



Melih Alkan

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

**GATEWAY IMPLEMENTATION AND END-TO-END
PERFORMANCE STUDY**

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FOR IN-VEHICLE COMMUNICATION:
GATEWAY IMPLEMENTATION AND END-TO-END
PERFORMANCE STUDY

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Approval of the thesis:

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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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Signature :

ABSTRACT

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

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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

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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 geçidi (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 kütmesi ile çeşitli çizelgeleme yaklaşımlarına göre gerçekleştirilen deneylerin sonuçları sunulmuş ve tartışılmıştır.

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

To My Family

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