

# Marcellinus Aroli

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## PROFILE SUMMARY

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High-performance C++ Software Engineer with 6+ years of experience delivering in-silico cardiac electrophysiology simulators at MetaHeart (Computational Medicine Laboratory). Specializes in accelerating large-scale numerical simulations using MPI and CUDA on Linux, consistently improving runtime and reliability in research-grade software.

## EDUCATION

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<b>PhD of Engineering</b> <i>Kumoh Institute of Technology</i>	expected August 2026
<b>Master of Engineering</b> <i>Kumoh Institute of Technology</i>	August 2018
<b>B. Sc. Information Technology</b> <i>President University</i>	September 2015

## RELEVANT COURSEWORK

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Computational Physiology | Algorithm and Data Structure | Differential Equation | Applied Mathematics | Software Engineering

## PROFESSIONAL EXPERIENCE

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<b>Computational Medicine Laboratory (MetaHeart) – Software Engineer &amp; Team Manager</b>	Sep 2018 – Present
<ul style="list-style-type: none"><li>• Designing and developing CardioSim, a C++-based cardiac electrophysiology simulation platform used by students and researchers for modeling and analysis.</li><li>• Implementing parallel programming with MPI and CUDA in performance-critical simulation kernels, improving overall runtime by approximately 30%.</li><li>• Building and maintaining a Qt Widgets-based GUI for CardioSim, enabling intuitive setup, execution, and visualization of complex simulation experiments.</li><li>• Collaborating with researchers to translate mathematical and physiological models into robust C++ components.</li><li>• Managing the development team and tracking their development progress with their respective works.</li></ul>	
<b>PT iForce Indonesia – Software Engineer (as vendor for Maybank Indonesia)</b>	Dec 2015 – Aug 2016
<ul style="list-style-type: none"><li>• Improved and extended Maybank's Online Customer Registration System, delivering new features to streamline onboarding and automate document handling.</li><li>• Built and integrated scanned-document processing modules using the OpenText API, enabling accurate extraction of 15+ data fields per document and reducing manual data entry by ~40%.</li><li>• Refactored key backend components to improve performance, reducing average document-processing time from ~12 seconds to ~7 seconds (~ 40% faster).</li><li>• Collaborated closely with business analysts and technical teams to translate requirements into scalable, maintainable solutions aligned with banking compliance standards.</li><li>• Optimized processing workflows by refactoring legacy components, resulting in more reliable performance and reduced processing errors.</li></ul>	

### **Aprisma Indonesia – IT Support (as vendor for ANZ Indonesia)**

Jan 2012 – Jan 2014

- Resolved technical issues for 500+ internet banking users per month, helping maintain 99.9% system uptime and high customer satisfaction.
- Designed and implemented middleware integrations enabling credit card point redemption in online marketplaces within the Internet Banking platform.
- Coordinated deployment of 10+ major system updates, ensuring minimal downtime and adherence to banking security and compliance standards.
- Collaborated with cross-functional teams to analyze customer requirements and deliver solutions that improved system performance by approximately 15%.
- Monitored and tuned internet banking application and middleware components, proactively reducing incidents by around 20% through early detection.

## **TECHNICAL SKILLS & CERTIFICATION**

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Computer-related:

C/C++ | Qt | CUDA | MPI | Linux | Java

Language:

English: TOEIC 990, IELTS 6.0

Korean: KIIP 1 (as equal as TOPIK 1)

## **PROJECT EXPERIENCE**

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### **MetaHeart – CardioSim Electrophysiology Simulator** (<http://cardiosim.metaheart.kr:8080/>)

- Developed a high-performance cardiac electrophysiology simulator with an emphasis on numerical accuracy and computational efficiency.
- Implemented core simulation algorithms in classic C++, ensuring robust memory management (with pointers and references), deterministic execution, and minimal overhead.
- Optimized nonlinear ODE/PDE numerical solvers for simulating cardiac action potentials, reducing simulation time by up to 30% with the correct parameters.
- Designed and built the GUI using Qt, enabling intuitive visualization and interaction with complex electrophysiology models.
- Refactored legacy components into modular, testable C++ classes, improving maintainability and overall code quality.
- Implemented multi-threaded workloads using MPICH and CUDA GPU to accelerate simulation loops on multi-core architectures.
- Ensured numerical correctness through unit testing, validation against published electrophysiology models, and reproducibility checks.
- Integrated file I/O pipelines for simulation parameters, logs, and visualization outputs (JSON/CSV/binary formats).
- Collaborated in the design of the simulator architecture, ensuring scalable code structure suitable for future extensions (e.g., tissue-level modeling).

## **HONORS & AWARDS**

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### **KOSOMBE Best Poster Presentation Award**

May 2023

- Recognized for an exemplary presentation for my laboratory project, CardioSim.