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Notice for the PhD Viva Voce Examination

Ms Sharon Poornima, Registration Number: 2170008, PhD Scholar at the Department of Computer Science, School of Sciences, CHRIST (Deemed to be University) will defend her PhD thesis at the public viva-voce examination on Friday, 22 May 2026 at 10.30 am in Room No. 628, 6th Floor, R&D Block, CHRIST (Deemed to be University), Bengaluru - 560029, Karnataka, India.

Title of the Thesis	:	A Self-Organizing Microservice Composition Model for Smart Healthcare Ecosystem
Discipline	:	Computer Science
External Examiner - I	:	Dr John T Abraham Professor Department of Computer Science Bharata Mata College (Autonomous) Thrikkakara, Kochi - 682021 Kerala
External Examiner - II	:	Dr Poonam Professor Nowrosjee Wadia College Bund Garden Road Sangamvadi, Pune - 411001 Maharashtra
Supervisor	:	Dr Ashok Immanuel V Professor Department of Computer Science School of Sciences CHRIST (Deemed to be University) Bengaluru - 560029 Karnataka

The members of the Research Advisory Committee of the Scholar, the faculty members of the Department and the School, interested experts and research scholars of all the branches of research are cordially invited to attend this open viva-voce examination.

Registrar (Academics)

Place: Bengaluru
Date: 18 May 2026

ABSTRACT

Modern IoT-enabled healthcare ecosystems need an adaptive and dynamic service composition approach to overcome the challenges of the open nature of IoT-powered systems. Conventional service composition frameworks typically rely on centralized control, lack real-time adaptability, and are unable to effectively handle run-time dynamism and composition failures. These challenges are overcome by utilizing self-organized service composition, a well-known bottom-up approach. The synopsis presents a novel Self-organizing Microservices using Intelligent Learning (SMIL) model aimed at overcoming the limitations of traditional service composition approaches in dynamic healthcare environments powered by IoT devices. The SMIL model establishes decentralized microservice interactions and enables autonomous service choreography without the need for centralized control. The model integrates a hybrid machine learning framework combining Random Forest and XGBoost to accurately classify medical conditions and prescribe treatment plans in real time, achieving high accuracy on authentic clinical datasets. The inclusion of a deep learning agent, supported by Self-organizing Maps (SOM) for unsupervised learning, facilitates emergent and valid service sequences that adapt dynamically to patient requirements. The model enables predictive service composition through learning, supporting the preloading of services and thereby reducing latency in critical care scenarios. Further, it incorporates a multi-objective optimization algorithm, NSGA-II with Horizontal Crossover (NSGA-II+HC), to select optimal service combinations by minimizing execution time while considering key Quality of Service (QoS) parameters such as reliability and cost. This research contributes to real-time, adaptive healthcare service composition in IoT-enabled environments. The model has strong deployment potential in critical care environments, particularly NICUs, offering a scalable and responsive solution that enhances neonatal patient safety, reduces treatment delays, lowers waiting time and cost, and strengthens automated healthcare delivery. Future research will aim to incorporate adaptive Quality of Service (QoS) parameters into the service composition process for multiple treatment plans. This enhancement is intended to provide personalised treatment while ensuring resilient and seamless service delivery within a dynamic, IoT-driven healthcare ecosystem.

Keywords: *Self-Organization, Emergence, Service Composition, IoT healthcare, Hybrid Learning, QoS-aware service selection.*

Publications:

1. **S. Poornima** and A. Immanuel, "Suitability of self-organizing service composition approach for smart healthcare ecosystem: A study," SHS Web of Conferences, vol. 139, p. 03020, 2022, doi: 10.1051/shsconf/202213903020.
2. **S. Poornima** and A. Immanuel, "Self-Organizing Micro Service Composition for IoT Ecosystem," 2025 6th International Conference on Mobile Computing and Sustainable Informatics (ICMCSI), Goathgaun, Nepal, 2025, pp. 273-279, doi: 10.1109/ICMCSI64620.2025.10883497.
3. **S. Poornima** and A. Immanuel, "Self-Organizing Microservice Composition for IoT-Enabled Neonatal Monitoring," 2025 International Conference on Advances in Modern Age Technologies for Health and Engineering Science (AMATHE), Shivamogga, India, 2025, pp. 1-5, doi: 10.1109/AMATHE65477.2025.11081365.