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Electro-mechanical direction sensor for vehicle guidance and control

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In this work, an electro-mechanical direction sensor was designed and developed. The purpose of this electro-mechanical direction sensor is to measure the change in the heading angle for a wheeled ground vehicle. The mechanism used in our designed sensor is inspired from the ancient Chinese piece of mechanical art; The South Pointing Chariot. The south pointing chariot uses mechanical gears in a special arrangement in order to maintain a figure/pointer pointing to a fixed direction, whatever the chariot direction is. The mechanical part of the South Pointing Chariot has been integrated with an electronic circuit to form the electro-mechanical direction sensor. The designed sensor can be used for vehicle guidance and control. The measured data of the electro-mechanical direction sensor has been compared to magnetic compass readings to validate its output. A test to drive a vehicle in a predefined path was performed using the feedback of the electro-mechanical direction sensor. The results showed good performance of the electro-mechanical direction sensor in measuring the change in the heading angle for a 3-wheeled vehicle and controlling it.

Biography

Khaled R Asfar is a Professor of Mechanical Engineering at JUST University. He received his MSc and PhD degrees from Virginia Tech in 1980. He was a visiting scholar in Aerospace Engineering at Texas A & M University (2007-2008), and a visiting Professor at the School of Mechanical Engineering at Purdue University (2008-2010). He is the founder of The Center of Excellence for Innovative Projects and The Technological Incubator at JUST University. He received many scientific honors and awards such as the Hisham Hijjawi Award in 1995 and 2001, JUST Award for Scientific Distinction in 1997 and 2006, and the Alexander von Humboldt Research Fellowship in 1991-1992. He has published numerous articles in several fields and holds three US Patents and two US patent pending applications. He is an Associate Editor for the *Journal of Vibration and Control*, and editorial boards of three other journals.

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