

## CURRICULUM VITAE: Emmanuel Effah, PhD

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### PROFILE SUMMARY

Dedicated ICT researcher and educator with over a decade of experience in Artificial Intelligence, IoT, and Smart Systems design. RSIF PhD alumnus and RSIF-JIRA Grant Principal Investigator with a proven track record in executing high-impact, interdisciplinary research aligned with the PASET thematic area on ICTs. Passionate about systematic research synthesis, capacity building, and translating research into practical solutions for sustainable development across Sub-Saharan Africa.

## 1. EDUCATION

### Academic Degrees Earned with Dates

<i>Degrees/Certificates</i>	<i>Date</i>
• PhD (Computer Science), Université Gaston Berger (UGB), Senegal	Feb. 2022
• MSc (Information Technology), Open University of Malaysia, Malaysia	Aug. 2013
• BSc(hons) (Electrical/Electronic Engineering) University of Mines and Technology (UMaT), Tarkwa, Ghana	Jun. 2009

## 2. PROFESSIONAL EXPERIENCE

<i>Date</i>	<i>Positions/Ranks Held</i>
<b>2022 ---Date:</b>	<i>Senior Lecturer</i> , Dept. of Computer Science and Eng., UMaT, Ghana
<b>2025 ---Date:</b>	<i>Head</i> , Department of Computer Science and Eng., UMaT, Ghana
<b>2015 – 2022:</b>	<i>Lecturer</i> , Dept. of Computer Science and Eng., UMaT, Ghana
<b>2013 – 2015:</b>	<i>Assistant Lecturer</i> , Dept. of Computer Science and Eng., UMaT, Ghana
<b>2022---2025</b>	Departmental Exams Officer, Dept. of Computer Science and Eng., UMaT, Ghana

**2022—Date**                    **Foundation President, Rsif Alumni Network (RAN)**, Partnership for Skills in Applied Sciences, Engineering and Technology- Regional Scholarship and Innovation Fund (PASET-RSIF)-Funded PhD Scholars, icipe, Kenya. It is The World Bank’s Project.

### **3. RESEARCH EXPERIENCE AND COLLABORATIONS**

2022 – 2025                    **Principal Investigator (PI)**, Robust and Affordable Smart Agri-IoT Technology (Agri-IoT Project) Grant (Grant Ref: RSIF/JIRA/004) funded Project by the World Bank through RSIF/JIRA, icipe, Kenya.

2023 – 2024                    **Principal Investigator (PI)**, RAMSTECH Project that Custom-built prototypes of an air quality monitoring system that measures PM 2.5, HUMIDITY, TEMPERATURE, AND AQI of a sample air, with the results sent to the cloud for visualisation on a mobile app, funded by the Ghana Chamber of Mines-Tertiary Education Fund (GCM-TEF), Ghana.

2024– 2025                    **Co-Principal Investigator (PI)**, **AQUA MONITOR** project, which builds prototypes of a real-time water quality monitoring system that measures the pH, turbidity, and TDS of a sample of water, with the results sent to the cloud and visualized on a mobile App, funded by the Ghana Chamber of Mines-Tertiary Education Fund (GCM-TEF), Ghana.

2023 -- Date                    **Senior Personnel**, Investigating mercury biogeochemical cycling via mixed-methods in complex artisanal gold mining landscapes and implications for community health, NSF-DISES IMPACT Project (Grant No. PTE 2307870)

2023 – 2024                    **Lead Trainer**, Ladies in Mining and Allied Professions (LiMAP)/Cummins Ghana Project that trained 120 scientists in AI and IoT-based Smart Systems Development

2022-2023                    **Lead Trainer and Technical Consultant**, Mechanized Irrigation-based Intelligent Farming Approach for Ghana, a Project funded by the Ghana Chamber of Mines Tertiary Educational Fund (GCM-TEF).

2014 – 2016                    **Research Associate**, United Nations Project on Women in Artisanal and Small-scale in Africa Project.

2014 – 2016                    **Team Member**, International Growth Centre, UK project on ‘Informalisation’ of Ghana’s Small-Scale Gold Mining Economy: Drivers and Policy Implications.

