

Real-time Android



RTAndroid makes real-time Android possible. It provides support for applications with real-time requirements while preserving all benefits of Android. Extended system components augment the new platform with a predictable and deterministic real-time behavior on different levels. By creating a reliable execution environment for general purpose mobile devices, RTAndroid can be used as a low-cost platform for data monitoring and visualization or in the field of industrial automation and control.

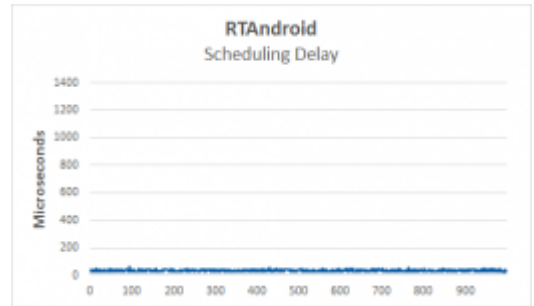
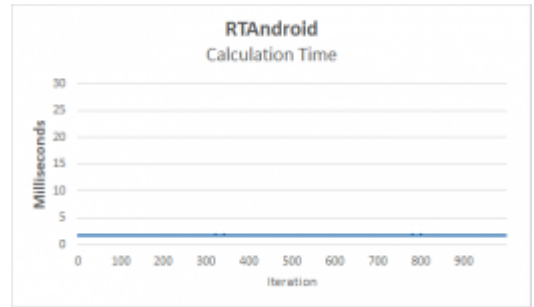
The platform has been carefully designed based on many years of experience in Android and real-time systems to preserving the standard Android application programming model, as well as the full compatibility to already existing Android components and third-party software.

General Information

RTAndroid was developed by the Embedded Software Laboratory at RWTH Aachen University and provides a reliable execution environment for applications with real-time requirements on common mobile devices. The platform benefits from Android's high usability and its wide range of supported hardware. The application framework and the original system API are extended with functionality that turn Android into a predictable and deterministic soft real-time system. Due to the fact that RTAndroid is fully backward compatible to the original Android platform, application development is just as comfortable as for the stock Android platform. Android is built upon a Linux kernel, which has been modified in RTAndroid to allow deterministic priority-based process scheduling. Furthermore, RTAndroid introduces a number of additional features to ensure a reliable process execution:

- Predictable interprocess communication using Intent broadcasting
- Non-blocking, real-time capable garbage collection
- Extended system services for bypassing Android's low memory process killer
- Isolation of the running real-time application on one of the available CPUs

The synergy of the described techniques allows predictable execution times and significantly reduced latencies.



Industrial Android with emteria.OS



A brand new industrial Android release for Raspberry Pi 3 and dedicated industrial hardware platforms was published under a new name **emteria.OS**. It has been developed from scratch based on the latest Android 7 release from Google and includes all recent bugfixes, additional features, simplified installation process and support for commercial applications. Test it for free at <https://emteria.com> and provide us your feedback in the new discussion forum.

Contact

Dr. Igor Kalkov ik@emteria.com

Publications

[KGK15]

[PDFBIB](#)

Kalkov, I., Gurchian, A., and Kowalewski, S., "Priority Inheritance during Remote Procedure Calls in Real-Time Android using Extended Binder Framework", in *Proc. 13th International Workshop on Java Technologies for Real-time and Embedded Systems (JTRES)*, 2015 in JTRES '15, ACM, p.

5:1-5:10.

