

# Line Tracking Control Demonstration of a Master-slave Balancing Mobile Robot

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**Abstract** – This video shows the line tracking control performance of two balancing mobile robots that have two wheels. Two balancing mobile robots form a master–slave configuration that the master robot follows the line and the slave robot follows the master. Two robots are equipped with a camera to detect lines on the playgrounds. Real demonstration of following the line by the master-slave balancing mobile robot has been presented in CIRO(Creative and Intelligent ROBot Contest) 2015 held in Daejeon.

**Keywords** – Two-wheel mobile robot, line tracking control, master-slave formation, CIRO.

## Summary

Two wheel mobile robots have been gained a lot of interests from control and robot engineers for its challenge of control. The robot is required to move forward and backward while maintaining upright position with two wheels. Segway is one of popular two wheel mobile robots that have been commercialized and well known [1].

In the control education aspects, line tracers are a good example for students to understand electric vehicles since the tracer is a miniature of the electric vehicle on the market.

More challengingly, two wheel mobile robots are one of personal transportation vehicles for the purpose of the short distance travel. The robots are one of challenging examples for students to learn advanced practical control methods of nonholonomic systems as well.

Therefore, CIRO(Creative and Intelligent Robot Contest) has been initiated with the aim of aforementioned purposes. The contest has been held in Daejeon for 14 years. There are four categories of the line tracer competition for students to participate in. Categories are DC motor-based line tracer competition, step motor-based line tracer competition, master-slave competition, and balancing line tracer competition. The master-slave line tracer competition mimics the platoon of multi cars [2]. The master-slave line tracer forms a platoon of two tracers that the master follows the line and the slave follows the master.

The balancing line tracer competition is also held for

students to demonstrate the fast movement of two wheel robot while balancing [3]. Combining the master-slave and the balancing line tracer yields the novel balancing line tracer competition.

In this video, therefore, the line and the master-slave configuration of two balancing robots is presented. The master has a camera covered by a black box to detect white lines on black board. The slave also has a camera to detect red colored circle on the back of the master.

Two balancing robots having two wheels are demonstrated to maintain balance and perform platoon. Fig. 1 shows the image of line tracking control performance of the balancing robots and the successful demonstration is presented.



Fig. 1 Line tracking control performance by two balancing robots in the master-slave formation

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