# Intelligent Online Driving System

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**Abstract**

Recently, IVS (Intelligent Vehicle Systems) or ITS (Intelligent Traffic Systems) are much concerned subjects of automotive industry. In this paper, we will introduce an Intelligent Online Driving System for a car. This system allows the driver to be able to drive the car just by operating an integrated joystick. The proposed driving system could be implemented into any car and the key point of the design is that the driver still can drive the car as normal without using the joystick.

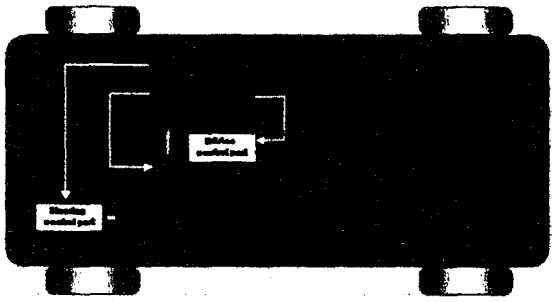
Our Intelligent Online Driving System includes the integrated joystick, steering wheel control system, brake and acceleration (B&A)pedals control system, and the central control computer system. Steering wheel and B&A pedals are controlled by AC servo-motors. The integrated joystick generates the desired positions and the embedded computer controls these two servo-motors to track the commands given by joystick. The control method for two servo-motors is PID control.

## 1 Introduction

The automotive industry has a long history. Over 100 years, automotive technologies have been developed tremendously. Nowadays, engineers try to design cars which are lighter, more convenient and they concentrate on the safety more than ever.

During the past decade, the research on Intelligent Transportation Systems (ITS) and Intelligent Vehicle Systems (IVS) are growing rapidly. In resolving the problem of traffic system, the ITS and IVS could allow much more cars to run on the roads with higher safety, however, these systems have not been used yet because they cost high and the safety is still not assured. Recently, another research trend of automotive industry is the driving by wired car, which is that the driver does not drive the car by either operating the steering wheel with hands or pressing the brake and acceleration pedals by feet, they drive with assistant devices. In other words, the driver will drive with other assistant devices, such as voice-recognition driving device or joystick-assistant driving device and the car may not be equipped with the normal steering wheel and pedals.

In this paper, we will suggest a design scheme of Intelligent Online Driving System for a car. The driving system is designed to be very simple but it works effectively. A driver could drive the car by just operating a joystick. The joystick generates position commands for steering and brake or acceleration to the central control computer, then the control signals for each servo-motor will be computed and given due to feedback control. Steering wheel control system and pedals control system are including AC servo-motors and these two motors are controlled by PID controller. And we use digital filter to reduce the noise of joystick signal and to give smooth operations for system. The overall system is shown in Fig. 1. Following sections contain detailed mechanical descriptions of our system.



(a)The Scheme of Overall System


(b)The Real View of System

Fig. 1: The Overall System

## 2 Online Driving Systems

### 2.1 Integrated Joystick

The idea to make the online driving system for a car is using one motor to control the pedal actions and another one to control the steering wheel. Therefore,