Chapter 3
Smarter Phone

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ABSTRACT

Over the last two decades, the evolution of mobile technologies has led to an unprecedented adoption of cellphones in mainstream society. Consumers have moved from having the ability to make telephone calls from anywhere at any time using the traditional cellphones to having an all-access pass to cyberspace using today's smartphones. This portable device has become a reliable support system for the user because of the accessibility and flexibility it offers to maintain the users' daily routine. Authors in this chapter have chosen software optimization techniques to increase battery efficiency because these techniques are more robust. This chapter introduces a novel idea of an automated system for smartphones that prioritize application access based on the owner's usage patterns and daily routine to conserve battery life. This system will serve two purposes: save battery power and improve the smartphone's artificial intelligence.

INTRODUCTION

Power conservation has become an increasingly important issue among modern digital system designers. As the digital technology evolution takes us into the 21st century coupled with ground breaking system performance, the power consumed by these systems are at record highs. Smartphones and other portable devices have been most affected by this growing trend since users depend on the mobility that battery powered electronic devices offer. Currently, smartphone users are faced with limited battery lifetime which is an inverse process. The more we use the smartphones, the less battery life our smartphones have.

If you own a smartphone, then you probably cannot imagine a day without it. In fact, you are probably more dependent on this portable device than you realize. Today's smartphones offer features that allow its user to accomplish a task more efficiently by providing endless access to the World Wide Web. The

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unlimited applications and built-in features are seamlessly embedded into our daily routine and tasks that once took hours to complete can now be completed with the touch of a button. Have you actually thought how many ways your smartphone is assisting your daily life?

The first handheld cellular mobile phone was developed by Motorola in 1973 and weighted 2kg (about 4.5 lbs.) ('Mobile phone', 2018). In later years, mobile phones began to add more features, which in turn, increased its value to users. Nokia, Motorola, and Blackberry introduced phones which allowed users to read and response email from anywhere. This feature was extremely popular with business professionals. This was considered the birth of the smartphone genre. Although, the first commercially available smartphone was the IBM Simon personal communicator in 1994; the Nokia 900 communicator introduced in 1996 was more popular. It had the same features as Simon but showcased a graphical web browser (Pothitos,2016). It was widely considered the first smartphone. Even so, the size of the keyboard and inputs limited its popularity. In 2006, the Blackberry was introduced which featured a full keyboard. Its popularity grew but mostly with business professionals. It became more common when Apple and Google launched their smartphone with iOS and Android in 2007 and 2008, respectively. These phones were easy to operate because they featured touch screens which displayed applications. Simply touching an application icon on the screen made the smartphone more user-friendly which led to widespread usage. In the last decade, smartphones have reached unprecedented popularity because they place the world in the palm of your hand instantly.

The advancements of smartphone functionalities have allowed it to become an indispensable part of our daily life. In fact, smartphones are replacing personal computers. For 2007-2017, the number of smartphones sold worldwide was 1.54 billion and it is projected that by 2020 this number will be 1.7 billion (Number of smartphones sold, (2018)). By 2021, 40% of the world population is predicted to own a smartphone ('Smartphones industry: Statistics & Facts'. (2018).). If you closely examine the features incorporated in the smartphones, you will notice that they use RAMs comparable to computers, the ROMs is in the scale of Gigabytes and they use a variety of sensors. Additionally, by the end of the first quarter of 2018, smartphone users have the options of choice among 3.8 million and 2 million applications in the marketplace like Google Play and Apple Appstore respectively ('Number of apps available',2018). The downside to this growing trend of increased usage is the smartphone's limitation of battery power. Currently, smartphone users are faced with limited battery lifetime or limited battery interaction which is an inverse process. The more we use the smartphones, the less battery life our smartphones have.

This growing concern of conserving battery life is the focal point of this proposed chapter. There have been several hardware-based and software-based optimization techniques introduced over the years to combat this issue. Hardware-level modifications have been highly successful. However, research has proven that techniques that are effective for one smartphone architecture may be ineffective for different architectures (Zaman & Almusalli, 2017). Software-based optimization techniques are more robust which removes platform restrictions. For these reasons, we have chosen a software level optimization technique to extend battery life.

This project will advance knowledge in artificial intelligence of portable device like smartphones, wearable devices, laptops etc. Not only that, this project's outcome will contribute to the power efficient device design which is unique for every user. The focus of this research is saving power consumption in portable device through an automated system which will be different from user to user. This research will benefit research areas of artificial intelligence and power optimization for smart devices at the same time. Other research benefitting from this sort of work include data analytics and automation.