Curriculum Vitae & Memorandum

Dr. Ioannis Stylios BSc., MSc., M.Ed., PhD, Postdoc
Data and Cybersecurity Scientist

Adjunct Professor (full time)
University of Ioannina
Department of Informatics and Telecommunications

Tutor and Author
University of Athens e-Learning
University of the Aegean e-Learning

Postdoctoral Researcher
University of Piraeus
Department of Digital Systems

2/2026

PERSONAL INFORMATION

Dr. Ioannis Stylios BSc., MSc., MEd., PhD, Postdoc.

University of the Aegean (Dept. of ICSE, Info-Sec-Lab)
Istylios@aegean.gr

https://www.dit.uoi.gr/staff/profile/?id=45

Google Scholar
ResearchGate
Linkedin

SUMMARY

Dr. Ioannis Stylios is a full-time Adjunct Professor at the University of Ioannina, Department of Informatics and Telecommunications. Also, he is working as a Tutor and Author at the University of Athens and the University of the Aegean e-Learning. In addition, he is a Postdoctoral Researcher at the University of Piraeus, Faculty of Information and Communication Technologies (ICT), Department of Digital Systems. He is the author of several books and textbooks (Publishers: University of Athens & University of the Aegean) and refereed papers in international scientific journals and conferences. He has been involved in several national and EU-funded R&D projects in Information and Communication Systems Security.

Education:

- Doctor of Philosophy - PhD (Unanimously "Excellent" - HFRI Scholarship) from the Department of Information and Communication Systems Engineering (ICSE), University of the Aegean.
- Master's Degree (MSc) in Information & Communication Systems Security from the University of the Aegean, Department of ICSE.
- Master of Education (MEd) in Didactics of Mathematics, Sciences, and ICT in Education: Interdisciplinary Approach, from the Department of Preschool Education and Educational Planning of the University of the Aegean.
- Bachelor of Science (BSc) in Communication Informatics & Administration from the University of Ioannina (dit.uoi.gr/alumni).
- Bachelor of Science (BSc) in History and Philosophy of Science, School of Science, National and Kapodistrian University of Athens (in progress).

Ioannis has received several honors and awards and the most recent are the following:

- *2020: Technology Transfer Plan Funding*. The Hellenic Ministry of Labour and Social Affairs, in collaboration with the Labour Employment Agency (LEA) committee, distinguished Ioannis's Ph.D. technology transfer plan. The funding amounted to €12,000.
- *2019: Scholarship of Excellence for Research.* Funded by the act "Supporting Researchers with a Focus on Young Researchers" under the "Human Resources Development, Education, and Lifelong Learning" program, co-financed by the European Union. The scholarship amount was €15,000, while the total project funding amounted to €41,000.
- *2017: Scholarship of Excellence for Doctoral Dissertation.* Ioannis was distinguished in the HFRI (Hellenic Foundation for Research and Innovation) scholarship program, selected from among 2,144 Ph.D. candidates (acceptance rate approximately 20%). The funding amounted to €23,500.

Research Interests: Artificial Intelligence, Machine and Deep Learning, Cybersecurity, Biometrics and Mobile Security, Continuous Authentication, Mobile Security and Privacy, Internet of Things, Blockchain.

CURRENT OCCUPATION

2/2025 - Now
Adjunct Professor (full time)
University of Ioannina, Department of Informatics and Telecommunications, Arta, Greece.

12/2023 - Now
Postdoctoral Researcher
University of Piraeus, School of Information and Communication Technologies (ICT), Department of Digital Systems.

1/2020 - Now
Tutor & Author
University of the Aegean, e-Learning, Samos, Greece.

9/2019 - Now
Tutor & Author
University of Athens, e-Learning, Athens, Greece.

EDUCATION

April 2016 – 23 Jan 2023
Doctor of Philosophy, PhD (HFRI Excellence Scholarship) EQF level 8

University of the Aegean, School of Engineering, Department of Information and Communication Systems Engineering, Samos, Greece.

- Research areas: Cybersecurity, Artificial Intelligence and Data Science.
- Thesis: Behavioral Biometrics for Continuous Authentication: Security and Privacy Issues.
- Grade: (Unanimously "Excellent").
- Three-member committee: Professor Spyros Kokolakis (supervisor), Associate Professor Sotirios Chatzis, Assistant professor Panagiotis Rizomiliotis.
- Online available: https://www.didaktorika.gr/eadd/handle/10442/53367

Distinctions:

- Technology Transfer Plan Funding. Amount 12.000€, August 2020.
- Scholarship of Excellence for Doctoral Dissertation from HFRI (Hellenic Foundation for Research and Innovation). Funding 23.500€, August 2017.
- Erasmus Mobility Grant for PhD Research. Amount 1800 €, May 2016.

Oct 2018 – 10 July 2020
Master of Education (MEd) in Didactics of Mathematics, Sciences and ICT in Education: Interdisciplinary Approach EQF level 7

University of the Aegean, School of Humanities, Department of Preschool Education Sciences & Educational Design, Rhodes, Greece.

- Grade: Excellent.
- Thesis: Designing a digital and robotic learning environment for interdisciplinary approach to the concept of pattern.
- Certificate of pedagogical and teaching competence.

Sep 2014 – 31 Mar 2016 | Master's Degree in Information & Communication Systems Security | EQF level 7

University of the Aegean, School of Engineering, Department of Information and Communication Systems Engineering, Samos, Greece.

- Grade: Very good.
- Thesis: Privacy Enhancing on Mobile Devices: Continuous Authentication with Biometrics and Behavioral Modalities.
- 4 academic publications in international and European peer-reviewed computing conferences.
- Scholarship for Postgraduate Research Traineeship from Erasmus+ and IKY (State Scholarship Foundation). Amount 1800 €, June 2015.

Sep 2004 – 18 Sep 2008 | BSc Degree in Communication Informatics & Administration | EQF level 6

University of Ioannina (Ex Epirus Institute of Technology), School of Informatics and Telecommunication (Ex Communication Informatics & Administration), Epirus, Greece.

- Grade: Very Good.
- Thesis: “Performance Comparison of Machine Learning Algorithms for Diagnosis of Cardiotocograms with Class Inequality”.
- One academic publication in international peer-reviewed conference.

Sep 2024 – Now | BSc Degree in History and Philosophy of Science | EQF level 6

National & Kapodistrian University of Athens, School of Science, Department of History and Philosophy of Science, Athens, Greece.

- Specialization in History and Philosophy of Science (Mixed direction).

ADDITIONAL EDUCATION

Seminars

1. “Training Adults' Trainers”. Centre of Continuing Education and Lifelong Learning, University of Macedonia. 27/3/2023 – 27/6/2023.
2. “Ethical Hacking”. 40 hours Seminar. Axxon Plus. Instructor: Theofanis Kasimis. 18/11/2016 to 17/12/2016.
3. “ERDAS IMAGINE”. Geosystems Hellas A.E. Geoinformatics Center. School of Rural and Surveying Engineering. 2/11/2014.
4. "Training Mentors – Instructors". 100-hour Seminar. Specialization in the education of people with mental health problems, and application training 2.5 months. Organization: KEK-Mental Health Centre. 28/1/2013 to 28/02/2013.
5. "Entrepreneurial Initiatives". 25 hours Seminar. Organization: Employment Agency (OAED). 8/3/2010 to 5/8/2010.

6. “Summer School - Information on the latest developments in research and technology”. Organization: NCSR Demokritos. 6 to 17/07/2009.
7. "Executives Web Application and Web Business Applications Development (e-business-PHP). 250 hours Seminar. Organization: KEK "Research". 09/01/2008 to 14/05/2008.
8. "Designers of various sectors". 600 hours Seminar. Organization: Technical Educational KEK. 6/6/2007 to 19/10/2007.
9. "GIS - Education in ArcGIS”. Three days Seminar. Organization: Marathon Data System. 16/5/2007 to 18/05/2005.

Certifications

1. PhD Research Traineeship Certificate in Information Security Research. Cyprus University of Technology, Department of Electrical Engineering, Computer Engineering and Informatics. July 2016.
2. Postgraduate Traineeship Certificate in Information Security Research. Cyprus University of Technology, Department of Electrical Engineering, Computer Engineering and Informatics. Sep. 2015.
3. "PHP – Web Authoring Professional Certificate" - Vellum Global Educational Service, License GX729085018R. May 2008.

Courses

University of the Aegean

Faculty of Engineering, Department of Information and Communication Systems Engineering, Karlovasi, Samos, Greece. Academic year: 2016-2017.

