

Design and Implementation of the Embedded Control System for the Electrical Motor Based Cargo Vehicle

Authors : Syed M. Rizvi, Yiqing Meng, Simon Iwnicki

Abstract : With an increased demand in the land cargo industry, it is predicted that the freight trade will rise to a record \$1.1 trillion in revenue and volume in the following years to come. This increase is mainly driven by the e-commerce model ever so popular in the consumer market. Many innovative ideas have stemmed from this demand and change in lifestyle likes of which include e-bike cargo and drones. Rural and urban areas are facing air quality challenges to keep pollution levels in city centre to a minimum. For this purpose, this paper presents the design and implementation of a non-linear PID control system, employing a micro-controller and low cost sensing technique, for controlling an electrical motor based cargo vehicle with various loads, to follow a leading vehicle (bike). Within using this system, the cargo vehicle will have no load influence on the bike rider on different gradient conditions, such as hill climbing. The system is being integrated with a microcontroller to continuously measure several parameters such as relative displacement between bike and the cargo vehicle and gradient of the road, and process these measurements to create a portable controller capable of controlling the performance of electrical vehicle without the need of a PC. As a result, in the case of carrying 180kg of parcel weight, the cargo vehicle can maintain a reasonable spacing over a short length of sensor travel between the bike and itself.

Keywords : cargo, e-bike, microcontroller, embedded system, nonlinear pid, self-adaptive, inertial measurement unit (IMU)

Conference Title : ICCST 2018 : International Conference on Control Systems and Technologies

Conference Location : Paris, France

Conference Dates : March 15-16, 2018