

Title: Online Characterization and Thermal Management of Mobile Phones

Abstract:

Understanding the relationship between user demand and hardware architecture utilization is more complex in smartphones and tablets. As an example, some mobile applications can use either more graphic or computational resources depending on the type of user's activity. Our contribution is twofold. We first analyze the usage of CPUs, GPUs in real user interactions to create representative replayable test runs. We use these test benchmarks to empirically characterize power consumption of the CPUs and GPUs on the phones. However, high CPU & GPU power, along with changing ambient conditions, can strongly influence the thermal behavior of the phone. Thus, we propose an online identification algorithm to generate an accurate and fast Linear Time-invariant (LTI) thermal representation of the phone under changing ambient conditions. We show that the LTI model can be used for thermal management to avoid high temperatures.

Francesco Paterna Bio:

Formerly a graduate student at University of Bologna in Italy at the department of Computer Science and Engineering, Francesco has been Postdoc first at Brown University and currently at UC San Diego. He is well-versed in a variety of subjects and techniques in embedded systems. His main projects have involved variability-aware and aging-tolerant workload distribution techniques for multicore processors, dark silicon mitigation using super-lattice thermoelectric coolers, ambient-variation tolerant and inter-component aware thermal management strategies for mobile devices.