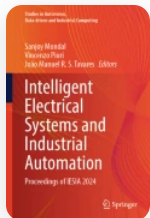


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Checkpoint-Aware Droplet Routing Avoiding Cross-Contamination on Cyber-Physical Cross-Referencing DMFBs

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[Intelligent Electrical Systems and Industrial Automation](#)

(IESIA 2024)

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Abstract

A Digital Microfluidic Biochip (DMFB) performs several bioassays involving discrete fluid droplets with high precision, which is prone to actuation tampering attacks in real-life scenarios. Static checkpoints (optical sensors) are embedded to detect such attacks. Cross-contamination (in any cell, including checkpoint) is an unavoidable issue while reusing the on-chip resources. Moreover, electrode interference problem is another key problem of droplet routing on biochips with low number of pins like cross-referencing biochips. Neither checkpoint-contamination nor electrode interference have been considered in the existing works regarding checkpoint-aware routing. Our proposed method performs a cross-contamination-aware checkpoint assignment on a cross-referencing biochip, followed by an electrode interference free checkpoint-aware routing, intra-, and inter-assay washing to ensure overall safety of an assay operation.

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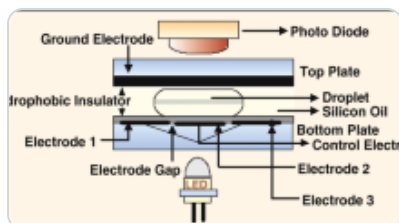
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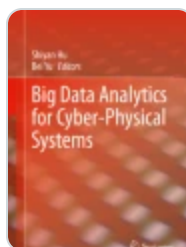
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Acknowledgements

First Author is supported by UGC-NET Junior Research Fellowship provided by University Grants Commission, India (NTA Reference No. 210520102302). Second Author has received support for research from Centre of Excellence for Data Science, IEM, Kolkata.

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Cite this paper

Majumdar, R., Datta, P., Pal, R.K. (2024). Checkpoint-Aware Droplet Routing Avoiding Cross-Contamination on Cyber-Physical Cross-Referencing DMFBs. In: Mondal, S., Piuri, V., Tavares, J.M.R.S. (eds) Intelligent Electrical Systems and Industrial Automation. IESIA 2024. Studies in Autonomic, Data-driven and Industrial Computing. Springer, Singapore.
https://doi.org/10.1007/978-981-97-6806-6_5

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DOI	Published	Publisher Name
https://doi.org/10.1007/978-981-97-6806-6_5	29 November 2024	Springer, Singapore

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