

Android Laboratory

Mobile Applications Laboratory, University of Bologna

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Overview

The Android Laboratory is a 32-hours module within the Course on Mobile Application Laboratory, for the undergraduate students of Computer Science and "Informatica per il Management", University of Bologna. The goal of this module is to introduce the basics of mobile applications development for Android-based terminals (e.g. smartphones and tablets). We do not aim at providing an exhaustive insight of the latest releases of the Android platforms. Instead, we aim at presenting the essential concepts of software deployments for mobile and battery-constrained devices, at introducing the main characteristics and components of the Android projects, and at providing the minimum know-how required to develop (from scratch) mobile applications for the Android architecture, at increasing levels of complexity.

Contacts

The lectures on Android will be held by [Dr. Luca Bedogni](#). Please contact him: lbedogni@cs.unibo.it if you have any question about the module. The responsible of the course on Mobile Application Laboratory is prof. [Luciano Bononi](#).

Program and Resources

Here is the (preliminary) program of the Android Module. In the first part of the module, we introduce the Android architecture, and we describe the core components of an Android application, i.e.: Activities, Resources, Intents, Widget and Events, Broadcast Receivers, Notifications. In the second part of the module, we show how to deploy more-sophisticated mobile applications that might -for instances- offer geo-localization functionalities (through Google Maps API), utilize network connectivity (through Bluetooth API), interact with sensors (through the Arduino platform), etc. Although the main focus is on Android-smartphones, we will provide some lectures on Android-programming for tablet devices. For each lecture, we provide the slides and some application examples.

- The Android Class [[PDF](#)]
- Installing the Android SDK [[PDF](#)]
- The Android Architecture [[PDF](#)]
- The Android Resources System [[PDF](#)] [[CODE](#)]
- Android Activities and Fragments [[PDF](#)] [[CODE](#)]
- Android Intents [[PDF](#)] [[CODE](#)]
- Android Layouts [[PDF](#)] [[CODE](#)]
- Android Widgets and Events [[PDF](#)] [[CODE](#)]
- Android Animation, Menu, Dialog and Toasts [[PDF](#)] [[CODE](#)]
- Android Services [[PDF](#)] [[CODE](#)]
- Android Data Management [[PDF](#)] [[CODE](#)]
- Android Google Maps Support [[PDF](#)] [[CODE](#)]
- Kotlin for Android [[Slides](#)]
- Android Network [[PDF](#)] [[CODE](#)]
- Android System Services [[PDF](#)] [[CODE](#)]