- Master’s Degree Program (MSc) in “Teaching Information and Communication Technologies”. Courses:
    1. Modern learning theories in Education on Computing and Communication Systems 7,5 ECTS
    2. Research methods in Education 7,5 ECTS
    3. Current trends in Computing & Communication Systems 7,5 ECTS

National & Kapodistrian University of Athens

Faculty of Sciences, Department of Information and Telecommunications, Athens, Greece.

- Master's Degree Program (MSc) in "Information Technologies in Medicine and Biology". Direction: "Medical Informatics". Academic year: 2009-2010.
  Courses:
    1. Medical Information Technology and Telemedicine 7,5 ECTS
    2. Biology - Physiology 7,5 ECTS
    3. Medical Imaging Systems 7,5 ECTS
    4. Radiographic Anatomy 7,5 ECTS

ACADEMIC POSITIONS

2/2026 - Now

Adjunct Professor (full time)

University of Ioannina, Department of Informatics and Telecommunications, Arta, Greece.

- Appointed through the program *"Human Resources and Social Cohesion 2021-2027"* (Call No. 108523/24.07.2024, Code EKP30) under the action *"Acquisition of Academic Teaching Experience at the University of Ioannina"* (MIS Code: 6017329).

17/2//2025 – 20/6/2025

Adjunct Professor (full time)

University of Ioannina, Department of Informatics and Telecommunications, Arta, Greece.

- Appointed through the program *"Human Resources and Social Cohesion 2021-2027"* (Call No. 108523/24.07.2024, Code EKP30) under the action *"Acquisition of Academic Teaching Experience at the University of Ioannina"* (MIS Code: 6017329).

TEACHING EXPERIENCE

Undergraduate Courses:

2/2026 - Now

Adjunct Professor (full time)

University of Ioannina, Department of Informatics and Telecommunications, Arta, Greece.

- Course: Databases.
- Semester: D'.
- Teaching Hours/Week: Theory (3 hours), Laboratory (3 hours).

17/2/2025 – 20/6/2025

Adjunct Professor (full time)

University of Ioannina, Department of Informatics and Telecommunications, Arta, Greece.

- Course: Databases.
- Semester: D'.
- Teaching Hours/Week: Theory (3 hours), Laboratory (5 hours).

University Distance Programs:

2/2026 - Now

Tutor

University of Ioannina, Department of Informatics and Telecommunications, e-Learning, Arta, Epirus, Greece.

- Instructor/Lecturer of 9 courses.
  1. New Technologies in Education: Pedagogical Use and Digital Tools in Practice.
  2. Writing a Doctoral Proposal: Methodology, Strategies, and Writing Tools.
  3. Databases & SQL: From Design to Management.
  4. Prompt Engineering: Best Practices and Applications.
  5. Data Analysis with the R Language.
  6. Python and Artificial Intelligence: From Coding to Innovation.
  7. Artificial Intelligence in Education.
  8. Scientific Article Writing.
  9. Curriculum Vitae & Cover Letter Writing: From Structure to Personal Strategy.

9/2019 - Now **Tutor**

University of Athens, e-Learning, Athens, Greece.

- Instructor/Lecturer of 10 courses.
  1. IT & Cyber Security: Threat Management and Security Policies.
  2. Data Science with Python.
  3. Artificial Intelligence and Machine Learning Specialist in Financial Services.
  4. Internet of Things and Machine Learning Applications.
  5. Android Developer- Android App Production.
  6. Blockchain and Energy.
  7. Blockchain Developer.
  8. Digital Energy.
  9. Digital Business Transformation.
  10. Digital Education.

1/2020 - Now **Tutor**

University of Aegean, e-Learning, Karlovasi, Samos, Greece.

- Instructor/Lecturer of 9 courses.
  10. Statistical Data Analysis with SPSS.
  11. Data Science and Artificial Intelligence with R.
  12. Advanced Python with applications in Machine Learning.
  13. Programming with Python.
  14. ChatGPT Expert User: Tools and Applications.
  15. Artificial Intelligence Applications (ChatGPT) in Education.
  16. Blockchain Technology.
  17. Digital Transformation: Services and Technologies.
  18. WordPress Web Development: Technologies and Applications for eCommerce and Dropshipping.

On-Site University Programs:

31/10/2022 – 31/12/2022 **Tutor**

University of Athens, e-Learning, Athens, Greece.

- Tutor in the Labour Employment Agency (LEA) program: Skills and Restore Return Programs, focusing on high-demand digital and green skills.
- Courses:
  1. IT & Cyber Security: Threat Management and Security Policies.
  2. Cybercrime and Cybersecurity.

Invited Lectures:
28 April 2018

Invited Lecturer

University of the Aegean, ICSE Dept., Info-Sec-Lab, Samos, Greece.

- Behavioral Biometrics and Continuous Authentication: The Beginning of a New Era without PIN's & Passwords.
  - Lecturer: Dr Ioannis Stylios. Scientific coordinator: Professor Spyros Kokolakis.

Second Chance Schools (SCS):
25 Mar 2015 – 31 May 2015

Tutor

Youth Foundation and Lifelong Learning - EPAL Zografou, Athens, Greece.

- Course: "Online tools and services in everyday life".

Private Schools:
Sep 2008 – Feb 2009

Tutor

Private school of Informatics "Pronomio", Ioannina (Greece).

- ECDL tutor

THESES SUPERVISION

Completed

MSc. theses co – supervisor

1. Koutsioukis Konstantinos, (2018). "A survey of smartphone users authentication methods", Dept. of Information and Communication Systems Engineering, University of the Aegean. Supervisor: Professor Spyros Kokolakis.
2. Olga Thanou, (2019). "Exploring the role of biases in the Internalization of Information Security Policies", Dept. of Information and Communication Systems Engineering, University of the Aegean. Supervisor: Professor Maria Karyda.

R&D ACTIVITIES - PROJECTS

National Projects:
12/2023 - Now

Impacts and limitations of Artificial Intelligence (AI) in the areas of security, privacy, and data protection".
University of Piraeus, Faculty of Information and Communication Technologies (ICT), Department of Digital Systems

- Position: Postdoctoral Researcher.
- Supervisor: Professor Stefanos Gritzalis.
- Research title: "Impacts and limitations of Artificial Intelligence (AI) in the areas of security, privacy, and data protection".

5/2020 – 31/12/2021

BioPrivacy: Development and validation of a Behavioral Biometrics Continuous Authentication System.

Info-Sec-Lab, Department of ICSE, University of the Aegean, Samos, Greece.

- Position: Researcher.
- Supervisor: Prof. Spyros Kokolakis.
- Funding by the Act "Supporting researchers with a focus on young researchers - 2nd cycle" of the "Human Resources Development, Education and Lifelong Learning" program. Also is co-financed by the European Union.

Aug 2017 – 30 Sep 2019

Biometric Authentication Methods, Information Systems Security and Privacy Issues.

Info-Sec-Lab / University of the Aegean, Samos, Greece.

- Position: PhD Scholar - Researcher.
- Supervisor: Prof. Spyros Kokolakis.
- Funded by the Hellenic Foundation for Research and Innovation (ELIDEK) – General Secretariat for Research and Technology (GSTR), Athens (Greece).

Sep 2016–Mar 2017

Development of research and education in the Department of Communication and Media Studies of the University of Athens.

University of Athens, Department of Communication and Media Studies, Athens (Greece).

- Position: Technical support, Information system security, web development.
- Supervisor: Associate prof. Konstantinos Mourlas.

01 Sep 2014–31 Dec 2014

STIRIZO - Horizontal project to support schools, teachers and students on the way to the digital School.

University of Athens, Network Operation Centre, Athens, Greece.

- Position: Technical Scientist.
- unded by: University of Athens (UOA) / Special Research Account (ELKE).

2 Feb 2009–30 Sep 2009

NET-REFOUND/034413: NetWorking Research Foundations and Trends.

Centre for Research & Technology Hellas (CERTH), Thessaloniki, Greece.

- Position: Technical Scientist.
- The research project is funded by: CERTH.

International Projects:

1 Jan 2020–31/12/2022

University - Industry Educational centre in advanced biomedical and medical informatics (CeBMI). Project no: 612462-EPP-1-2019-1-SK-EPPKA2-KA.

Telesig ltd, (Plovdiv, Bulgaria) & University of Zilina, Zilina, Slovakia.

- Position: Technical Scientist.
- The research project is funded by European Union and Erasmus +.

