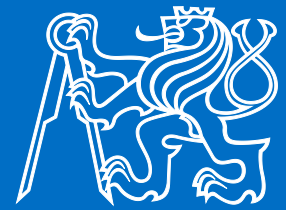


# Road Following For Hexapod Walking Robot

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We propose robust road following method for hexapod walking robot. The method combines two complementary approaches - tactile and vision based. The proposed combined solution compensates drawbacks of individual approaches while it is as minimalistic as possible.



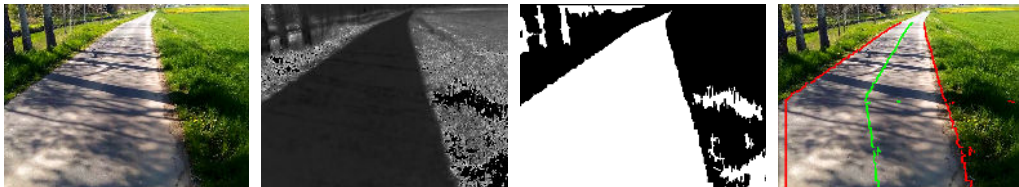
## Terrain classification based road following

- Adaptive motion gait - based on position error feedback from servo drives
- Position error differs in particular gait phases during crawling various terrains, which is utilized in terrain classification
- Four classes of terrain are considered:
  - road, offroad, left and right road border
- Terrain type history is utilized to steer the robot motion to keep the robot on the road and avoid offroad terrain



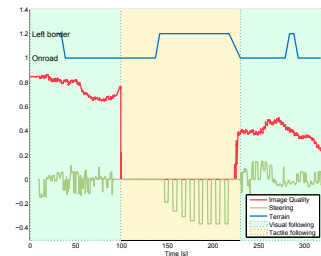
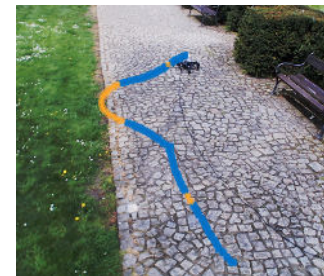
## Vision based road following

- Shadow removal technique is utilized to improve robustness
- The input RGB image is converted to log-chromaticity space
- The image is then thresholded and filtered
- Self-calibration method for estimation of camera parameters



## Fusion of the road following methods

- At each moment only one controller (terrain classification or vision based) steers the robot
- The controllers are switched according to proposed criteria: *image quality criteria* and *terrain classification reliability criteria*
- Autonomous terrain learning method has been proposed
- The method was experimentally validated in outdoor environments and also during the mobile robot competition
- The proposed strategy with two motion steering methods improve the overall robustness of the autonomous road following for hexapod crawling robot



## Publications

M. Stejskal, J. Mrva and J. Faigl, "Road following with blind crawling robot", IEEE International Conference on Robotics and Automation (ICRA), 2016, pp. 3612-3617