

# **International Workshop on *Design Principles for Next Generation Embedded Computing Systems***

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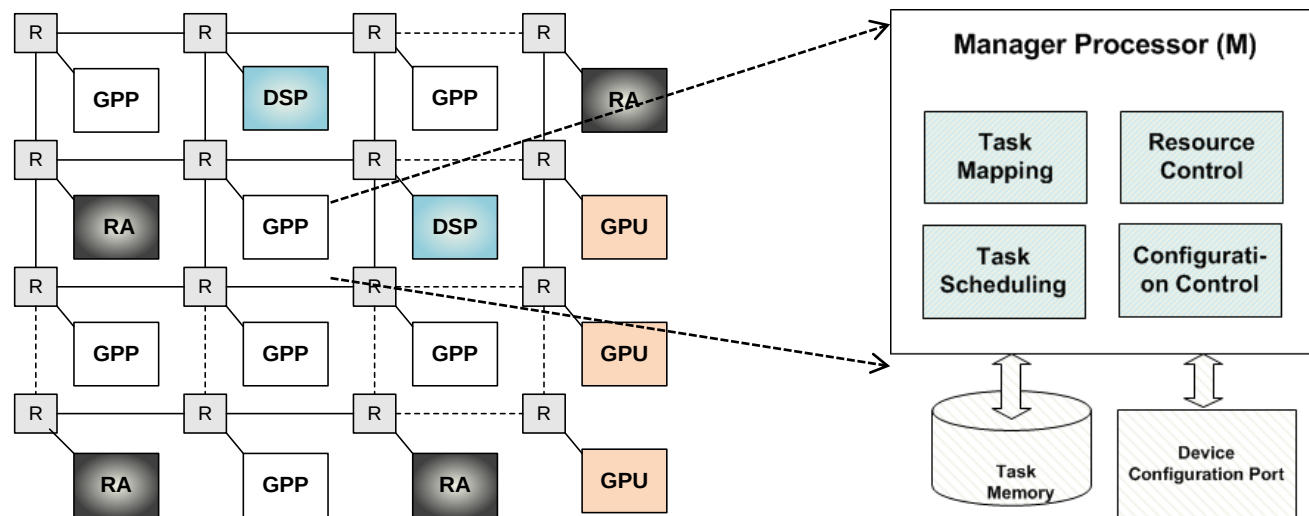
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# **Envisioned future and design challenges for next generation embedded systems**

# Future Research Direction

- Multi-objective optimization of Heterogeneous Multi/Many-cores



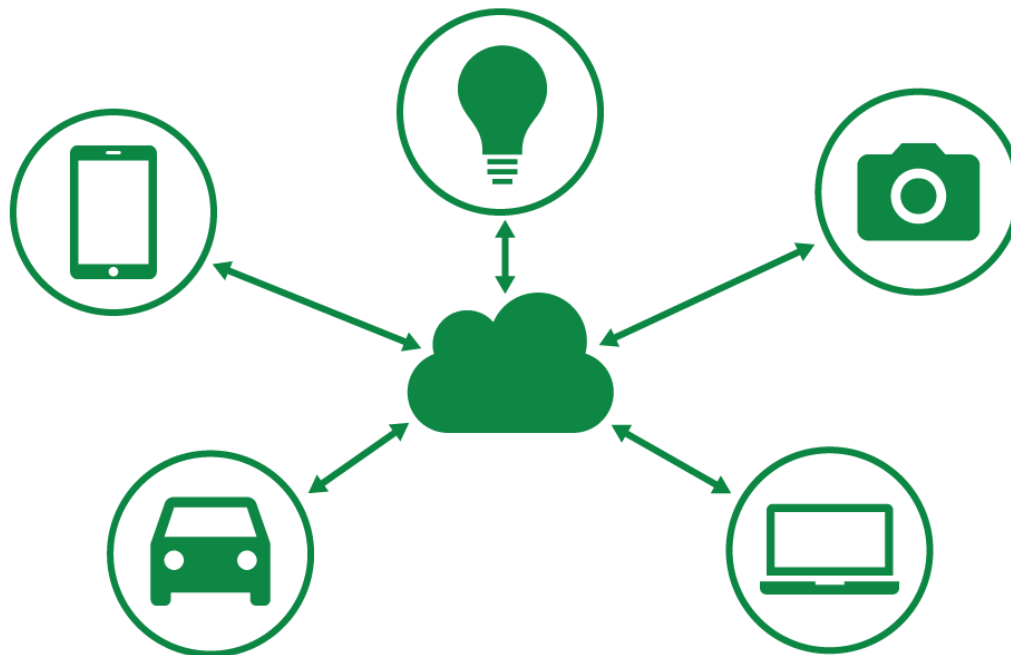
- For several metrics, e.g. execution time, energy, temperature, reliability, security

# Envisioned Future Work

- Hierarchical Management for Multi-cluster Mobile Platforms
  - With increasing application complexities and technological advancement, the number of clusters is expected to increase.
    - A MediaTek processor contains three clusters.
  - This will require hierarchical management, where a local manager will need to manage a cluster and all the local managers will coordinate with a global manager.
  - To further alleviate the management complexity, a cluster will need to be managed with more than one sub-cluster and thus sub-managers
    - e.g., a cluster of four cores in Samsung Galaxy S10 supporting voltage/frequency scaling differently at sub-cluster level (for two cores)
  - Finding the best hierarchical management policy is challenging.

# Envisioned Future Work

- Secure and Green Multi-core IoT Infrastructure



Handling issues of immense power constraints, immense power needs and potential security threats.

# Reference

- **Dynamic Energy and Thermal Management of Multi-Core Mobile Platforms: A Survey**

Amit Kumar Singh, Somdip Dey, Karunakar Reddy Basireddy, Klaus McDonald-Maier, Geoff Merrett, Bashir Al-Hashimi  
*IEEE Design and Test (D&T) Special Issue on Mobile Platforms, 2020*

- **Thermal Management in Embedded, High-Performance and Cloud Computing Systems: Current Trends and Path Forward**

Amit Kumar Singh

*Huawei's 12th International Electronics Cooling Technology Workshop, 12-November-2020*

**Invited**

- **Similar talks at ARM and Samsung research**

# Acknowledgement

- **DreamCloud EU project and its members**
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**Thank You!**

Questions?