4 May 2016–31 Jul 2016

ReCRED: Real-world Identities to Privacy-preserving and Attribute-based CREDentials.

Cyprus University of Technology, Department of Electrical Engineering, Computer Engineering and Informatics, Limassol, Cyprus.

- Position: Special Scientist - Researcher C.
- Supervisor: Lecturer Michael Sirivianos.
- The research project ReCRED is an H2020 Innovation Action aiming at providing usable and secure device-centric and attribute-based access control.

12 May 2016 – 31 July 2016

PhD Research Traineeship - Erasmus Placement

Cyprus University of Technology, Department of Electrical Engineering, Computer Engineering and Informatics, Limassol, Cyprus.

- Position: Research Traineeship.
- Supervisor: Associate Professor Sotirios Chatzis.
- The research project is funded by: Erasmus + and IKY (State Scholarship Foundation).

13 Jul 2015–30 Sep 2015

Postgraduate Research Traineeship - Erasmus Placement

Cyprus University of Technology, Department of Electrical Engineering, Computer Engineering and Informatics, Limassol, Cyprus.

- Position: Research Traineeship.
- Supervisor: Associate Professor Sotirios Chatzis.
- The research project is funded by: Erasmus + and IKY (State Scholarship Foundation).

WORK EXPERIENCE

12 Dec 2020–Now

Freelance Professional in Education, Authoring, and Research Services

Ioannis Stylios, Athens, Greece.

- Education Services. Author Services. Research Services in Computer Science.

July 2017–Oct 2017

IT Engineer (Software) - Information Security Manager

ELGA (Hellenic Agricultural Insurance Organization) - IT Department, Athens, Greece.

- IT Engineer (Software), SOX1/2017 with no. 5337/12-04-2017.

24 Nov 2015–15 Mar 2016

ICT Engineer

University of Athens, Athens (Greece). Postgraduate Programme "Biostatistics".
Faculty of Medicine, National and Kapodistrian University of Athens.
Department of Mathematics, National and Kapodistrian University of Athens.

- Technical support, Network & Security issues
- Web Developing - Design: http://biostatistics.med.uoa.gr

Dec 2013–May 2015

Vice President - Project Manager

Free Thought Group - Social Cooperative Enterprise, Athens (Greece).

- Culture, Education, Publications, ICT services.
- He has worked as the Director of the Free Thought Group - Social Cooperative Enterprise.

Feb 2011–Nov 2013

IT Engineer - Project Manager

Ioannis Stylios, E-Commerce & Information Technology Services Ltd., Athens (Greece).

IT services, Computer & Network Security.

Project Manager.

Strategy and Sales Management.

1 Mar 2008–31 Aug 2008

Laboratory Assistant

Epirus Institute of Technology, Department of Speech & Language Therapy, Ioannina (Greece).

- Technical support.
- Network & Security issues.
- Web Developing – Design.

1 Aug 2007–29 Feb 2008

Network & Software Engineer

Click Solutions, Ioannina (Greece).

- Fleet Manager developing.
- CRM systems developing.

ACCOMPLISHMENTS

Publications

PUBLICATIONS IN PEER – REVIEW SCIENTIFIC JOURNALS

1. ***Ioannis Stylios****, Sotirios Chatzis, Olga Thanou, Spyros Kokolakis, (2023). Continuous Authentication with Feature-Level Fusion of Touch Gestures and Keystroke Dynamics to Solve Security and Usability Issues. Computers & Security, ISSN 0167-4048.* ***(IF 5.6).***
2. ***Ioannis Stylios****, Spyros Kokolakis, Andreas Skalkos, Sotirios Chatzis, (2022), BioGames: a new paradigm and a behavioral biometrics collection tool for research purposes. Information and Computer Security, ISSN: 2056-4961, Vol. 30 No. 2, pp. 243-254. https://doi.org/10.1108/ICS-12-2020-0196.* ***(IS: 3.3).***
3. ***Ioannis Stylios****, Spyros Kokolakis, Olga Thanou, Sotirios Chatzis, (2022), "Key factors driving the adoption of behavioral biometrics and continuous authentication technology: an empirical research", Information and Computer Security, Vol. 30 No. 4, pp. 562-582. https://doi.org/10.1108/ICS-08-2021-0124* ***(IS: 3.4).***

4. ***Ioannis Stylios**, Andreas Skalkos, Spyros Kokolakis, Maria Karyda, (2022), "BioPrivacy: a behavioral biometrics continuous authentication system based on keystroke dynamics and touch gestures", Information and Computer Security, ISSN: 2056-4961, Vol. 30 No. 5, pp. 687-704. https://doi.org/10.1108/ICS-12-2021-0212. INVITED PUBLICATION. **(IS: 3.5).***
5. ***Ioannis Stylios**, Spyros Kokolakis, Olga Thanou, Sotirios Chatzis, (2021). Behavioral biometrics & continuous user authentication on mobile devices: A survey, Information Fusion, Volume 66, 2021, Pages 76-99, ISSN 1566-2535, https://doi.org/10.1016/j.inffus.2020.08.021. **(IF 13.669).***
6. *Andreas Skalkos, **Ioannis Stylios**, Maria Karyda, Spyros Kokolakis, (2021). "Users' Privacy Attitudes towards the Use of Behavioral Biometrics Continuous Authentication (BBCA) Technologies: A Protection Motivation Theory Approach" Journal of Cybersecurity and Privacy 1, no. 4: 743-766. https://doi.org/10.3390/jcp1040036.*

PUBLICATIONS IN INTERNATIONAL & EUROPEAN PEER – REVIEW CONFERENCE PROCEEDINGS

1. ***Ioannis Stylios**, Andreas Skalkos, Spyros Kokolakis, Maria Karyda, (2022). BioPrivacy: Development of a Keystroke Dynamics Continuous Authentication System. In: Katsikas, S., et al. Computer Security. ESORICS 2021 International Workshops. ESORICS 2021. Lecture Notes in Computer Science(), vol 13106. Springer, Cham. https://doi.org/10.1007/978-3-030-95484-0_10*
2. ***Ioannis Stylios**, Olga Thanou, Iosif Androulidakis, Elena Zaitseva, (2016). A Review of Continuous Authentication Using Behavioral Biometrics. ACM SEEDA-CECNSM 2016, 25-27 September, Kastoria Greece, Pages 73-80, ACM.*
3. ***Ioannis Stylios**, Olga Thanou, Iosif Androulidakis, Elena Zaitseva, (2016). Communication Security & Cyberbullying: A Review of the Legal Issues. ACM SEEDA-CECNSM 2016, 25-27 September, Kastoria Greece, Pages 67-72, ACM.*
4. ***Ioannis Stylios**, Kokolakis Spyros, Olga Thanou, Sothrios Chatzis, (2016). User's Attitudes on Mobile Devices: Can Users' Practices Protect Their Sensitive Data? 10th Mediterranean Conference on Information Systems (MCIS16), Cyprus.*
5. ***Ioannis Stylios**, Sotirios Chatzis, Olga Thanou, Spyros Kokolakis, (2015). Mobile Phones & Behavioral Modalities: Surveying users' practices. TELFOR 2015 International IEEE Conference. November 24-26, 2015, Belgrade, Serbia. IEEE.*
6. ***Ioannis Stylios**, Vasileios Vlachos, Iosif Androulidakis. (2014). Performance Comparison of Machine Learning Algorithms for Diagnosis of Cardiotocograms with Class Inequality. TELFOR 2014 International IEEE Conference Record No.34903. November 25, 2014, SAVA Center, Belgrade, Serbia. p. 951–954. IEEE.*
7. *Tzelepis Georgios, Skentos Athanasios, **Stylios Ioannis**, (2014). Study and environmental surveying on the Fire of Parnitha with Geographic Information Systems (GIS) for similar natural risk management in the future. 8th National Conference HellasGIs at the National Technical University of Athens.*

8. *Iosif Androulidakis, Vasilios Christou, Nikolaos G. Bardis, **Ioannis Stylios**, (2009). Surveying users' practices regarding mobile phones' security features. ECC'09: Proceedings of the 3rd international conference on European computing conference, Tbilisi, Georgia, Pages: 25-30.*