2010 – 2015                    **Research Associate**, Climatic extremes, mining, and Mycobacterium ulcerans: a coupled systems perspective (Funded by the National Science Foundation, USA).

## THESIS SUPERVISION

**Thesis Supervision:** 30 Undergraduates and 5 Postgraduates, Dept. of Computer Science and Eng., UMaT, Ghana

**RESEARCH INTERESTS:** Agri-IoT, Smart Systems, Artificial Intelligence, Cloud-based Machine Learning, Low-Cost Sensing Technologies, Multihop Wireless Sensor Networks, ICT for Development (ICT4D)

## 5. SELECTED PUBLICATIONS (20 out of 41)

1. Sitti, M., **E. Effah**, V. M. Nofong, and W. A. Agangiba, (2025), "A Survey: Lightweight Blockchain Privacy-Preserving techniques for Smart Cameras in Agriculture 4.0." *Ghana Journal of Technology* 9, no. 1, pp. 23-55.
2. **E. Effah**, G. Aggrey, O. L. Frimpong, L. Ephraim, D. Aidoo, J. K., Nunoo, S., **Effah, E.** and Agangiba W. A. (2025), "Survey: Fundamentals of Agri-IoT, Security Challenges and Proposed Remedies", *Ghana Journal of Technology*, Vol. 9, No. 1, 2025, pp. 56-61.
3. **Effah, E.**, Thiare, O. and Wyglinski A. (2024), "Hardware Evaluation of Cluster-based Agricultural IoT Networks", *IEEE Access*, vol. 12, pp. 33628-33651.
4. **Effah, E.**, Gharthey, G., Aidoo, J. K. and Thiare, O. (2024), "Hardware Development and Evaluation of Multihop Cluster-Based Agricultural IoT Based on Bluetooth Low-Energy and LoRa Communication Technologies", *Sensors-MDPI*, vol. 24(18), pp. 1-29.
5. **E. Effah**, S. Mensah, and J. K. Aidoo (2024), "Comparative Analysis of Convolutional Neural Network (CNN) and Transfer Learning in Breast Cancer Detection", *Ghana Journal of Technology (GJT)*, Vol 8, No 1, pp. 31-40.
6. Asare Kyei, A. D. Amponsah, J.J. Arthur and E. K. Agbodemegbe (2024), "Survey: The Evolution and Applications of Turing Machine", *International Journal of Computer Science and Information Security (IJCSIS)*, Vol. 22, No. 3, pp. 1-7.
7. J. K. Aidoo, S. Nunoo and **E. Effah** (2024), "A Novel Genetic Evolution and Linear Feedback Shift Register Based Pseudo-random Number Generator for Internet of Things", *International Journal of Computer Science and Information Security (IJCSIS)*, Vol. 22, No. 4, pp. 1-7.
8. G. E. Y. Okai, **E. Effah**, E. M. Martey, W. A. Agangiba, and S. Mensah (2024), "Smart Farming Solutions: A Case Study of IoT-Driven Automatic Irrigation Systems for Mining Communities in Ghana", *Ghana Journal of Technology (GJT)*, Vol 8, No 1, pp. 1-10.
9. **Effah, E.**, Thiare, O., & Wyglinski, A. M. (2023). A Tutorial on Agricultural IoT: Fundamental Concepts, Architectures, Routing, and Optimization. *IoT-MDPI*, 4(3), pp. 265-318.
10. Umaru M. Y., **Effah E.**, Minta F. and Essilfie A. (2023) "In-depth IoT-based Home Automation System for Ghana's Context," *International Journal of Research and Scientific Innovation*, *International Journal of Research and Scientific Innovation (IJRSI)*, vol. 10(11), pp. 521-530.