Priority Inheritance during Remote Procedure Calls in Real-Time Android using Extended Binder Framework

Bibtex entry :

```
@inproceedings { KGK15,  
  author = { Kalkov, Igor and Gurghian, Alexandru and Kowalewski,  
Stefan },  
  title = { Priority Inheritance during Remote Procedure Calls in  
Real-Time Android using Extended Binder Framework },  
  booktitle = { 13th International Workshop on Java Technologies for  
Real-time and Embedded Systems (JTRES) },  
  series = { JTRES '15 },  
  publisher = { ACM },  
  publishedas = { Druck Online },  
  isbn = { 978-1-4503-3644-4 },  
  language = { eng },  
  pages = { 5:1--5:10 },  
  year = { 2015 },  
  timestamp = { 2015.10.09 },  
  illkey = { conference },  
  illprojectkey = { RTAndroid },  
  url = { http://publications.embedded.rwth-aachen.de/file/5z },  
  for_reporting_period = { 2015 },  
}
```

[KKOT15]

[PDFBIB](#)

Kowalewski, S., Kalkov, I., Obster, M., and Thönnessen, D., "Echtzeiterweiterung für Android: SPS inside", *IEE - Elektrische Automatisierung + Antriebstechnik*, pp. 58-61, 2015

Echtzeiterweiterung für Android: SPS inside

Bibtex entry :

```
@article { KKOT15,  
  author = { Kowalewski, Stefan and Kalkov, Igor and Obster, Mathias  
and  
Th{"o}nnessen, David },  
  title = { Echtzeiterweiterung f{"u}r Android: SPS inside },  
  journal = { IEE - Elektrische Automatisierung + Antriebstechnik },  
  year = { 2015 },  
  pages = { 58--61 },  
  publisher = { IEE },  
  publishedas = { Online Druck },  
  issn = { 1434-2898 },  
  illkey = { journal },  
  language = { ger },
```

```
url = {  
http://www.iee-online.de/wp-content/uploads/sites/9/2015/01/IEE_02_2015  
_web.pdf },  
timestamp = { 2017.09.07 },  
for_reporting_period = { 2015 },  
}
```

[KGK14]

[PDFBIB](#)

Kalkov, I., Gurchian, A., and Kowalewski, S., "Predictable Broadcasting of Parallel Intents in Real-Time Android", in *Proc. 12th International Workshop on Java Technologies for Real-time and Embedded Systems (JTRES)*, 2014, ACM, pp. 57-66.

Predictable Broadcasting of Parallel Intents in Real-Time Android

Bibtex entry :

```
@inproceedings { KGK14,  
author = { Kalkov, Igor and Gurchian, Alexandru and Kowalewski,  
Stefan },  
title = { Predictable Broadcasting of Parallel Intents in Real-Time  
Android },  
booktitle = { 12th International Workshop on Java Technologies for  
Real-time and Embedded Systems (JTRES) },  
publisher = { ACM },  
publishedas = { Druck Online },  
isbn = { 978-1-4503-2813-5 },  
language = { eng },  
pages = { 57 -- 66 },  
year = { 2014 },  
timestamp = { 2014.10.14 },  
illkey = { conference },  
illprojectkey = { RTAndroid },  
url = { http://publications.embedded.rwth-aachen.de/file/5g },  
for_reporting_period = { 2014 },  
}
```

[OKK14]

[PDFBIB](#)

Obster, M., Kalkov, I., and Kowalewski, S., "Development and Execution of PLC Programs on Real-Time Capable Mobile Devices", in *Proc. 19th IEEE International Conference on Emerging Technologies and Factory Automation (ETFA)*, 2014, IEEE.

Development and Execution of PLC Programs on Real-Time Capable Mobile Devices

Bibtex entry :

```
@inproceedings { OKK14,
```

```
author = { Obster, Mathias and Kalkov, Igor and Kowalewski, Stefan
},
title = { Development and Execution of PLC Programs on Real-Time
Capable Mobile Devices },
booktitle = { 19th IEEE International Conference on Emerging
Technologies
and Factory Automation (ETFA) },
publisher = { IEEE },
publishedas = { Druck Online },
isbn = { 978-1-4799-4845-1 },
language = { eng },
year = { 2014 },
timestamp = { 2014.09.17 },
illkey = { conference },
illprojectkey = { RTAndroid },
url = { http://publications.embedded.rwth-aachen.de/file/5e },
for_reporting_period = { 2014 },
}
```

[AFKK13]

[PDFBIB](#)

Armoush, A., Franke, D., Kalkov, I., and Kowalewski, S., "An Approach for Using Mobile Devices In Industrial Safety-Critical Embedded Systems", in *Proc. 5th International Conference on Mobile Computing, Applications and Services (MobiCASE)*, 2013, Springer, p. 4.

