

Context-Driven User Interface Support for Ubiquitous Web Applications with Webinos

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The diversity of devices supporting the installation and use of third party software applications is increasing at an incredible pace. From traditional desktop and laptop PCs, to mobile devices, home entertainment systems, and even in-car units, users are provided the freedom to access their information anytime and anywhere they want. However, such a ubiquitous ecosystem also introduces a number of resource-consuming requirements. The available combinations of hardware characteristics, operating systems, software support, etc. are virtually endless. Hence, for application developers, maintaining a viable balance between development costs and market coverage has turned out to be a challenging issue.

Consequently, the use of the web as a universal application platform is rapidly gaining momentum. With universal development languages such as HTML, CSS, and JavaScript, applications can be made available anytime, anywhere, and on any device. But even with the use of standardized web-technology, efficiently managing fragmentation remains an important ongoing research topic. To optimally address this issue, ubiquitous applications should dynamically adapt to the current context of use, and even to contextual situations not foreseen at the application's design time. From this perspective, the Webinos project aims to minimize the influences of device fragmentation by upholding a "single service for every device" ideology. The project represents a leap forward as a federated web runtime that offers a common set of APIs, allowing applications to easily access cross-user, cross-service, and cross-device functionality in an open yet secure manner. As part of the Webinos platform a framework was designed to support the realization of rich context-driven user interface (UI) transformations. The framework relies on a Model Driven Engineering (MDE) approach. Starting from a generic abstract UI model, a platform-dependent version of the UI is automatically generated by the framework based on the specific characteristics of the current delivery context. In result, the developer is only required to define one abstract description of his application's UI.

An initial prototype of the Webinos platform and our context-driven UI adaptation framework has been implemented. Furthermore, a proof-of-concept e-commerce application is built on top of this platform. The application was evaluated using a set of automated usability tests from the W3C MobileOK test suite, checking the validity of markup, accessibility, content and navigation structuring, resource usage, etc. The prototype applications scored perfect on all MobileOK tests. Accessibility and usability focus group validations are currently being performed in order to further validate our approach from the perspective of developers as well as end-users.

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