Rapid proliferations of mobile devices—as the preferred platform for people to work, socialize, and play—have created many new opportunities to develop innovative solutions. The rise of tablets and smart phones has enabled users across all age groups to easily create, share, and consume multimedia contents and services, anywhere and at anytime. Most of the current generation smart phones are equipped with high-quality image/video camera, high-speed Internet connectivity, and sensors for context awareness, such as time, location, lighting conditions, motion, and object proximity, thus promoting rich social and mobile multimedia interactions.

Mobile and multimedia researchers worldwide are starting to adopt and fully leverage the latest devices’ capabilities to deliver innovative solutions for many real-world applications. For example, delivery of online education via mobile video streaming (Ulrich, et al., 2010), smart mobility via mobile transit information for public transports (Ferris, et al., 2010), and personalized health delivery via mobile interfaces (Liu, et al., 2011). Such applications can potentially solve grand challenges and improve current societies and environments, and will inspire new techniques for context-aware multimedia data analysis, mobile interaction design frameworks, and ultimately revolutionize the traditional mobile multimedia systems.

Mobile multimedia researchers and engineers need to design, develop, and evaluate mobile application prototype(s) to test new algorithms (e.g. face recognition for smartphone [Choi, et al., 2011]), and innovative paradigms for mobile interactions, such as gesture-based browsing in mobile devices (Wachs, et al., 2011) and substance abuse prevention using mobile app (Marsch, 2012). To gain the knowledge of tools and methodologies available for developing and programming on mobile devices, most of the available resources have focused on teaching general skills to equip aspiring programmers to develop applications that are ready to sell. Such resources may not be entirely relevant for researchers, as they need to primarily learn how to develop prototypes for testing and evaluation purposes, instead of a product. On the other hand, multimedia researchers require more in-depth knowledge on using specific components and tools for their research projects, such as image processing, objects recognition, sensors processing, and user-interactions logging.

While many mobile-multimedia innovations seem to be directed from technological perspectives, there is a need for a strong balance of attention to the user interaction issues as the emerging platforms create new ways for people to achieve tasks and activities. User-driven innovations lead to adaptations in techniques, methodologies, and approaches during research experiments, including the design, programming, development, and evaluation of mobile multimedia tools and applications.

This book aims to provide an intersection between the latest research findings in the area of mobile multimedia, and the latest tools and methodologies for developing prototypes for testing and evaluating theoretical frameworks. A particular focus will be given to understanding how to use mobile platforms for
research development projects. The book compiles chapters written from the perspective of researchers who work in mobile platforms, and who share their case studies, tips, and tricks, in order to inspire and quick start researchers’ skills in developing novel solutions for the emerging mobile platforms.

The book is organized into four sections: Methodologies and Tools; Sensor-Based Interactivity; Accessibility Technology; and Health and Environmental Monitoring.

**Section 1:** Methodology and Tools contains four chapters that provide an overview of the methodology and tools used for mobile multimedia research, including some case studies.

Chapter 1 (by Dekker et al.) proposes a rapid and reflective model of real deployment of high-fidelity prototypes, borrowing the best habits of industry, where the researcher relinquishes tight control over their prototype in exchange for an opportunity to observe patterns of use that would be intractable to plan for in a controlled study. The approach moves the emphasis in prototyping, away from evaluation, and towards exploration and reflection.

Chapter 2 (by Song et al.) will help researchers to understand the tools and methodologies for a user-driven study on the quality of experience in mobile videos, by providing examples on the scoping of issues, user study methods, and data analysis examples. Through the presented case study, readers will explore challenges and opportunities in mobile video research, and identify potential improvements for future research.

Chapter 3 (by Nunes et al.) presents a strategy for modeling aspect-oriented variations for product line software, which provides support to manage different media (photo, music, and video) on mobile devices. Their experiment demonstrates the synergy and benefits of integrating two existing approaches: use cases and crosscutting.

Chapter 4 (by Rouillard) describes the development process of a scientific experiment in which a mobile application will be used to determine which modality (e.g. touch, voice, QRcode) is preferred for entering expiration dates of food products. The experiment on “pervasive fridge” case study demonstrates the benefits and limitations of AppInventor framework as the visual development tool.

**Section 2:** Sensor-Based Interactivity contains four chapters that focus on achieving engaging, context-aware, and intuitive user interactions by leveraging mobile devices’ multimodal sensors.

Chapter 5 (by Sang et al.) presents a framework and algorithms for contextual and personalized mobile recommendation systems. As people are increasingly using their phones as a personal concierge to discover what is around and deciding what to do, mobile recommendation becomes important to understand user intent and simplify task completion on the go. The presented algorithms exploit mobile query data for local business recommendation, and mobile check-in record to assist activity planning.

Chapter 6 (by Fitz-Walter et al.) explores opportunities and challenges in the use of mobile applications and sensing for gamification, which means turning day-to-day activities into fun and engaging tasks. The proposed framework and its case study will demonstrate the benefits of adding achievements to mobile applications for engaging university students to participate in events and accomplish tasks during an orientation period.
Chapter 7 (by Lee et al.) presents a context-aware smart TV system with body-gesture control and personalized recommendation. It focuses on the design of a body control system that recognizes and interprets human gestures as machine commands to control TV, new social tag-based method to recommend most suitable multimedia contents to users, and a context-aware platform that takes into account different environmental situations in order to make the best recommendations.

Chapter 8 (by Mehigan et al.) discusses the development of intelligent and personalized user models for mobile learning, along with the subsequent benefits for learners. The use of biometric technologies for the identification of visual or verbal learners in mobile learning environments is discussed, with a focus on the use of accelerometer sensors. A user interface model is presented, designed to intelligently identify the user’s learning style and adapt learning content accordingly in mobile learning environments.

**Section 3: Accessible Technology** contains two chapters that discuss emerging mobile-multimedia applications for accessible computing.

Chapter 9 (by Crowley et al.) presents the opportunities in monitoring users’ emotions using brain controller interfaces to build ubiquitous, minimally invasive, mobile systems. Tracking how a user interacts with a system, and the emotion-based responses that are invoked as they interact with the system, yield very valuable datasets for the development of intelligent, adaptive systems.

Chapter 10 (by Mehigan et al.) describes the development of a Navigational Interface for Visitors and Blind Students on Campus, and the ongoing user testing to assess the viability of the interface for use by vision-impaired people. Technologies such as Bluetooth, and the compass and accelerometer are combined to accurately orient the user, providing feedback on their exact location on campus.

**Section 4: Health and Environment Monitoring** contains two chapters that explore emerging mobile-multimedia applications for health and environment monitoring.

Chapter 11 (by Aboelfotah et al.) focuses on ubiquitous multimedia data access in electronic health care systems. It introduces issues and challenges in remote access to medical data in different settings, and provides a background on the different software technologies used in the medical systems that have been proposed for use in these settings. It presents a comprehensive overview and qualitative analysis of the functional aspects of these different medical systems.

Chapter 12 (by Law et al.) presents the framework, real-world experiment, and evaluation for a mobile application that aids vegetation assessment and assists beginners with on-site guidance for conducting the survey. A Windows Phone mobile application, BioCondition Assessment Tool, was developed to provide on-site guidance to beginners and document the assessment process for future revision and comparison. The application was tested at Samford Conservation Park, Australia.

The target audience of this book includes professionals and researchers working in multiple disciplines, especially in mobile multimedia fields, as the case studies demonstrate how to rapidly develop prototypes for image, video, audio, and other sensor-related research projects in emerging mobile devices.

*Dian Tjondronegoro*

*Queensland University of Technology, Australia*

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REFERENCES