An Approach for Using Mobile Devices In Industrial Safety-Critical Embedded Systems

Bibtex entry :

```
@inproceedings { AFKK13,
author = { Armoush, Ashraf and Franke, Dominik and Kalkov, Igor and
Kowalewski, Stefan },
title = { An Approach for Using Mobile Devices In Industrial
Safety-Critical Embedded Systems },
booktitle = { 5th International Conference on Mobile Computing,
Applications and Services (MobiCASE) },
publisher = { Springer },
publishedas = { Online },
language = { eng },
pages = { 0 -- 4 },
year = { 2013 },
timestamp = { 2013.11.11 },
illkey = { conference },
illprojectkey = { RTAndroid },
url = { http://publications.embedded.rwth-aachen.de/file/56 },
for_reporting_period = { 2013 },
}
```

[GKS+13]

PDFBIB

Gerlitz, T., Kalkov, I., Schommer, J., Franke, D., and Kowalewski, S., "Non-Blocking Garbage Collection for Real-Time Android", in *Proc. 11th International Workshop on Java Technologies for Real-time and Embedded Systems (JTRES)*, 2013, ACM, pp. 108-117.

Non-Blocking Garbage Collection for Real-Time Android

Bibtex entry :

```
@inproceedings { GKS+13,
  author = { Gerlitz, Thomas and Kalkov, Igor and Schommer, John and
    Franke, Dominik and Kowalewski, Stefan },
  title = { Non-Blocking Garbage Collection for Real-Time Android },
  booktitle = { 11th International Workshop on Java Technologies for
    Real-time and Embedded Systems (JTRES) },
  publisher = { ACM },
  publishedas = { Druck Online },
  isbn = { 978-1-4503-2166-2 },
  language = { eng },
  pages = { 108 -- 117 },
  year = { 2013 },
  timestamp = { 2013.10.07 },
  illkey = { conference },
  url = { http://publications.embedded.rwth-aachen.de/file/4v },
  for_reporting_period = { 2013 },
}
```

[KFSK12]

PDFBIB

Kalkov, I., Franke, D., Schommer, J. F., and Kowalewski, S., "A Real-time Extension to the Android Platform", in *Proc. 10th International Workshop on Java Technologies for Real-time and Embedded Systems (JTRES)*, 2012, ACM, pp. 105-114.

A Real-time Extension to the Android Platform

Bibtex entry :

```
@inproceedings { KFSK12,
  location = { Copenhagen, Denmark },
  author = { Kalkov, Igor and Franke, Dominik and Schommer, John F.
    and
    Kowalewski, Stefan },
  title = { A Real-time Extension to the Android Platform },
  booktitle = { 10th International Workshop on Java Technologies for
    Real-time and Embedded Systems (JTRES) },
  publisher = { ACM },
  publishedas = { Druck Online },
  isbn = { 978-1-4503-1688-0 },
  language = { eng },
  pages = { 105 -- 114 },
```

```
year = { 2012 },
timestamp = { 2012.08.13 },
i11key = { conference },
i11projectkey = { RTAndroid },
url = { http://publications.embedded.rwth-aachen.de/file/57 },
for_reporting_period = { 2012 },
}
```

From:

<https://embedded.rwth-aachen.de/> - **Lehrstuhl Informatik 11 - Embedded Software Laboratory**

Permanent link:

<https://embedded.rwth-aachen.de/doku.php?id=en:tools:rtandroid>

Last update: **2018/06/22 14:34**

