Iman Mohamed Atef Helal, PhD

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Academic Degrees

All from the Faculty of Computers and Information, Cairo University, Egypt

- PhD, Information Systems, March 2017
- MSc, Information Systems, January 2011
- B.Sc., Information Systems, July 2006

Positions

Cairo University – Faculty of Computers and Artificial Intelligence

- 2022 – Now: Associate Professor, Information Systems Department
- 2017 – 2022: Assistant Professor, Information Systems Department
- 2011 – 2017: Lecturer, Information Systems Department
- 2006 – 2011: Teaching Assistant, Information Systems Department

Research Experience

- **Current and Recent Research Projects:**

  1. ***Overcoming Robotics Process Automation (RPA) Challenges: With A Combined Approach*** (2021-now)
     - RPA is a technique that enables businesses to automate everyday actions (or routines) carried out by human users on their computer systems' application User Interfaces (UI). The UI log can store data on different routines, with their operations interspersed in a fashion that mirrors the order in which the user conducted them. However, it is difficult to automate the assignment of user's actions to particular procedures in UI log. This presents the log segmentation issue. We present a method for automatically deriving the routine behaviors (i.e. segments) as recorded in an unsegmented log. The method was applied and compared to a state-of-the-art method over different UI logs.

  2. ***An Integrated Framework for Implementing Intelligent Robotic Process Automation***, (2021-now)
     - We aim at handling exceptions that may occur through robotic process automation which are not handled by robots. Also, we aim to implement cognitive decision capabilities in intelligent automation through the integration of machine learning and artificial intelligence approaches. Finally, we aim to monitor the health of the robots to proactively adapt to changes in business rules and to achieve continuous maintenance of intelligent robots in operation for longer-term use.

  3. ***Compliance Checking of Process Data using Graph Databases***, (2021-now)
     - Our focus is on how to represent huge event data using a graph database in a good and efficient way. Also, how to perform compliance checking on top of a graph database can decrease processing time.

4. ***Automated Human Resource Recommendation for Business Processes: A Machine Learning-Based Approach***, (2021-now)
    - In this research an automatic resource recommendation approach for business processes using machine learning is proposed to maximize the efficiency of resource utilization and optimize business performance. So, we are motivated to utilize Machine Learning for runtime resource recommendation.

5. ***Monitoring Collaborative Business Processes***, (2020-now)
    - We propose a model to verify the correctness of the designed CBP using the existing business process monitoring techniques. This model should detect deviations of the designed CBP, Violations of (Service Level Agreement SLA, time, or BP activities).

6. ***A Proposed Enhanced Model for Information Systems Outsourcing***, (2019-now).
    - We investigate the lack of outsourcing models that consider all the aspects affecting an organization's performance, such as: financial and strategic factors. We propose an enhanced model for outsourcing that addresses all these factors as well as other factors that affect the trust between all parties while using smart contracts.

- **Closed Projects**

    1. ***IS Risk Governance for Cloud Computing Services***, (2019-2023)
        - We analyze in depth the risks generated while using cloud computing. The primary goals of IS/IT Governance are to assure that the investments in IS/IT generate business values, and to mitigate the risks that are associated with IS/IT. However, most comprehensive framework/models don't support the needed controls to ensure risks assessment in an appropriate way over different types of cloud computing services as each service has different risks. We aim to provide a model to support these needed controls which abide with IS/IT governance standards, policies, and procedures.

    2. ***Enhancing Systems Integration in Large-Scale Software Projects***, (2019-2023).
        - We analyze in depth the challenges facing large-scale software projects and focus on identifying and analyzing the weaknesses and strengths of the main current frameworks published in the literature and/or used as best practices in the industry. We aim to overcome these challenges by presenting a novel framework that keeps the strengths of existing frameworks and amends their weaknesses.

    3. ***Grafting Blockchain Technology onto Auditing using Process Mining Techniques***, (2019-canceled)
        - We target enabling IS auditing on blockchain technology and study the impacts of blockchain on existing IS auditing standards and guidelines. Also, we aim to provide an auditing benchmark with process mining techniques and enhance blockchain applications using process mining models.

