Demo: Chameleon: A Color-Adaptive Web Browser for Mobile OLED Displays

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1. Introduction
Displays based on organic light-emitting diode (OLED) technology are appearing on many mobile devices. Unlike liquid crystal displays (LCD), OLED displays consume dramatically different power for showing different colors. In particular, OLED displays are inefficient for showing bright colors. This has made them undesirable for mobile devices because much of the web content is of bright colors. To tackle this problem, we present Chameleon, a color adaptive web browser that renders web pages with power-optimized color schemes under user-supplied constraints. Driven by the findings from our motivational studies, Chameleon provides end users with important options, offloads tasks that are not absolutely needed in real-time, and accomplishes real-time tasks by carefully enhancing the codebase of a browser engine. According to measurements with OLED smartphones, Chameleon is able to reduce average system power consumption for web browsing by 41% and reduce display power consumption by 64% without introducing any noticeable delay. A very early prototype of Chameleon was demonstrated at HotMobile’10 [1]. Our prior work, reported in [2, 3], provide modeling techniques and color transformation algorithms that can be used in Chameleon. The technical details of Chameleon are presented in a paper that has been accepted by Mobisys’11 [4].

2. Prototype
We have implemented Chameleon on Fennec, the mobile version of Mozilla Firefox, and the Android WebKit. Chameleon consists of four modules that interact with a browser engine, as illustrated in Figure 1.
- A model construction module generates a power model of the OLED display of the mobile system, using the smart battery interface.
- A contribution collection module gathers a color contribution vector for each web site from the Layout Calculation and Painting stages of the browser engine in an event-driven manner.

Figure 1: Architecture of Chameleon and how it interacts with the browser engine
- An offline mapping optimization module computes the color map based on and . Note that Chameleon computes the color maps for all possible user options so that the user can immediately see the impact of a change in user options.
- An execution module applies the color map to transform colors in a web page.

Out of the four modules, only contribution collection and execution have to be executed in real-time.

3. Demonstration
In the demo, we will display our Chameleon prototype in action. Conference delegates will be able to see Chameleon on smartphones either provided by us, including a Nexus One and a Samsung Galaxy S, or of their own after installing Chameleon. They can also change the color maps of Chameleon on the fly and observe their effects. Our demo would benefit from Wi-Fi or Ethernet connectivity along with an electrical outlet for a laptop.

4. References
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