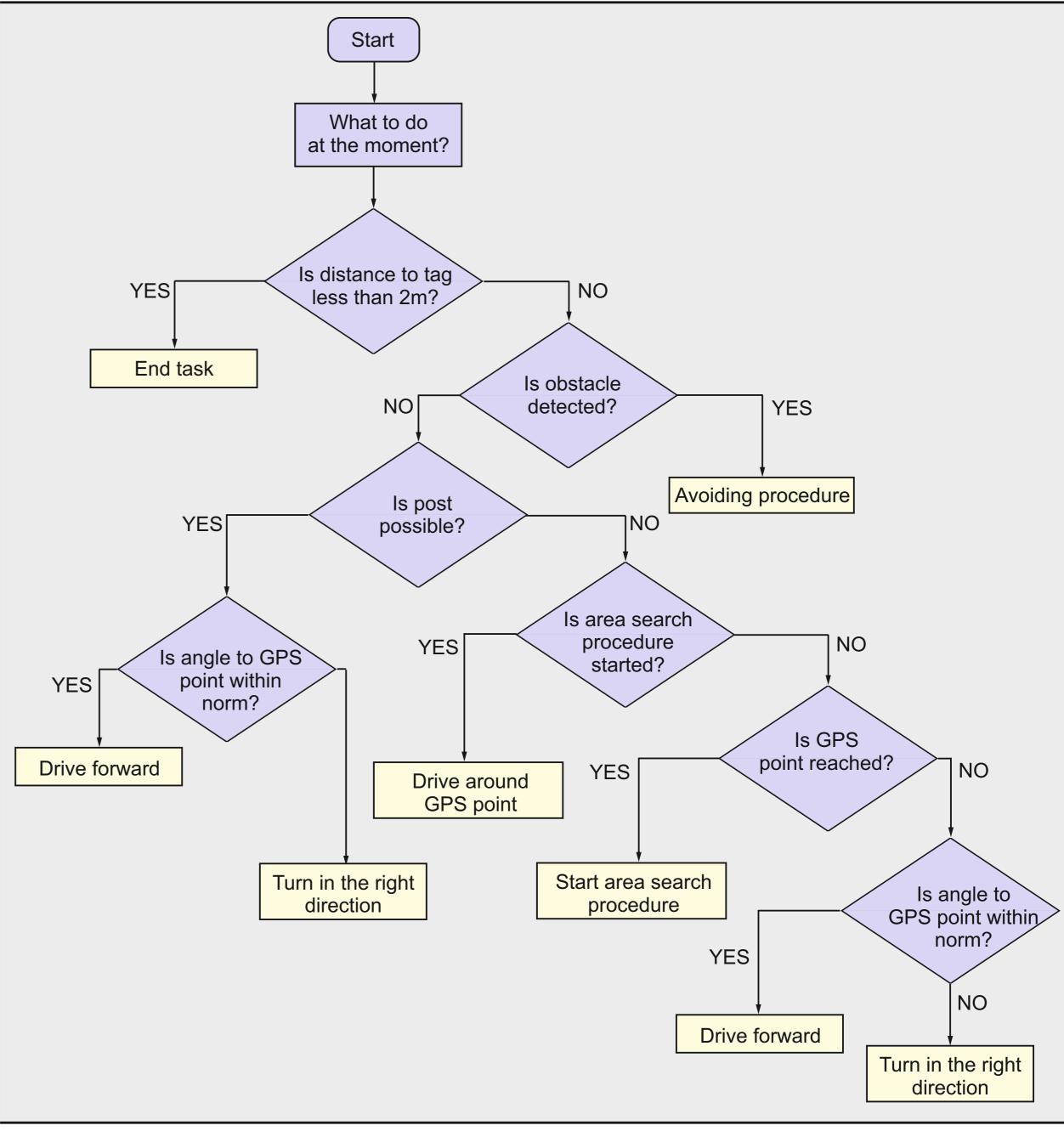dawid.cekus@pcz.pl

The subject of the invention is working out of autonomous navigation system of the Mars rover. The system was developed in a python program that runs on an NVIDIA jetson TX2 placed on the rover. Based on data from the compass, GPS module, vision from the 3D camera, and information about the type of task and its details, the rover analyzes and looks for the suitable way to the goal.

The example of using the carried out autonomous navigation system is Autonomous Navigation Mission during the University Rover Challenge in the USA . This mission consists of 7 stages. The first 3 consist in reaching the given GPS point and stopping within 3 m from it. The next 3 also have a given GPS point, but the task is to find the post at a distance of 5-15 m (approximately, depending on the stage number). The posts and gate have 3-sided visual markers in this case ARUCO tags with 20 x 20 cm faces. After locating the post, the rover has to stop within 2 m of it. The last stage looks similar to the previous three, but the target the rover is looking for is a gate made of two posts and is 2 m wide. The rover should drive through a gate from the appropriate side and stop when the entire rover passes through the gate. An additional difficulty is the fact that the gate is about 20 m away from the given gps point. The rover has to use the mounted LED identifier to inform whether it is currently going to its destination or has already reached it.