    4. ***A Proposed Approach for Auditing Big Data Governance***, (2018-2023).
        - The approach provides the most suitable policies, standards, and metrics controls. It can help the auditor to assess big data throughout its entire lifecycle and to ensure an effective and efficient usage of data to achieve organization goals.

    5. ***A Framework for Developing an Enhanced and Integrated IS Auditing Tool***, (2017-2022).

- The tool uses the existing standards and procedures of the audit process to ensure that all auditing tasks are addressed. It covers all auditing phases, starting from planning and ending with producing audit report.

6. ***An Integrated Tool for Auditing and Controlling Information Systems Cyber Security***, (2017-2019).
   - We focus on building a framework for an integrated tool that makes the process of cybersecurity easier and more comprehensive for IS auditors. The functional specifications of the tool are based on an analysis of more than 70 security tools to specify the functionality needed to build an integrated tool for IS auditors.

7. ***A Human-Resource Recommendation Approach Based on Enterprise Historical Data***, (2015-2019).
   - We introduce a novel approach to investigate the co-working history of resources and recommend a resource that has the best harmony with the rest of the resources. Best Position Algorithms (BPA and BPA2) are implemented with this approach to recommend the resource that has the highest overall score.

- **PhD Thesis**
  - ***Towards Monitoring Compliance of Business Processes***.
  - **Description:** We designed algorithms to deduce missing information from the incoming stream of events and modified a monitoring framework to support the presented algorithms to detect possible violations.
  - **Tools:** Python, Java, C# (for simulating event streams and applying Esper)

- **MSc Thesis**
  - ***A design approach for active rules***.
  - **Description:** We designed a model for representing active rules and presented a tool supporting this model.
  - **Tools:** Eclipse Modeling tools (EMF, GMF, and XText)

- **Graduation Project**
  - ***Component-based Educational Portals***.
  - **Description:** We present a set of components that can be integrated together to design any educational portal for any educational institute.
  - **Tools:** J2EE (JSPs and Servlets), HTML and XML, JavaScript for validation

Teaching Experience

- **Postgraduate courses**
  - Business Process Modeling and Workflow Systems
  - Requirements Engineering
  - Advanced Topics in Information Systems - 1
  - Advanced Information Systems Engineering
  - Advanced Topics in Database Engineering

- **Undergraduate courses**
  - Business Process Management
  - Business Process Mining

- Software Engineering
- Analysis and Design of Information Systems - 1
- Analysis and Design of Information Systems - 2
- Introduction to Information Systems
- Introduction to Database Management Systems
- Advanced Database Management Systems
- Data Warehousing
- Management Information Systems
- Internet Applications
- Discrete Mathematics
- Technical Writing

Technical Skills

- **Programming Languages and Technologies**
  - Java - J2EE (JDBC, Applets, JSP, Servlets, Ajax), J2SE
  - Python
  - C#
  - Java Script, HTML, PHP and XML
  - Fair working knowledge of: Power Builder, R, and Perl.

- **RAD, CASE and IDE**
  - PyDev
  - Rational Rose, XDE
  - Eclipse, and Eclipse modeling tools (EMF, GMF, XText)
  - Power designer
  - JBuilder
  - SELECT SSADM
  - UML

- **Operating Systems**
  - Windows
  - Macintosh
  - Ubuntu

- **Database Management Systems - DBMS:**
  - MySQL
  - MS SQL Server + Analysis Services
  - SQLite
  - Attended VLDB summer school (2007)

- **Business Process Management and Mining:**
  - ProM Tools versions (5.2 – 6.12)
  - Bizagi Modeler and Studio
  - Fluxicon Disco Process Mining tool
  - Signavio Business Process Academic
  - Fair knowledge of: Bonita Studio, Celonis, Apromore, RapidMiner

- **IBM Business Analytics**

- **Dell EMC Data Science , Big Data Analytics and AI TTT workshop**

Research Publications

1. Taha, Aya; Mazen, Sherif A; Helal, Iman MA; IFPS-RPA: Interface-based Frequent Pattern Segmentation for Robotic Process Automation 2023 Intelligent Methods, Systems, and Applications (IMSA), IEEE, Pages 610-615.(2023)