Students' Seminars

Scheduled seminars

Lori Flynn, Will Klieber, "Smartphone Security", IEEE Pervasive Computing	Matteo del Vescovo, Bruno Marafini	10/3/2017
Volker Turau, Julian Ohrt, "Cross-Platform Development Tools for Smartphone Applications", Computer	Simone Dondi, Dario Floris	10/3/2017
Yongtae Park, Seungho Kuk, Inhye Kang, Hyogon Kim, "Overcoming IoT Language Barriers Using Smartphone SDRs", IEEE Transactions on Mobile Computing	Riccardo Contigiani, Davide Marchi, Margherita Donnici	10/3/2017
Sonell Raman, Kevin Streff, Yong Wang, "Smartphone Security Challenges", Computer	Alessandro Bandini, Filippo Peterlini, Matteo Rontauoli	10/3/2017
M. Ciman; K. Wac, "Individuals' stress assessment using human-smartphone interaction analysis," in IEEE Transactions on Affective Computing	Costanza Laudisa, Federica Merendi, Benedetta Correa	10/3/2017
Yohan Chon, E. Talipov, Hojung Cha, "Content Sharing over Smartphone-Based Delay-Tolerant Networks", IEEE Transactions on Mobile Computing	Luca Sparvoli, Iacopo Talevi, Lorenzo Gasparini	10/3/2017
L. Zhang et al., "Accurate online power estimation and automatic battery behavior based power model generation for smartphones," 2010 IEEE/ACM/IFIP International Conference on Hardware/Software Codesign and System Synthesis (CODES+ISSS)	Lorenzo Antonio Pappalardo, Luca Lasciarrea	17/3/2017
Alexander De Luca, Janne Lindqvist, "Is secure and usable smartphone authentication asking too much?", Computer	Gabriele Casanova, Luca Federzoni	17/3/2017
Trinh Minh Tri Do, Daniel Gatica-Perez, "The Places of Our Lives: Visiting Patterns and Automatic Labeling from Longitudinal Smartphone Data", IEEE Transactions on Mobile Computing	Francesco Badiali, Ricardo Milton Balestra, Francesco Polisena	17/3/2017
Juan R. Terven, Joaquin Salas, Bogdan Raducanu, "New Opportunities for Computer Vision-Based Assistive Technology Systems for the Visually Impaired", Computer	Benedetta Bastoni, Julienne Mirabella	17/3/2017
Guang Tan, Mingming Lu, Fangsheng Jiang, Kongyang Chen, Xiaoxia Huang, Jie Wu, "Bumping: A Bump-Aided Inertial Navigation Method for Indoor Vehicles Using Smartphones", IEEE Transactions on Parallel and Distributed Systems	Andrea De Silvio, Riccardo Molinari	17/3/2017
Dwarakanath R. et al, Analyzing the Influence of Instant Messaging on User Relationship Estimation, on Proceeding of 2016 IEEE International Conference on Mobile Services (MS)	Alessandro Leone, Chiara Comandini	17/3/2017
Daniel Aranki, Gregorij Kurillo, Posu Yan, David M. Liebovitz, Ruzena Bajcsy, "Real-Time Tele-Monitoring of Patients with Chronic Heart-Failure Using a Smartphone: Lessons Learned", IEEE Transactions on Affective Computing	Riccardo Rolfini, Andra Maria Saceanu	24/3/2017
"Measuring Variance between Smartphone Energy Consumption and Battery Life", Computer	Rossana Poli, Sara Cattin	24/3/2017
Jiadi Yu, Yingying Chen, Jianda Li, "Color Scheme Adaptation to Enhance User Experience on Smartphone Displays Leveraging Ambient Light", IEEE Transactions on Mobile Computing	Giulia Cantini, Michelangelo Monoriti	24/3/2017
Guillermo Suarez-Tangil, Juan E. Tapiador, Flavio Lombardi, Roberto Di Pietro, "Alterdroid: Differential Fault Analysis of Obfuscated Smartphone Malware", IEEE Transactions on Mobile Computing	Andrea Scorza, Davide Hu	24/3/2017
Yan Wang, Yingying Jennifer Chen, Jie Yang, Marco Gruteser, Richard P. Martin, Hongbo Liu, Luyang Liu, Cagdas Karatas, "Determining Driver Phone Use by Exploiting Smartphone Integrated Sensors", IEEE Transactions on Mobile Computing	Davide Schiavi, Simone Siena, Francesco Mascarello	24/3/2017
Hongwei Xie, Tao Gu, Xianping Tao, Haibo Ye, Jian Lu, "A Reliability-Augmented Particle Filter for Magnetic Fingerprinting Based Indoor Localization on Smartphone", IEEE Transactions on Mobile Computing	Stefano Leggio, Filippo Bottonelli	24/3/2017
Eduardo Cuervo, Aruna Balasubramanian, Dae-ki Cho, Alec Wolman, Stefan Saroiu, Ranveer Chandra, and Paramvir Bahl. 2010. MAUI: making smartphones last longer with code offload. In Proceedings of the 8th international conference on Mobile systems, applications, and services (MobiSys '10).	Matteo Del Vecchio, Simone Preite, Alessio Innocenzi	31/3/2017

