# CS5052 – Data Intensive Systems

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# Workload Management for Dynamic Mobile Device Clusters in Edge Femtoclouds

Karim Habak, Mostafa Ammar, Ellen W. Zegura, Khaled A.Harras

## INTRODUCTION:

The number of mobile devices connecting to the internet has *significantly increased* in recent years. These devices are often used for running compute-intensive applications such as **machine learning, video processing and augmented reality.**

However, the limited resources of these devices, such as *battery life* and *processing power* can make it difficult to run applications efficiently. An alternative to centralised cloud computing services is edge computing. Edge computing may have benefits including reduced wide-area network congestion, improved responsiveness due to lower latency, and possibly improved privacy due to data being kept locally to the edge.

The paper discusses *Femtoclouds,* an edge computing system that leverages small base stations and can further improve the performance of mobile devices by providing them with access to nearby resources.
It **addresses the full requirements of workload management** and the authors develop a *system architecture* that relies on the cloud to efficiently control and manage a Femtocloud.

The authors evaluate the system by implementing a prototype on Android devices. Using simulation to isolate and study the impact of the workload management mechanisms and test the system at scale. They also propose resource allocation techniques to optimise resource *utilization and minimize energy consumption.*

**OBJECTIVE :**

*The management of the workload of dynamic mobile device clusters in edge Femtoclouds seems to be the core concern* that the paper addresses. The authors emphasised that existing practices are either too complicated or require too much energy to be effective.

To maximise the performance of the edge Femtoclouds while minimising the energy consumption of mobile devices, a proposed solution was developed.

Three key parts make up the proposed workload management system: *a central controller*, *a task scheduler*, and *a resource allocator*. Data on the cluster's mobile devices' current resource usage and energy consumption are collected by the centralised controller.

The task scheduler receives requests from the mobile devices to execute tasks and determines which device should execute the task based on the current resource availability and energy consumption of the devices. Finally, the resource allocator is responsible for dynamically allocating resources to the mobile devices based on the current workload.

## NOVELTY :

Seeing as it provides a workable answer to the issue of controlling the workload of dynamic mobile device clusters in edge Femtoclouds, the suggested method is regarded as *novel*.

The authors provide a novel approach to a recurring issue in the area of edge computing. The suggested alternative is based on a workload management algorithm that enhances energy-efficient edge Femtocloud performance. The solution can be used in a variety of industries that rely on edge computing, such as the *Internet of Things (IoT).*

The problem and the solution are closely examined in the paper. The authors did not, however, contrast their suggested approach with other alternatives currently being used in the industry. As a result, it is challenging to evaluate the novelness of the suggested solution or its effectiveness in comparison to current methods.

## APPLICATIONS :

Numerous applications for the proposed workload management system occur in a wide variety of domains, including healthcare, smart cities, and industrial IoT.

In healthcare, the system could be used to manage the workload of mobile health applications that require compute-intensive processing, such as **medical imaging analysis and real-time monitoring of patient data.**

The technology could be deployed in smart cities to control the workload of mobile devices that are used for **environmental monitoring, public safety, and traffic management.** The system could be implemented in Industrial IoT to control the workload of mobile devices that are used for quality control and predictive maintenance.

## EVALUATION :

Utilizing simulations, the proposed workload management system was evaluated. The **OMNeT++ network simulator** was used to do the simulations. A dynamic mobile device cluster of 20 mobile devices and 5 base stations was used in the simulations.

The simulations assessed the workload management system's efficiency in terms of resource use, energy use, and task completion time. The simulation results demonstrated that, in terms of resource usage and energy efficiency, the proposed system performed better than the alternatives.

The simulations also demonstrated that the suggested system could manage dynamic variations in the workload, including changes in job quantity and resource requirements. Due to the system's ability to dynamically assign resources to mobile devices based on the workload at hand, both resource usage and energy consumption were optimised.

Since the evaluation is based on simulations, those simulations might not *correctly reflect real-life scenarios.* As a result, the validity of the simulation results may be undermined. The evaluation's validity is also hindered by the authors' failure to contrast their suggested solution with other ones already being used.

## CONCLUSION :

To manage the workload of dynamic mobile device clusters in edge Femtoclouds while preserving energy, the paper offers a viable solution. The proposed method is novel and has the potential to transform the field of edge computing. To evaluate its efficacy and innovation, the authors could have contrasted their suggested solution with other current systems.

Additionally, as the evaluation of the suggested remedy is based on simulations, these results may not be wholly accurate. The effectiveness and viability of the suggested remedy must therefore be properly evaluated through additional testing and evaluation.

## QUESTIONS TO ASK THE AUTHORS :

- What inspired you to focus on the workload management issue in edge Femtoclouds?
- How does your proposed method compare to other edge computing systems that are already in use?

- Can you give us more information about the simulations that were performed to assess the suggested solution? Exactly how accurate are these simulations?
- What practical uses do you anticipate for your suggested solution?
- What other work in this field are you planning to conduct?

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