11. **Effah, E.**, Umaru M. Y., Dodoo F.N.D., Gharthey G. and Akogo K.K. (2023), " Smart Road Accident Prevention System for Revenue Generation in Ghana", *International Journal of Computer Science and Information Security (IJCSIS)*, vol. 1, pp. 1-11.
12. **Effah, E.**, Umaru, M. Y. and Mensah E. O. (2022), "A Context-Relevant Smart Water Quality Monitoring Testbed for Mining Communities in Ghana", 2022 IEEE/IET International Utility Conference and Exposition (IUCE-2022)-IEEE Explore, pp. 1-6.
13. **Effah, E.**, Okai, G. E. Y. and Aidoo, J. K. (2022), "Smart Anti-Theft Water Metering System", 2022 IEEE/IET International Utility Conference and Exposition (IUCE-2022)-IEEE Explore, pp. 1-5.
14. **Effah, E.**, Thiare, O. and Wyglinski A. (2020), "Multi-Objective Optimization Modeling of Clustering-Based Agricultural Internet of Things," *IEEE Access*, pp. 1-5, doi: 10.1109/VTC2020-Fall49728.2020.9348460.
15. **Effah, E.**, Thiare, O. and Wyglinski A. (2020), "Energy-Efficient Multihop Routing Framework for Cluster-based Agricultural Internet of Things (CA-IoT)," 2020 IEEE Access, 2020, pp. 1 – 5, doi: 10.1109/VTC2020-Fall49728.2020.9348608.
16. **Effah, E.** and Thiare O. (May 2019) "Estimation of Optimal Number of Clusters: A New Approach to Minimizing Intra-Cluster Communication Cost in WSNs." *IJITEE* ISSN: 2278-3075, Volume-8 Issue-7S2, pp. 521-524.
17. Dogbe, A., **Effah, E.**, and Annan, R. K. (2019). Global System for Mobile (GSM) Communication-Based Smart-Prepaid Energy Meter Monitoring System. *Research and Applications: Embedded System*, vol. 2, no. 3, pp 1-12.
18. **Effah, E.** and Thiare, O. (2018) " Survey: Faults, Fault Detection and Fault Tolerance Techniques in Wireless Sensor Networks, " *IJCSIS*, vol. 16, no. 10 October 2018, pp. 1-14.
19. **Effah E.**, Kabanda S., Owusu-Adjei E. (2019) "Using Motion Detection and Facial Recognition to Secure Places of High Security: A Case Study at Banking Vaults of Ghana", *Intelligent Systems and Applications Springer, Cham*, vol. 868, pp. 504-520.
20. **Effah, E.** and Thiare, O. (2018), " Survey: Faults, Fault Detection and Fault Tolerance Techniques in Wireless Sensor Networks", *IJCSIS*, Vol. 16, No. 10, pp. 1-14.
21. **Effah, E.** and Thiare, O. (2018), "Survey: Faults, Fault Detection and Fault Tolerance Techniques in Wireless Sensor Networks", *International Journal of Computer Science and Information Security (IJCSIS)*, Vol. 16, No. 10, pp. 1-14
22. **Effah, E.** and Dorgloh, W. (2016), "GSM Controlled Irrigation System (GSMCIS) for Vegetables Farmers in Ghana", *Ghana Journal of Technology*, Vol. 1, No. 1, pp. 21 - 24.

## 6. PROFESSIONAL AFFILIATIONS

### *Professional Titles*

- Member, Institute of Electrical and Electronics Engineers
- Member, International Association of Engineers
- Member, Internet Society, Ghana Chapter

### *Date*

June 2020 - date  
 May 2022 – date  
 May 2022 -- Date

## 7. AWARDS AND HONORS

<i>Scholarships/Sponsorship Awards</i>	<i>Date</i>
<ul style="list-style-type: none"> <li>Partnership for Skills in Applied Sciences, Engineering and Technology- Regional Scholarship and Innovation Fund (PASET-RSIF), The World Bank's Higher Education Project for Africa</li> </ul>	Mar. 2018 – Feb. 2022
<ul style="list-style-type: none"> <li>Best Thesis Award, 2013, Open University of Malaysia (OUM), Malaysia</li> </ul>	Aug. 2013
<ul style="list-style-type: none"> <li>Brilliant but Needy Student Award, Electrical and Electronic Engineering Department, UMaT, Tarkwa</li> </ul>	Sept. 2006

## 8. REFERENCES

**Professor Richard Akwasi Amankwah, Vice-Chancellor,**  
 University of Mines and Technology, P. O. Box 237, Tarkwa, Ghana  
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