BOOKS

1. *Ioannis Stylios, Matina Zerva, Alexandros Tzallas (2026). Relational databases, Disigma Publications.*
2. *Ioannis Stylios, Olga Thanou (2026). Governance, Risk & Compliance (GRC) Leadership in Cybersecurity. Textbook, Publisher: University of Athens.*
3. *Ioannis Stylios, Olga Thanou (2025). AI Developers: Development of Artificial Intelligence Applications with Python and OpenAI API. Textbook, Publisher: University of Athens.*
4. *Ioannis Stylios, Olga Thanou (2025). Data Analyst for Business: Utilizing AI Tools in Practice. Textbook, Publisher: University of Athens.*
5. *Ioannis Stylios (2024). Statistical Data Analysis with SPSS. Textbook, Publisher: University of Aegean.*
6. *Ioannis Stylios, Olga Thanou (2024). WordPress Web Development: Technologies and Applications for eCommerce and Dropshipping. Textbook, Publisher: University of Aegean.*
7. *Ioannis Stylios, Olga Thanou (2024). Artificial Intelligence Applications (ChatGPT) in Education. Textbook, Publisher: University of Aegean.*
8. *Ioannis Stylios, (2024) ChatGPT Expert User: Tools and Applications. Textbook, Publisher: University of Aegean.*
9. *Ioannis Stylios, Olga Thanou (2023). Data Science and Big Data with R and Rstudio. Textbook, Publisher: University of Athens.*
10. *Ioannis Stylios, Olga Thanou (2023). Data Analysis Using R: Introduction to R and RStudio. Textbook, Publisher: University of Athens.*
11. *Ioannis Stylios, Olga Thanou (2022). WordPress Developer. Textbook, Publisher: University of Athens.*
12. *Ioannis Stylios, (2022). Android Developer - Android App Production. Textbook, Publisher: University of Athens.*
13. *Ioannis Stylios, (2020). Advanced Python with applications in Machine Learning. Publisher: University of the Aegean.*
14. *Ioannis Stylios, (2020). Data Science with R. Textbook, Publisher: University of the Aegean.*
15. *Ioannis Stylios, (2020). Programming with Python. Textbook, Publisher: University of Aegean.*
16. *Ioannis Stylios, (2020). Blockchain Technology. Textbook, Publisher: University of the Aegean.*
17. *Ioannis Stylios, (2019). Internet of Things and Machine Learning Applications. Textbook, Publisher: University of Athens.*
18. *Ioannis Stylios, (2019). IT & Cyber Security: Threat Management and Security*

Policies. Textbook, Publisher: University of Athens.

19. *Ioannis Stylios, (2019), Data Science with Python. Textbook, Publisher: University of Athens.*
20. *Ioannis Stylios, (2018). Continuous Authentication with Biometrics & Behavioral Modalities: A New Era without PINs & Passwords. ISBN: 978-613-8-00459-2. Publisher: Lambert Academic Publishing.*

CHAPTERS IN BOOKS

1. *Information Security Analyst (2025), Textbook, Publisher: University of Athens. Chapter 7.1: Identification of Threats to Information System Security. Chapter 7.2: Information Security Policies. Chapter 7.3: Disaster Recovery Plan. Chapter 7.4: Security Awareness Programs.*
2. *Digital Education (2020), Textbook, Publisher: University of Athens. Chapter 6: 1. Augmented Reality Technologies in Education, 2. Virtual Reality Technologies in Education, 3. Artificial Intelligence Technologies in Education, 4. Educational Games, Simulation, 5. Digital Services in Education: Digital Libraries and Archives, 6. Digital Services in Education: Archives, Digital Museums, 7. Digital Technology in the Classroom, 8. Social Networks in Education.*
3. *Digital Transformation: Services and Technologies (2020), Textbook, Publisher: University of Aegean. Chapter 4: 1. Software Types and Programming Languages, 2. Introduction to Software Engineering, 3. Information Systems Development, 4. Introduction to Python, 5. Variables and Data Structures in Python, 6. Control flow and functions in Python.*
4. *Blockchain Developer (2019), Textbook. Publisher: University of Athens. Ch12: Introduction to Decentralized Application Architecture, Ch13: Web3 and Application Examples, Ch14: Crowdfunding Platforms, Ch15: A Network for Blockchain-enabled Crowdfunding Platform.*
5. *Digital Energy (2019), Textbook, Publisher: University of Athens. Chapters: Ch18: General Data Protection Regulation & Law 4624/2019, Ch19: Critical Infrastructure Protection Framework, Ch20: Cybersecurity and Electricity Systems.*
6. *Blockchain and Energy (2019), Textbook, Publisher: University of Athens. Ch14: Blockchain and Internet of Energy, Ch15: Energy and Applications of Blockchain, Ch16: Platforms for Blockchains in Energy, Ch17: Blockchain in Energy and Security, Ch18: Blockchain and Energy Communities, Ch19: Regulatory Framework, Ch20: Future Challenges.*

SCIENTIFIC EDITING OF ACADEMIC TEXTBOOKS

1. *Scientific Editing of Academic Textbook: Data Ethics and Privacy Protection. Publisher: University of Athens – RC/ELKE. Description: Scientific and pedagogical editing of educational material in the context of a university research project. Responsible for content refinement, structure optimization, and adherence to academic quality standards.*

TALKS

1. ***Ioannis Stylios*** *(4/2013). Talk in the conference: "Bridges of Employment" held on April 25, 2013, in Athens (Greek Amphitheatre Pasteur Institute), PEPSAEE.*

Honours & Awards

1. ***2020: Technology Transfer Plan Funding***

   Hellenic Ministry of Labour and the Labour Employment Agency (LEA) committee.

   Ioannis's PhD technology transfer plan was distinguished by the Hellenic Ministry of Labour and the Labour Employment Agency (LEA) committee. Funding 12.000€.

2. ***2019: Scholarship of Excellence for Research***

   Funding by the act "Supporting researchers with a focus on young researchers - cycle B" of the "Human Resources Development, Education and Lifelong Learning" program. Also is co-financed by the European Union (European Social Fund) and Greek national funds. Scholarship amount 15,000€. Total project financing amount 41.000€.

   - *Ioannis Stylios wrote the project proposal, in collaboration with Prof. Spyros Kokolakis, which was based on the findings and results of his PhD.*
   - *Project name: BioPrivacy: Development and validation of a Behavioral Biometrics Continuous Authentication System.*
   - *The project is conducted at the Laboratory of Information & Communication Systems Security, Department of Information & Communication Systems Engineering, University of the Aegean.*

3. ***2018: ACEin Incubation Services Award***

   11th University Competition on Entrepreneurship and Innovation "Ennovation 2018". Athens Center for Entrepreneurship and Innovation.

   After a six-month business acceleration with "BioPrivacy" project, Ioannis obtained the "ACEin Incubation Services Award" of Research Stream. The Research Stream is specifically addressed to researchers and research teams wishing to take the outcome of their research efforts to the market.

4. ***2018: John & Mary Pappajohn Business Plan Award***

   John and Mary Pappajohn awards and the American College of Thessaloniki (ACT), School of Business.

   Ioannis was the 3rd finalist of the innovation contest with the "BioPrivacy" business proposal.

5. ***2017: Scholarship of Excellence for Doctoral Dissertation***

   Hellenic Foundation for Research and Innovation (HFRI).
   Ioannis was distinguished in the scholarships of HFRI among 2.144 PhD candidates (Acceptance rate approx. 20%, funding 23.500 €), August 2017.

   The evaluation committee's criticism for the PhD Candidate:

A1. Academic performance: 40 out of 50
A2. Candidate Profile: 39.50 at 50

The candidate has a long-term professional experience related to the subject of Applied Informatics, as well as collaborations with Universities of Greece and Cyprus. There is enough activity of participation in training and scientific publications on the subject of the doctorate. The need for the biometric identification system to be developed is adequately analysed as well as any potential risks to the user from its application, given that mobile devices are connected to the internet. The DP's interest in the PhD thesis, as documented in the accompanying letter, appears to be genuine - as is shown by the above-mentioned CV - and his motivations are based on the need for excellence in his areas of interest. He still shows remarkable willingness to develop and cultivate research and innovation culture and elements of an integrated personality capable of dedicating himself to the dissertation. He is crucially oriented in identifying new research capabilities with enthusiasm for his scientific integration and his future involvement in research and technology policies and the development of research organizations by attracting external funding.

6. ***2016: Erasmus Mobility Grant for PhD Research***

   European Commission and the IKY (State Scholarship Foundation). Amount 1800€.

   Scholarship for PhD Research in the department of Electrical Engineering, Computer Engineering and Informatics, Cyprus University of Technology, through the "Erasmus Mobility Grant" of the University of the Aegean.

7. ***2015: Erasmus Mobility Grant for Postgraduate Research Traineeship***

   European Commission and the IKY (State Scholarship Foundation). Amount 1800€.

