Melih Alkan

INTER-CONNECTED FLEXRAY AND CAN NETWORKS FOR IN-VEHICLE COMMUNICATION

GATEWAY IMPLEMENTATION AND END-TO-END PERFORMANCE STUDY

VDM
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INTER-CONNECTED FLEXRAY AND CAN NETWORKS FOR IN-VEHICLE COMMUNICATION: GATEWAY IMPLEMENTATION AND END-TO-END PERFORMANCE STUDY

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

MELİH ALKAN

IN PARTIAL FULLFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF SCIENCE
IN
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MAY 2010

Approval of the thesis:

INTER-CONNECTED FLEXRAY AND CAN NETWORKS FOR IN-VEHICLE COMMUNICATION: GATEWAY IMPLEMENTATION AND END-TO-END PERFORMANCE STUDY

submitted by **MELİH ALKAN** in partial fulfillment of the requirements for the degree of **Master of Science in Electrical and Electronics Engineering Department, Middle East Technical University** by,

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I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

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ABSTRACT

INTER-CONNECTED FLEXRAY AND CAN NETWORKS FOR IN-VEHICLE COMMUNICATION: GATEWAY IMPLEMENTATION AND END-TO-END PERFORMANCE STUDY

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M. S., Department of Electrical and Electronics Engineering
Supervisor: Asst. Prof. Dr. Ece Ş. Güran Schmidt

May 2010, 265 pages

The increasing use of electronic components in today's automobiles demands more powerful in-vehicle network communication protocols. FlexRay protocol, which is expected to be the de-facto standard in the near future, is a deterministic, fault tolerant and fast protocol designed for in vehicle communication. The current de-facto in-vehicle communication standard, CAN, and the future in-vehicle communication standard FlexRay will exist together in future cars. Data exchange between these two standards will be performed via Gateway units. In this thesis, end-to-end performance of a FlexRay-CAN network connected by a Gateway is evaluated as well as Gateway functionality and processing delay. The results of the experiments, which are performed for a realistic message set with various scheduling schemes, are presented and discussed.

Keywords : in-vehicle communication, FlexRay, Gateway, end-to-end performance

ÖZ

ARAÇ İÇİ HABERLEŞME İÇİN BİRBİRİNE BAĞLI FLEXRAY VE CAN AĞLARI: AĞ GEÇİDİ (GATEWAY) UYGULAMASI VE UÇTAN UCA BAŞARIM ÇALIŞMASI

Alkan, Melih

Yüksek Lisans, Elektrik Elektronik Mühendisliği Bölümü
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Günümüz otomobillerinde artan elektronik birim kullanımı daha güçlü araba içi haberleşme protokollerine olan ihtiyacı doğurmaktadır. FlexRay protokolü ortaya çıkan bu ihtiyacı karşılayabilecek özelliklere sahip, kararlı, hatalara dayanıklı ve hızlı bir haberleşme protokolüdür. Bugünün defakto araç içi haberleşme protokolü CAN ve geleceğin defakto araç içi haberleşme protokolü FlexRay gelecekte, otomobillerde eş zamanlı olarak yer almaları beklenmektedir. Bu iki ağ arasındaki veri haberleşmesi ağ geçiti (gateway) birimleri ile gerçekleştirilecektir. Bu tezde, Ağ Geçidi ile bağlanmış FlexRay-CAN ağlarının uçtan uca başarımı ve aynı zamanda Ağ Geçidi işlem süresi ve çalışırlığı değerlendirilmiştir. Gerçekçi mesaj kümesi ile çeşitli çizelgeleme yaklaşımlarına göre gerçekleştirilen deneylerin sonuçları sunulmuş ve tartışılmıştır.

Anahtar Kelimeler: araç içi haberleşme, FlexRay, Ağ Geçidi, uçtan uca başarım

To My Family

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