2. Montasser, Reem Kadry; Helal, Iman MA; . Process Discovery Automation: Benefits and Limitations 2023 Intelligent Methods, Systems, and Applications (IMSA), IEEE, Pages 496-501.(2023)

3. Abdelwahab, Mahmoud BM; Helal, Iman MA; . Advanced Techniques for Business Process Automation: Insights and Challenges 2023 Intelligent Methods, Systems, and Applications (IMSA), IEEE, Pages 303-308.(2023)

4. Abdelkader, Mohammed A; Mazen, Sherif A; Helal, Iman MA; LMSs: A Roadmap from Selection to Evaluation 2023 Intelligent Methods, Systems, and Applications (IMSA), IEEE, Pages 484-489 (2023).

5. Nassar, Ebtehal; Helal, Iman; Mazen, Sherif; Blockchain Interoperability Method for the Cross-organizational Transactions: A Meta-Meta-Model 2022 OkIP Books

6. Zaki, Nesma M; Helal, Iman MA; Hassanein, Ehab E; Awad, Ahmed; . Efficient Checking of Timed Ordered Anti-patterns over Graph-Encoded Event Logs International Conference on Model and Data Engineering, Springer Nature Switzerland Cham, Pages 147-161.(2022)

7. Osamah M. M. Al-Matari, Iman M. A. Helal, Sherif A. Mazen & Sherif Elhennawy (2021) Adopting security maturity model to the organizations' capability model, Egyptian Informatics Journal. Volume 22, Issue 2, Pages 193-199, https://doi.org/10.1016/j.eij.2020.08.001

8. Osamah M. M. Al-Matari, Iman M. A. Helal, Sherif A. Mazen & Sherif Elhennawy (2021) Integrated framework for cybersecurity auditing, Information Security Journal: A Global Perspective, 30:4, 189-204, DOI: 10.1080/19393555.2020.1834649

9. Elnakeep E., Helal I.M.A., Mazen S.A. (2022) Models and Frameworks for IS Outsourcing Structure and Dimensions. In: Al-Emran M., Al-Sharafi M.A., Al-Kabi M.N., Shaalan K. (eds) Proceedings of International Conference on Emerging Technologies and Intelligent Systems. ICETIS 2021. Lecture Notes in Networks and Systems, vol 299. Springer, Cham. https://doi.org/10.1007/978-3-030-82616-1_49

10. Shibl M.A., Helal I.M.A., Mazen S.A. (2022) System Integration for Large-Scale Software Projects: Models, Approaches, and Challenges. In: Al-Emran M., Al-Sharafi M.A., Al-Kabi M.N., Shaalan K. (eds) Proceedings of International Conference on Emerging Technologies and Intelligent Systems. ICETIS 2021. Lecture Notes in Networks and Systems, vol 299. Springer, Cham. https://doi.org/10.1007/978-3-030-82616-1_10

11. Gamal M., Helal I.M.A., Mazen S.A., Elhennawy S. (2022) IS Risks Governance for Cloud Computing Service. In: Magdi D.A., Helmy Y.K., Mamdouh M., Joshi A. (eds) Digital Transformation Technology. Lecture Notes in Networks and Systems, vol 224. Springer, Singapore. https://doi.org/10.1007/978-981-16-2275-5_4

12. Mervat Helmy, Sherif Mazen, Iman M. Helal, Wagdy Youssef. Analytical Study on Building a Comprehensive Big Data Management Maturity Framework, International Journal of Information Science and Management, Vol. 20, No. 1, 2022, 225-255. https://dorl.net/dor/20.1001.1.20088302.2022.20.1.13.6

13. Esheiba, L.; Helal, I.M.A.; Elgammal, A.; El-Sharkawi, M.E. A DataWarehouse-Based System for Service Customization Recommendations in Product-Service Systems. Sensors 2022, 22, 2118. https://doi.org/10.3390/s22062118