   Scholarship for Postgraduate Research Traineeship in the department of Electrical Engineering, Computer Engineering and Informatics, Cyprus University of Technology, through the "Erasmus Mobility Grant" of the University of the Aegean.

8. ***2009: Certificate of Appreciation***

   Certificate of Appreciation for a lecture in the European computing conference (ECC'09), Computing Intelligence (CI'09), Tbilisi, Georgia.

9. ***2002: Honours and Medals of Excellence***

   Two Honours and two Medals of Excellence, from Municipality of Ioannina, for the best school performance in the prefecture for two years in a row.

10. ***2001: Class distinctions and awards of excellence***

    Six total class distinctions and awards of excellence during high school education.

EDITING & CONFERENCE ORGANIZATION ACTIVITIES

Journals Reviewer:

1. Computers & Security, ISSN: 0167-4048. Impact Factor 5.6. Year: 2026.
2. Computers & Security, ISSN: 0167-4048. Impact Factor 5.6. Year: 2026.
3. Computers in human behavior reports, ISSN: 2451-9588. Impact Factor 5.8. Year: 2026.
4. Expert Systems with Applications, ISSN: 0957-4174. Impact Factor 7.5. Year: 2025.
5. Computers & Security, ISSN: 0167-4048. Impact Factor 5.6. Year: 2025.
6. Computers & Security, ISSN: 0167-4048. Impact Factor 5.6. Year: 2025.
7. Computers & Security, ISSN: 0167-4048. Impact Factor 5.6. Year: 2025.
8. Transport Policy, ISSN: 0967-070X. Impact Factor 6.3. Year: 2025.
9. Computers & Security, ISSN: 0167-4048. Impact Factor 5.6. Year: 2025.
10. Scientific Reports - Nature. ISSN 2045-2322. Impact Factor 4.9. Year: 2024.
11. IEEE Transactions on Information Forensics and Security. Impact Factor 6.8. Year: 2024.
12. Pattern Recognition, ISSN 0031-3203, Impact Factor 7.5. Year: 2024.
13. Computers & Security, ISSN: 0167-4048. Impact Factor 5.6. Year: 2024.
14. IEEE Transactions on Dependable and Secure Computing. Impact Factor 7.3. Year: 2024.
15. IEEE Transactions on Information Forensics and Security. Impact Factor 6.8. Year: 2024.
16. Computers & Security, ISSN: 0167-40 48. Impact Factor 5.6. Year: 2024.
17. Pervasive and Mobile Computing. ISSN: 1574-1192. Impact Factor 4.3. Year: 2023.
18. International Journal of Biometrics. ISSN 1755-8301. Impact Factor 0.8. Year: 2023.
19. Systematic Reviews. ISSN: 2046-4053. Impact Factor 3.8. Year: 2023.
20. Pervasive and Mobile Computing. ISSN: 1574-1192. Impact Factor 4.3. Year: 2023.
21. Applied Sciences, ISSN: 2076-3417. Impact Factor 2.7. Year: 2023.
22. Computers & Security, ISSN: 0167-4048. Impact Factor 5.6. Year: 2023.
23. IEEE Transactions on Biometrics, Behavior, and Identity Science. ISSN: 2637-6407. Year: 2023.
24. Computers & Security, ISSN: 0167-4048. Impact Factor 5.6. Year: 2023.
25. Expert Systems with Applications, ISSN: 0957-4174. Impact Factor 8.665. Year: 2023.
26. IEEE Transactions on Dependable and Secure Computing. Impact Factor 6.791. Year: 2022.
27. Advances in Medical Sciences. ISSN: 1896-1126. Impact Factor: 2.57. Year: 2020.

Conferences and Workshops:

Reviewer:

1. 27th International Science Conference on Computer Networks CN2020, (Gliwice, Poland), June 2020.
2. 26th International Science Conference on Computer Networks CN2019, (Gliwice, Poland), June 2019, CCIS series of Springer (ISSN 1865-0929).
3. 4th International Conference for the Promotion of Educational Innovation, (Larissa, Greece), October 2018, SCIENTIFIC ASSOCIATION FOR THE PROMOTION OF EDUCATIONAL INNOVATION
4. 25th International Science Conference on Computer Networks CN2018. June 19-

22, 2018, Gliwice, Poland. CCIS series of Springer (ISSN 1865-0929).

5. 18th International Conference on Security and Cryptography (SECRYPT 2021). 6 – 8 July 2021.

Program Committee Member:

1. 1st International Conference on Engineering, Technology, and Applied Science Innovations (ICETASI). 2025, October, 1-3.
2. 27th International Science Conference on Computer Networks CN2020, (Gliwice, Poland), June 2020.
3. 26th International Science Conference on Computer Networks CN2019, (Gliwice, Poland), June 2019, CCIS series of Springer (ISSN 1865-0929).
4. 25th International Science Conference on Computer Networks CN2018. June 19-22, 2018, Gliwice, Poland. CCIS series of Springer (ISSN 1865-0929).

MEMBERSHIP

Member of tutors' registers

1. Member of the Registry of Tutors of the University of Athens (ELKE-EKPA). Protocol Number: 089974 / 09-10-2019. Tutor Registration Number (TRN) - EKPA: 0656201913. Themes: 1: Informatics & Telecommunications. 2: Educational Sciences/Education/Human Resource Development.
2. Member of the Registry of Tutors of the University of the Aegean. Protocol Number: 45/09.07.2020. Themes: 1: Informatics & Telecommunications.

Academic Network Membership

1. Member of the Advisory Council in non-profit Organization, AI CYPRUS ETHICAL NOVELTIES LTD.
2. Member of the Laboratory of Information & Communication Systems Security, Department of Information & Communication Systems Engineering, University of the Aegean.
3. Member of the ACM Special Interest Group in Human Computer Interaction, Greece chapter (ACM Greek SIGCHI).

Scientific & Professional Organizations Membership

1. Member of the Registry of Certified Assessors of the General Secretariat of Research and Innovation (GSRI) v. 4310/2014, based on the decision of GSRI No. 95711/08/06/2017.
2. Full Member of the Greek Association of Geographic Information Systems “HellasGis”.
3. Member of the Hellenic Education Society of STEM
4. Member of the Scientific Association for the Promotion of Educational Innovation

PROFESSIONAL SKILLS

Job-related skills

ICT SECURITY:

- General Data Protection Regulation (GDPR)
- Risk Assessment Methodology CRAMM
- Risk Assessment Methodology Octave Allegro
- ISO 27001: 2013

- Security Awareness ENISA 2010
- Emergency and Disaster Recovery Plan, Security Policies

PROGRAMMING LANGUAGES:

- Procedural languages: Pascal, C
- Object: C ++, JAVA, Python
- Special purpose languages: Clips, Matlab, R
- WEB Development: HTML, PHP, CSS
- Descriptive language question answering: SQL
- Scripting languages: java Script

DATA SCIENCE & MACHINE LEARNING:

- Descriptive and Predictive Analytics
- Tensorflow, Keras, Scikit-Learn, pytorch
- NumPy, Pandas, Matplotlib, SciPy
- SPSS, AMOS
- SmartPLS
- WEKA

MANAGEMENT OF DATABASES:

- NoSQL: HBase, Cassandra & MongoDB
- SQL Server,
- MySQL
- Oracle
- Design knowledge of databases

CMS:

- Wordpress, Joomla

PROJECT MANAGEMENT:

- Proposal Drafter
- Project Coordinator skills

COMPUTER NETWORKS:

- Network design and programming (cisco routers, switches)

Mother tongue(s) Greek

Other language(s)

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	C2	C2	C2	C2	C2

OTHER STUDIES - ACTIVITIES

Music Education

- Continental Conservatory of Epirus "Tsakalof":
  - Theory - harmony of music
  - Guitar
  - Oboe

Interests

- History and Philosophy of Science & Technology
- Arts & Culture

PUBLICATIONS IN JOURNALS

Computers & Security
(IF 5.6)
2023
Impact Factor 5.105
CiteScore 11.1
Scimago Q1
Elsevier

Continuous Authentication with Feature-Level Fusion of Touch Gestures and Keystroke Dynamics to Solve Security and Usability Issues.

