

Editorial Notes

The advancement in technology has been one of the factors that bring innovation in the field of Robotics and Mechatronics. The two fields deal with various systems from simple to complex ones and cover a wide range of applications which are also related aerospace engineering, mechanical engineering, control and electronics engineering. In this issue of the International Journal of Robotics and Mechatronics (IJRM), four innovative research papers with three papers deal with unmanned aerial vehicles and one paper with a mobile robot are presented. As at present days, the applications of UAVs are becoming notable, and for such complex systems, either to fly on their own autonomously or to form flight formations requires advanced control techniques. Similarly, a robot with its dynamics resemble those of a double inverted pendulum is challenging to control.

The first paper by Drak, A. et al., from United Arab Emirates University proposes an autonomous formation flight algorithm for quadrotors. The control system consists of path planning and hierarchical leader-follower algorithm for controlling flight formation of two autonomous quadrotors flying over a single axis. In the proposed algorithm, the leader has more autonomy while the follower is completely dependent on the leader's behaviour. The real-time implementation was tested over the x-axis only while keeping the other two axes; y and z-axis constant for each quadrotor. A graphical user interface is also developed for the implementation.

The second paper is by Abdul Rahman, et al. from International Islamic University Malaysia. It presents the combination of low pass filter (LPF) with hybrid fuzzy control for balancing a two-wheeled mobile robot with an extendable link, such that the overall system consists of three links. This unstable system is challenging to control as the dynamical behavior is similar to that of a double inverted pendulum. The balancing control is achieved based on the center of gravity analysis via hybrid proportional-derivative fuzzy controllers over the angular position of the first and second links, and a proportional-integral-derivative controller is used for the extension of the extendable link, i.e. the third link. The proposed LPF has improved the oscillation of the system response.

The next paper is by Santos et al. (from Portugal) who proposes a ground-based vision system to estimate the pose of an unmanned aerial vehicle. The vision system is located on a ship to reduce the processing power and size of the UAV. The proposed method provides the pose estimation by using a single frame standard RGB digital camera. The UAV detection method is based on cascaded classifier with particle initialization method and particle optimization based on evolutionary approaches. The proposed architecture can provide very accurate position estimation and a reasonable attitude error.

Last but not the least, the paper by Mahmud, et al. proposes a differential-evolution (DE) based robust controller for a small-scale autonomous helicopter. The controller is designed based on constrained optimization to tune the controller gains by using DE such that the maximum stability radius can be achieved. The idea of using the maximum stability radius is to guarantee that stability can be achieved in spite of wide class of uncertainties or perturbations. The proposed controller is applied to a longitudinal cruise control of the helicopter. The controller robustness was tested with various speed of the helicopter.

We hope that all contributions in this fourth issue are interesting and inspiring to other researchers. We look forward to receive your high quality contributions to the future journal issues.

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