Boya Di, Tianyu Wang, Lingyang Song, Zhu Han, "Collaborative Smartphone Sensing Using Overlapping Coalition Formation Games", IEEE Transactions on Mobile Computing	Mirko Mazzini, Andrea Alfiero, Andrea Carlo Toniolo	31/3/2017
William Enck, Peter Gilbert, Seungyeop Han, Vasant Tendulkar, Byung-Gon Chun, Landon P. Cox, Jaeyeon Jung, Patrick McDaniel, and Anmol N. Sheth. 2014. TaintDroid: An Information-Flow Tracking System for Realtime Privacy Monitoring on Smartphones. ACM Trans. Comput. Syst. 32	Alessio Koci, Alessandro Fabbri, Riccardo Costanzo	31/3/2017
"Smartphones in Mental Health: Detecting Depressive and Manic Episodes", IEEE Pervasive Computing	Riccardo Laghi, Alessandro Serra, Vincenzo Morelli	7/4/2017
Lin Zhong, Ahmad Rahmati, "Studying Smartphone Usage: Lessons from a Four-Month Field Study", IEEE Transactions on Mobile Computing	Adriano Cardace, Alessio Tosto, Gabriele Fabbri	7/4/2017
Chaocan Xiang, Panlong Yang, Chang Tian, Lan Zhang, Hao Lin, Fu Xiao, Maotian Zhang, Yunhao Liu, "CARM: Crowd-Sensing Accurate Outdoor RSS Maps with Error-Prone Smartphone Measurements", IEEE Transactions on Mobile Computing	Vincenzo Mattarella, Giuseppe Pedulla, Francesco Gregori	7/4/2017
Cardone, Foschini, Bellavista, Corradi, Borcea, Talasila, Curtmola, "Fostering ParticipAction in Smart Cities: A Geo-Social Crowdsensing Platform", in IEEE Communication Magazine	Debora Mandrioli, Matilde Pannella, Giampaolo Malavolta	7/4/2017
Dejun Yang, Guoliang Xue, Xi Fang, and Jian Tang. 2012. Crowdsourcing to smartphones: incentive mechanism design for mobile phone sensing. In Proceedings of the 18th annual international conference on Mobile computing and networking (Mobicom '12).	Matteo Sanfelici, Pietro Danza, Matteo Marchesini	7/4/2017
Prashanth Mohan, Venkata N. Padmanabhan, and Ramachandran Ramjee. 2008. Nericell: rich monitoring of road and traffic conditions using mobile smartphones. In Proceedings of the 6th ACM conference on Embedded network sensor systems (SenSys '08)	Stefano Pardini, Stefania Lusuardi, Fausto Carano	21/4/2017
Ian Warren, Andrew Meads, Satish Srirama, Thiranjith Weerasinghe, Carlos Paniagua, "Push Notification Mechanisms for Pervasive Smartphone Applications", IEEE Pervasive Computing	Davide De Martino, Alessandro Andolfo, Vincenzo De Luca	21/4/2017
Felix Gomez Marmol, Gregor Rozinaj, Sebastian Schumann, Ondrej Labaj, Juraj Kacur, "Smart AppStore: Expanding the Frontiers of Smartphone Ecosystems", Computer	Fabio Trigari, George Daniel Lungu, Nicola Rocco Cascione	21/4/2017
Lingjie Duan, Takeshi Kubo, Kohei Sugiyama, Jianwei Huang, Teruyuki Hasegawa, Jean Walrand, "Motivating Smartphone Collaboration in Data Acquisition and Distributed Computing", IEEE Transactions on Mobile Computing	Sara Minardi, Giulia Mitri, Sophie Lacordais	21/4/2017
Yongpan Zou, Guanhua Wang, Kaishun Wu, Lionel M. Ni, "SmartScanner: Know More in Walls with Your Smartphone!", IEEE Transactions on Mobile Computing	Giada Salvatori, Anna Avena, Simona Daniela Pralea	21/4/2017
"Enabling Smart Camera Networks with Smartphone Processors", Computer vol. 48 no. 4, p. 56-63, , 2015	Alessandro Fagnani, Federico Peconi, Gabriele Orazi	21/4/2017
Kaikai Liu, Xinxin Liu, Xiaolin Li, "Guoguo: Enabling Fine-Grained Smartphone Localization via Acoustic Anchors", IEEE Transactions on Mobile Computing	Lorenzo Biagio Lanzarone, Cristian Romanello	28/4/2017
Yepang Liu, Chang Xu, S. C. Cheung, Jian Lu, "GreenDroid: Automated Diagnosis of Energy Inefficiency for Smartphone Applications", IEEE Transactions on Software Engineering	Federico Nardi, Pietro Neri, Riccardo Stefoni	28/4/2017
Bin Guo, Zhiwen Yu, Daqing Zhang, Huilei He, Jilei Tian, Xingshe Zhou, "Toward a Group-Aware Smartphone Sensing System", IEEE Pervasive Computing	Olga Becci, Sara Brolli, Giacomo Rizzi	28/4/2017
S.K. Datta, C. Bonnet, N. Nikaein, "Android Power Management: Current and Future Trends	Luca D'Ambrosio, Pierluigi Tartabini, Andrea Ercolessi	28/4/2017
Mohammad-Mahdi Moazzami, Dennis E. Phillips, Rui Tan, Guoliang Xing, "ORBIT: A Platform for Smartphone-Based Data-Intensive Sensing Applications", IEEE Transactions on Mobile Computing	Francesco Galloni, Alexei Amato, Arber Sefgjini	28/4/2017

Survey of Smartphone-based sensing in vehicles for intelligent transportation system applications	Roberto Cocomazzi, Bartolomeo Lombardi	5/5/2017
Controlling a robot using brain waves	Stefano Pesare, Michela Tiscia, Silvia Di Fiore	5/5/2017
Preliminary study on activity monitoring using an android smart-watch	Francesca Ventruto, Leila Chehab, Marica Ferri	5/5/2017
Xinglin Zhang, Zheng Yang, Zimu Zhou, Haibin Cai, Lei Chen, Xiangyang Li, "Free Market of Crowdsourcing: Incentive Mechanism Design for Mobile Sensing", IEEE Transactions on Parallel and Distributed Systems	Andrea Cusmai, Ihor Formanyuk	5/5/2017

Available papers

Books

- Massimo Carli, Android: Guida per lo sviluppatore, Apogeo.
- Marko Margenta, Learning Android, O'Reilly.

Projects

In the following, we provide possible hints for the project, strongly enouraging the students in adding new features and additional customizations to the proposed applications:

- Project description [[Full description \(PDF\)](#)] [[Short Presentation](#)]

Links

Here is a list of Android related videos. With this, video, you'll see how Android could cooperate and communicate with platforms such as Andruino and NFC tags.

- [Android and NFC](#)
- [Android Open Accessory Demo Kit](#)

Here is a list of related courses on the Android platforms held in other Italian universities, and also of on-line tutorials on Android software development:

- [Sistemi Mobili](#), CdS Laurea Magistrale in Ing. Informatica, Bologna.
- [Android Developers Tutorial](#), Android Project WebPage.