Ioannis Stylios, Sotirios Chatzis, Olga Thanou, Spyros Kokolakis

Abstract — Behavioral Biometrics (BB) Continuous Authentication (CA) systems monitor user behavior and continuously re-authenticate user identity alongside the initial login process. Most studies use single behavioral modality systems to authenticate users. However, the behaviors of genuine users may change, and systems fail when signifi-cant changes occur. This results in either usability or security issues. In the literature, the fusion of biometrics is used to solve this problem and achieves improved results. This paper presents our research on the design and evaluation of new approaches to CA using fusion of touch gestures and keystroke dynamics. To collect the biometric data from mobile device users we have developed the BioGames App which follows an innovative approach based on the gamification paradigm. We examine each modality separately and investigate if we can improve the performance results with a feature-level fusion. For this reason, a new appropriate feature set is developed that combines touch gestures and keystroke dynamics. We used the Multi-Layer Percep-tron (MLP) and Long Short-Term Memory (LSTM) and compared their performance. We have shown that feature-level fusion of touch gestures and keystroke dynamics improves the performance of systems and solves security and usability issues. We found that the MLP is superior to LSTM in this context. The MLP achieved Accuracy 98.3% (increased 21.1%), EER 1% (error reduction by 23.7%), TAR 99.4% (increased 46%), TRR 97.4% (increased 10%), FAR 2.6% (reduced by 10.5%), and FRR 0.6% (reduced by 46%).

Keywords — Continuous Authentication, Behavioral Biometrics, Fusion, Long Short-Term Memory (LSTM), Multi-Layer Perceptron (MLP).

Online Available: 10.1016/j.cose.2023.103363

Information and
Computer Security
2022
Impact Score: 3.5
Scimago Q2
Emerald Publishing

BioPrivacy: A Behavioral Biometrics Continuous Authentication System based on Keystroke Dynamics and Touch Gestures.

Ioannis Stylios, Spyros Kokolakis, Olga Thanou, Sotirios Chatzis.

Abstract — This paper is an extended version of SECPRE 2021 paper and presents a re-search on the development and validation of a BBCA system that is based on us-ers keystroke dynamics and touch gestures on mobile devices. Session authenti-cation schemes establish the identity of the user only at the beginning of the ses-sion, so they are vulnerable to attacks that tamper with communications after the establishment of the authenticated session. Moreover, smartphones themselves are used as authentication means, especially in two-factor authentication schemes, which are often required by several services. Whether the smartphone is in the hands of the legitimate user constitutes a great concern, and correspondingly whether the legitimate user is the one who uses the services. In response to these concerns, Behavioral Biometrics (BB)

Continuous Authentication (CA) technol-ogies have been proposed on a large corpus of literature. This paper presents a research on the development and validation of a BBCA system (named BioPriva-cy), that is based on the user's keystroke dynamics and touch gestures, using a Multi-Layer Perceptron (MLP). Also, we introduce a new behavioral biometrics collection tool, and we propose a methodology for the selection of an appropriate set of behavioral biometrics. Our system achieved the best results for keystroke dynamics which are 97.18% Accuracy, 0.02% Equal Error Rate (EER), 97.2% True Acceptance Rate (TAR) and 0.02% False Acceptance Rate (FAR).

Keywords — Machine Learning, Behavioral Biometrics, Continuous Authentication, Mobile Devices, Multi-Layer Perceptron (MLP).

Online Available: http://dx.doi.org/10.1108/ICS-12-2021-0212

Information and Computer Security
2022
Impact Score: 3.4
Scimago Q2
Emerald Publishing

Key factors driving the adoption of Behavioral Biometrics & Continuous Authentication Technology: An Empirical Research.

Ioannis Stylios, Spyros Kokolakis, Olga Thanou, Sotirios Chatzis.

Abstract — Authentication systems that are based on the entry-point authentication model are exposed to attacks that take place past the initial authentication. To address this vulnerability, the development of Behavioral Biometrics (BB) Continuous Authentication (CA) technologies has been suggested by several researchers. For the success of future investments in the implementation of CA systems, we should explore the key factors that influence technology adoption. In this regard, we investigate the effect of various factors of behavioral intention through the new incorporation of a modified Technology Acceptance Model (TAM) and Diffusion of Innovation Theory (DOI). Also, we have created a new theoretical framework with constructs such as Security & Privacy Risks (SPR), Biometrics Privacy Concerns (BPC), and Perceived Risk of Using the Technology (PROU). In this paper we conducted a Structural equation modeling (SEM) empirical research. Our research is designed in such a way to respond to the trade-off between users' concern for the protection of their biometrics privacy and their protection from risks. We used the Partial Least Squares (PLS) and the bootstrapping method. We found that the main facilitators of Behavioral Intention to adopt the Technology (BI) are Trust in Technology (TT), followed by Compatibility (COMP), Perceived Usefulness (PU), and Innovativeness (Innov). Finally, our results support the hypotheses that SPR is a facilitator to Perceived Usefulness (PU) and PU acts as a facilitator to BI. Consequently, individuals do not feel adequately protected by classical methods and consider the usefulness of the BBCA as a technology for their extra protection against risks.

Keywords: Behavioral Biometrics, Continuous Authentication, Technology Adoption Models, TAM, DOI.

Online Available: 10.1108/ICS-08-2021-0124

Information Fusion
2021
Impact Factor 13.669

Behavioral Biometrics & Continuous User Authentication on Mobile Devices: A Survey.

Ioannis Stylios, Spyros Kokolakis, Olga Thanou, Sotirios Chatzis.

Abstract — This paper offers an up-to-date, comprehensive, extensive and targeted

CiteScore 21.9
Scimago Q1
Elsevier

survey on Behavioral Biometrics and Continuous Authentication technologies for mobile devices. Our aim is to help interested researchers to effectively grasp the background in this field and to avoid pitfalls in their work. In our survey, we first present a classification of behavioral biometrics technologies and continuous authentication for mobile devices and an analysis for behavioral biometrics collection methodologies and feature extraction techniques. Then, we provide a state-of-the-art literature review focusing on the machine learning models performance in seven types of behavioral biometrics for continuous authentication. Further, we conduct another review that showed the vulnerability of machine learning models against well-designed adversarial attack vectors and we highlight relevant countermeasures. Finally, our discussions extend to lessons learned, current challenges and future trends.

Keywords — Machine Learning, Behavioral Biometrics, Continuous Authentication, Mobile Devices, Attacks, Defense, Survey.

Online Available: 10.1016/j.inffus.2020.08.021

Information and Computer Security
2021
Impact Score: 3.3
Scimago Q2
Emerald Publishing

BioGames: A new Paradigm and a Behavioral Biometrics Collection Tool for Research Purposes.

Ioannis Stylios, Spyros Kokolakis, Andreas Skalkos, Sotirios Chatzis.

Abstract — One major challenge for Behavioral Biometrics (BB) and Continuous Authentication (CA) research is the lack of actual behavioral biometrics datasets for research purposes. The compilation and refinement of an appropriate set of behavioral biometrics data constitute a challenge and an open problem. The issue is aggravated by the fact that most users are reluctant to participate in long, demanding procedures entailed in the collection of research biometric data. As a result, they do not complete the data collection procedure, or they do not complete it correctly. Therefore, we propose a new paradigm and introduce a Behavioral Biometrics collection tool, which we call BioGames, for the extraction of biometric features in a convenient way. The BioGames paradigm suggests a user-friendly way for the collection of behavioral biometrics. All it takes is simply to play a few games and the BioGames App creates all the datasets for each behavioral modality. The BioGames App is available on GitHub. Interested researchers and practitioners may use it to create their datasets for research purposes.

Key-words: BioGames Paradigm, Behavioral Biometrics, Biometrics Collection Tool, Mobile Devices, BioGames App, Continuous Authentication.

Online Available: 10.1108/ICS-12-2020-0196

Journal of Cybersecurity and Privacy
ISSN: 2624-800X
2021
MDPI

Users' privacy attitudes towards the use of Behavioral Biometrics Continuous Authentication (BBCA) technologies: A protection motivation theory approach.

Andreas Skalkos, Ioannis Stylios, Maria Karyda, Spyros Kokolakis.

Abstract — Smartphone user authentication based on passwords, PINs and touch patterns raises several security concerns. Behavioral Biometrics Continuous Authentication technologies provide a promising solution which can increase smartphone security and mitigate users' concerns. Until now, research in BBCA technologies has mainly focused on developing novel behavioral bio-metrics continuous authentication systems

and their technical characteristics, overlooking users' attitudes towards BBCA. To address this gap, we conducted a study grounded on a model that integrates users' privacy concerns, trust in technology, and innovativeness with Protection Motivation Theory. A cross-sectional survey among 778 smartphone users was conducted via Amazon Mechanical Turk (MTurk) to explore the factors which can predict users' intention to use BBCA technologies. Our findings demonstrate that privacy concerns towards intention to use BBCA technology have a significant impact on all components of PMT. Further to this, another important construct we identified that affects the usage intention of BBCA technology is innovativeness. Our findings posit the view that reliability and trustworthiness of security technologies, such as BBCA are important for users. Together, these results highlighted the importance of addressing the users' perceptions regarding BBCA technology.