14. Iman M.A.Helal, Ahmed Awad. Online correlation for unlabeled process events A flexible CEP-based approach. Information Systems (2022) 102031. https://doi.org/10.1016/j.is.2022.102031

15. Esheiba L, Elgammal A, Helal IMA, El-Sharkawi ME. A Hybrid Knowledge-Based Recommender for Product-Service Systems Mass Customization. Information. 2021; 12(8):296. https://doi.org/10.3390/info12080296

16. Kamal S., Helal I.M.A., Mazen S.A., Elhennawy S. (2020) Computer-Assisted Audit Tools for IS Auditing. In: Ghalwash A., El Khameesy N., Magdi D., Joshi A. (eds) Internet of Things—Applications and Future. Lecture Notes in Networks and Systems, vol 114. Springer, Singapore. https://doi.org/10.1007/978-981-15-3075-3

17. Helal, I. M. A. and A. Awad, "Correlating Unlabeled Events at Runtime" at arXiv:2004.09971, 2020.

18. Kamal, S., I. M. A. Helal, S. A. Mazen, and S. Elhennawy, "Computer-Assisted Audit Tools for IS Auditing", *Internet of Things–-Applications and Future*, Singapore, Springer Singapore, pp. 139–155, 2020. DOI: 10.1007/978-981-15-3075-3_10

19. Al-Matari, O. M., I. M. A. Helal, S. A. Mazen, and S. Elhennawy, "Security Management Techniques and Tools for IS Auditing", *2019 First International Conference of Intelligent Computing and Engineering (ICOICE)*, pp. 1-8, Dec, 2019. DOI: 10.1109/ICOICE48418.2019.9035147

20. Al-Matari, O. M., I. M. A. Helal, S. A. Mazen, and S. Elhennawy, "Cybersecurity Tools for IS Auditing", *The 6th International Conference on Enterprise Systems*, Limassol, Cyprus, 2018. DOI: 10.1109/ES.2018.00040

21. Abdulhameed, N. M., I. Helal, A. Awad, and E. Ezat, "A Resource Recommendation Approach based on Co-Working History", *INTERNATIONAL JOURNAL OF ADVANCED COMPUTER SCIENCE AND APPLICATIONS*, vol. 9, issue 7, pp. 236-245, 2018. DOI: 10.14569/IJACSA.2018.090734

22. Helal, I. M. A., A. Awad, and A. ElBastawissi, "Runtime deduction of case ID for unlabeled business process execution events", *12th IEEE/ACS International Conference of Computer Systems and Applications (AICCSA),* Marrakech, Morocco, pp. 1-8, 2015. DOI: 10.1109/AICCSA.2015.7507132

23. Bayomie, D., I. M. A. Helal, A. Awad, E. Ezat, and A. ElBastawissi, "Deducing Case IDs for Unlabeled Event Logs", *13th International Business Process Management Workshops, Innsbruck, Austria, August 31 - September 3, 2015, Revised Papers*, vol. 256: pp. 242–254, Springer, 2015. DOI: 10.1007/978-3-319-42887-1_20

24. Helal, I. M. A., A. El-Bastawissy, and O. Hegazy, "ICCPN: Interval-based Conditional Colored Petri Net", *The 7th International Conference on Informatics and Systems (INFOS)*, Cairo, Egypt, IEEE, pp. 1-8, 2010. **E- ISBN:** 978-1-4244-5828-8

Academic Activities

- Reviewer in Egyptian Informatics Journal
- Member of the Program Committee of the Business Process Management & Enterprise Architecture track of the ACM/SIGAPP Symposium on Applied Computing (SAC) in 2017, 2018, 2019 and 2020.
- Participated in "Big Software on the Run" (BSR) summer school in the Netherlands, 2018.
- Member of the Organization Committee of the International Conference on Informatics and Systems (INFOS) in 2008, 2010, 2012, and 2016, Cairo, Egypt
- Member of the Quality Assurance Unit since 2016, developing Strategic Plans in Education and Learning, performing SWOT Analysis of Faculty strategic plan, and developing the Faculty General Guidelines with focus on Credibility and Ethics.

References available upon request.