

# GPS/Radar based Adaptive Cruise Control System

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## ABSTRACT

Intelligent Cruise Control System is one of the main development directions of vehicle industry, Adaptive Cruise Control (ACC) has been successfully applied to commercially available, it could reduce the burden on drivers when driving in a long time, but the function of ACC is limited to high-speed cruise use, so this paper simulated a variety of driving situations by CarSim software and come up with a policy-deciding system which can decide the mode instantly, another for the throttle and brakes to make the appropriate configuration to reduce fuel consumption and pollution. We also used radar and Global Positioning System (GPS) in wireless mobile rescue robot (SRV-1) to achieve the purpose of ACC, GPS navigation, GPS driving record.

Keywords : Intelligent vehicle ; Cruise Control System ; Global Positioning System ; Driving record

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## REFERENCES

- [1]交通部國道高速公路局, <http://www.freeway.gov.tw> [2]內政部警政署, <http://www.npa.gov.tw> [3]S. J. Wu, H. H. Chiang, J. W. Perng, T. T. Lee, and C. J. Chen, "The Automated Lane-Keeping Design for an Intelligent Vehicle," IEEE Intelligent Vehicles Symposium, Las Vegas, Nevada, USA, pp.507-511, June 6-8, 2005.
- [4]H. H. Chiang, J. W. Perng, B. F. Wu, S. J. Wu, and T. T. Lee, "The Human-in-the-loop Design Approach to the Longitudinal Automation System for an Intelligent Vehicle," Proceedings of the IEEE International Conference on System. Man and Cybernetics, Taipei, Taiwan, pp.383-388, Oct.8-11, 2006 [5]PATH, <http://www.path.berkeley.edu> [6]王立昇, 衛星導航智慧車, <http://nsc.gov.tw> [7]Jose E. Naranjo, Carlos Gonzalez, Ricardo Garcia, and Teresa de Pedro "ACC+Stop&Go Maneuvers With Throttle and Brake Fuzzy Control," IEEE Transactions on Intelligent Transportation Systems, Vol.7, No.2, June 2006 [8]Jose E. Naranjo, Carlos Gonzalez, Ricardo Garcia, and Teresa de Pedro "Cooperative Throttle and Brake Fuzzy Control for ACC+Stop&Go Maneuvers," IEEE Transactions On Vehicular Technology, Vol.56, No.4, July 2007 [9]蔣欣翰, "自動車輛駕駛縱向暨橫向控制器設計," 國立交通大學電機與控制工程系博士論文 [10]江忠潔, "以DSP平台實現多感測器資訊整合之車輛安全輔助駕駛系統," 國立交通大學電機與控制工程系碩士論文 [11]連政南, "以DSP平台實現RTK-DGPS為基礎之自動車輛駕駛系統," 國立交通大學電機與控制工程系碩士論文 [12]皮托科技, "SRV-1無線救援機器人中文使用手冊," [13]GARMIN GPS 入門手冊 [14]GOOGLE 地圖 <http://maps.google.com.tw>