Key-words: Behavioral Biometrics, Continuous Authentication, Protection Motivation Theory, Technology Adoption Models.

Online Available: 10.3390/jcp1040036

PUBLICATIONS IN CONFERENCES

5th International Workshop on SECurity and Privacy Requirements Engineering ESORICS 2021 Lecture Notes in Computer Science() vol 13106 Springer.

BioPrivacy: Development of a Keystroke Dynamics Continuous Authentication System.

Ioannis Stylios, Andreas Skalkos, Spyros Kokolakis, Maria Karyda.

Abstract — Session authentication schemes establish the identity of the user only at the be-ginning of the session, so they are vulnerable to attacks that tamper with commu-nications after the establishment of the authenticated session. Moreover, smartphones themselves are used as authentication means, especially in two-factor authentication schemes, which are often required by several services. Whether the smartphone is in the hands of the legitimate user constitutes a great concern, and correspondingly whether the legitimate user is the one who uses the services. In response to these concerns, Behavioral Biometrics (BB) Continuous Authentication (CA) technologies have been proposed on a large corpus of litera-ture. This paper presents a research on the development and validation of a BBCA system (named BioPrivacy), that is based on the user's keystroke dynam-ics, using a Multi-Layer Perceptron (MLP). Also, we introduce a new behavioral biometrics collection tool, and we propose a methodology for the selection of an appropriate set of behavioral biometrics. Our system achieved 97.18% Accuracy, 0.02% Equal Error Rate (EER), 97.2% True Acceptance Rate (TAR) and 0.02% False Acceptance Rate (FAR).

Keywords — Machine Learning · Behavioral Biometrics · Continuous Authenti-cation · Mobile Devices · Multi-Layer Perceptron (MLP).

Online Available: 10.1007/978-3-030-95484-0_10

ACM SEEDA-CECNSM
Sep 23, 2016
Kastoria, Greece

A Review of Continuous Authentication Using Behavioral Biometrics.

Ioannis Stylios, Olga Thanou, Iosif Androulidakis, Elena Zaitseva.

Abstract — Mobile phones are one of the most popular means of access to the internet. Users, via the telephone, connect to different services such as: Google, social networks, work accounts, banks accounts, etc. Those services, are many times, left open in their device. This enables risks, such as, loss or/and the violation of their personal data. In addition, in case of device theft after login, full access to sensitive data and applications may be fully granted. The purpose of this research is to analyze the most salient patterns characterizing user practices regarding certain behavioral modalities including: the way of using the various applications, power consumption, touch gestures and guest users' habits. To this end, we used an original questionnaire, created for the needs of the specific survey, to examine whether we can find some trends among the users. This can give us a qualitative information, for the different behaviors / "characters" of users, in order to be used in further research regarding User's Continuous Authentication.

Keywords — Literature Review; Mobile Phones; Privacy Risk; Behavioral Biometrics; Continuous Authentication.

Online Available: 10.1145/2984393.2984403

ACM SEEDA-CECNSM
Sep 23, 2016
Kastoria, Greece

Communication Security & Cyberbullying: A Review of the Legal Issues.

Ioannis Stylios, Olga Thanou, Iosif Androulidakis, Elena Zaitseva

Abstract — The research of legal issues concerning the cyberspace is complex because it requires not only legal but also technical knowledge. The present paper examines the challenges and answers stemming from three main research questions: a) are there gaps in legislation concerning cyberbullying? b) Does the penal legislator consider security in cyberspace as a legal asset? c) How is cyberbullying treated in the legal system? By taking into account the existing legal and social dimensions of the issue, and triggered by those three research questions, we conclude that the creation of a global framework of internet behavior rules, internet legislation and communication security policies is absolutely necessary. Keywords — Cyberbullying, Legislation, Communication Security.

Keywords — Cyberbullying, Legislation, Communication Security

Online Available: 10.1145/2984393.2984399

10th Mediterranean Conference on Information Systems (MCIS)
Sep 4, 2015
Pafos, Cyprus

User's Attitudes on Mobile Devices: Can Users' Practices Protect Their Sensitive Data?

Ioannis C. Stylios, Kokolakis Spyros, Olga Thanou, Sothrios Chatzis.

Abstract — Smartphones are the most popular personal electronic devices. They are used for all sorts of purposes, from managing bank accounts to playing games. As smartphone apps and services proliferate, the amount of sensitive data stored on or processed by handheld devices rise as well. This practice entails risks, such as violating users' privacy, stealing users' identities, etc. Particularly, stealing an unlocked device grants full access to sensitive data and applications. In this survey, we examine whether users adopt some basic practices to protect their sensitive personal data themselves, or is there a need to further strengthen their protection? Our statistical analysis assesses smartphone users' security attitudes and practices among different age groups. Finally, we investigate the

factors that affect the attitude of users with respect to their practices for the protection of personal data. The results of this study show that while many smartphone users do take some security precautions, a high percentage (24%) of them still ignores security and privacy risks. In addition, 19,1 % of users do not follow any practices to protect their PINs and Passwords.

Keywords — Mobile Phones, Privacy Risk, Users Attitudes, Survey.

Online Available: https://aisel.aisnet.org/mcis2016/1

TELFOR 2015
International IEEE Conference
Nov 25, 2015
SAVA Center
Belgrade, Serbia.

Mobile Phones & Behavioral Modalities: Surveying users' practices.

Ioannis C. Stylios, Sotirios Chatzis, Olga Thanou, Spyros Kokolakis.

Abstract — Mobile phones are one of the most popular means of access to the internet. Users, via the telephone, connect to different services such as: Google, social networks, work accounts, banks accounts, etc. Those services, are many times, left open in their device. This enables risks, such as, loss or/and the violation of their personal data. In addition, in case of device theft after login, full access to sensitive data and applications may be fully granted. The purpose of this research is to analyze the most salient patterns characterizing user practices regarding certain behavioral modalities including: the way of using the various applications, power consumption, touch gestures and guest users' habits. To this end, we used an original questionnaire, created for the needs of the specific survey, to examine whether we can find some trends among the users. This can give us a qualitative information, for the different behaviors / "characters" of users, in order to be used in further research regarding User's Continuous Authentication.

Keywords — Mobile Phones, Behavioral Modalities, Continuous Authentication, Survey.

Online Available: 10.1109/TELFOR.2015.7377614

TELFOR 2014
International IEEE Conference
Nov 25, 2014
SAVA Center
Belgrade, Serbia.

Performance Comparison of Machine Learning Algorithms for Diagnosis of Cardiotocograms with Class Inequality.

Ioannis C. Stylios, Vasileios Vlachos, Iosif Androulidakis.

Abstract — The objective of the present paper is to demonstrate the potential of Computational Intelligence in applications pertaining to the automatic identification – categorisation of Cardiotocograms using Machine Learning Algorithms and Artificial Neural Networks whose purpose is to distinguish between healthy or pathological cases leading to mortality during birth or fetal cerebral palsy. Interest is also placed on the performance of the Machine learning algorithms and the comparison of the classifiers' results.

Keywords — Artificial Neural Networks, Cardiotocograms, Machine Learning Algorithms, WEKA.

Online Available: 10.1109/TELFOR.2014.7034563

ECC'09: Proceedings of the 3rd international conference on European computing conference
June 26, 2009
Tbilisi, Georgia

Surveying users' practices regarding mobile phones' security features.

Iosif Androulidakis, Vasileios Christou, Nikolaos G. Bardis, Ioannis Stylios

Abstract — Despite the fact that mobile phone's security measures have been increased during the last years, users don't take the necessary measures to avoid a possible unauthorized access and/or sensitive data retrieval from their mobile phone. In order to investigate this issue, in this paper, we present the results of a survey conducted in the University of Ioannina, Greece according to which 282 participants were asked about quite many key factors concerning their mobile phone security. The results are very interesting and can be considered as a potential guide by various mobile operators for their future technological investments and their customer's briefing about mobile's phone security.

Keywords — Questionnaire Survey, Security Issues, Mobile Usage, Content Preference.

Online Available: https://dl.acm.org/doi/10.5555/1627955.1627964

8th Panhellenic HellasGIs Conference
Dec. 4, 2014
National Technical University of Athens, Greece

Study and environmental surveying on the Fire of Parnitha with Geographic Information Systems (GIS) for similar natural risk management in the future".

Tzelepis Georgios, Skentos Athanasios, Stylios Ioannis.

Abstract — Forest fires are one of the most important threats to the natural and man-made environment that Greece is called to face during the summer months. In recent years, there has been an effort for an interdisciplinary approach to natural hazards that draws techniques and tools from a wide range of sciences (geology, forestry, geography, engineering, computer science, etc.). The purpose of the article is to present the study and assessment of the environmental impact of fire and to extract quantitative and qualitative data on land uses, using modern remote sensing techniques and the environmental recording of fire with Geographic Information Systems (GIS), known as GIS. The present study highlights the pivotal role of GIS and Remote Sensing techniques in disaster prevention and management.

Keywords — Geographic Information Systems, Environmental Imaging, Natural Hazards Management, Parnitha Fire.

Online Available: https://goo.gl/ak9e2P

BOOKS

Publisher: University of the Aegean, 2022

Data Science and Big Data with R and Rstudio.

Ioannis Stylios, Olga Thanou (2022). Data Science and Big Data with R and Rstudio. Textbook, Publisher: University of Athens.

The purpose of the book "Data Science and Big Data with R and Rstudio" is to introduce readers to Data Science with R and the Rstudio integrated development environment. Initially, we introduce them to the basic concepts of Data Science. Following, we make a step-by-step tutorial on using the R language in Data Science, including tools and libraries and the Rstudio integrated development environment. Readers, learn how to use the

necessary technologies for the analysis of Big Data, to perform data web scraping, data handling in large datasets as well as to pre-process the data (missing values and imputation), and presentation of the data (data presentation / graphic overview). In addition, they become familiar with statistics, Data analysis, and Machine Learning. More specifically, they learn the basic principles of sampling, predictive models, and how to choose a model (Model selection). Also, they learn how the outlier detection and the stepwise regression are performed. Finally, they apply their knowledge in case studies with Real Data.

Publisher: University of the Aegean, 2022

Data Analysis Using R: Introduction to R and RStudio.

Ioannis Stylios, Olga Thanou (2022). Data Analysis Using R: Introduction to R and RStudio. Textbook, Publisher: University of Athens.

The book "Data Analysis Using R: Introduction to R and RStudio" aims to introduce readers to the R language and the integrated development environment Rstudio with applications in data analysis. Through hands-on application, readers can use the R language and Rstudio to perform data analysis. In this context, they initially become familiar with the R language, the environment of Rstudio, and the functions it offers. Then, a step-by-step learning of data types and the arithmetic and logical operators occurs. Also, readers can create and edit tables and practice with Continuous, Categorical, and Ordinal Variables. After becoming accustomed to the basic concepts of data management, they can import, pre-process and visualize data. In addition, they learn the basic concepts of Statistics, work on calculating basic statistics and learn the Pearson and Spearman correlation coefficients. Finally, the T-test and ANOVA are presented and analyzed.

Publisher: University of the Aegean, 2022

WordPress Developer.

Ioannis Stylios, Olga Thanou (2022). WordPress Developer. Textbook, Publisher: University of Athens.

The book “WordPress Developer” aims to introduce readers to WordPress Developing and creating websites. Through practical application, readers can design and develop dynamic websites. In this context, they initially become familiar with the installation of WordPress on the Web Server, the basic concepts, features, and the operating environment. Following a step-by-step WordPress learning is attempted. Readers become familiar with managing themes (templates), menus, and the homepage in WordPress and with organizing, managing, and editing content in WordPress. In addition, they learn to install and manage plugins and create a multilingual environment, contact forms and google maps. They also install an E-Commerce environment in WordPress and import content by creating posts, pages, menus, and products. At the same time, we analyze security and protection issues of a website, and present the necessary actions to meet the basic security requirements and legal compliance with the General Data Protection Regulation (GDPR). Finally, readers become familiar with connecting the WordPress website with Google Analytics to receive statistical data on its traffic and the optimization techniques (Search Engine Optimization - SEO) on the website.

Publisher: University of the Aegean, 2022

Android Developer- Android App Production.

Ioannis Stylios, (2022). Android Developer - Android App Production. Textbook, Publisher: University of Athens.

The book "Android Developer - Android App Production" aims to introduce readers to Android Development and the production of Android applications. Through hands-on application, they can design and build integrated applications. In this direction, readers initially become familiar with the Android Studio environment and the installation of the appropriate tools for program development. Next, we delve into step-by-step application creation, allowing the reader to understand the structure and operation of an Android application, as well as the conditions under which application components such as XML, manifest file, gradle scripts, etc., are used. Readers also learn to use Event Listeners to collect and process the data provided by the sensors of a modern Android Smartphone and an Android Watch and connect their applications to databases. In addition, they familiarize themselves with data entry and management and can work with forms, labels, datepickers, and buttons. They also learn to create and manage geospatial data, such as user location, use Emulators, and test and debug applications. The book also focuses on issues that relate to application security, rights, data security, and user authentication. Finally, readers learn the actions required to introduce an application to Google Play and the practices for creating applications with adaptability, scalability, and manageability.

Publisher: University of the Aegean, 2020

Advanced Python with applications in Machine Learning.

Ioannis Stylios, Spyros Kokolakis (2020). Advanced Python with applications in Machine Learning. Textbook, Publisher: University of Aegean.

The purpose of the book "Advanced Python with applications in Machine Learning" is to introduce readers to advanced topics in the Python programming language and Machine Learning. Readers will be introduced to Python Libraries for Machine Learning such as Scikit-learn, Tensorflow, Keras. They will learn to do Data Munging, Data Visualization, and Predictive Analytics using Machine learning algorithms. Important topics in Machine Learning will be presented and readers will become familiar with and implement Unsupervised Learning Algorithms such as K-Means and Principal Component Analysis as well as Supervised Learning Algorithms such as Linear Regression, Logistic Regression, Support Vector Machines, Decision Trees, and Random Forests, K-Nearest Neighbor. Finally, they will learn to work with Neural Networks and Deep Learning (Convolution Neural Networks) methods.

Publisher: University of Athens, 2020

Digital Education.

Spyros Kokolakis, Ioannis Stylios et al., (2020). "Digital Education". Textbook, Publisher: University of Athens.

The purpose of the book is the familiarization with the required knowledge and applied skills in the field of digital learning and teaching (digital education) in formal and non-formal frameworks of education. Targeted, it has a practical orientation and theoretical documentation and consists of courses with thematic and methodological continuity.

Concepts, definitions, and services in the context of Internet Education are clarified and the educational experience and culture of flexible learning and teaching are promoted. The guidelines issued by international organizations for education in the digital age are analyzed. It provides a description of the organization of a digital classroom to facilitate lifelong learning, as well as the production and distribution of e-learning content in virtual learning environments. Innovative practices are explored through the formulation of "gamification" learning and the use of distance learning/teleconference tools. Skills of producing and distributing electronic educational content are cultivated with multiple media, such as video, graphics, web technologies. Modern technologies for digital education are presented, such as augmented reality and virtual reality technologies and artificial intelligence technologies in education. Popular digital services in education are presented (digital libraries and archives, digital maps, digital museums). Educational game design and simulation skills are cultivated. Reference is made to digital technology in the classroom (smart boards, pens, tablet use by students, and BYOD). The role and use of social networks in education are described. Collaborative techniques are analyzed in the distance environment with an emphasis on the multiplicity of learning experiences from the perspective of the teacher and the learner. Methods of monitoring students' progress and self-assessment in distance education are described. Reference is made to the collection and analysis of data on the strategic planning and organization of digital education. Issues of educational research and writing of scientific papers are presented. Teaching examples are provided and the development of metacognitive skills through practice is encouraged.

Publisher: University of Aegean, 2020

Programming with Python.

Ioannis Stylios, Spyros Kokolakis, (2020). Programming with Python. Textbook, Publisher: University of Aegean.

The purpose of the book "Python Programming" is to educate readers about the Python programming language. Readers will be introduced to advanced programming topics and will be able to develop their programs. We will look at various data structures, program flow control, functions, files, and exceptions. They will also learn to do Descriptive Analytics, Data Munging, and Data Visualization. All this through a practical application and a final project in Python language.

Publisher: University of Aegean, 2020

Data Science with R.

Ioannis Stylios, Spyros Kokolakis. (2020). Data Science with R. Textbook, Publisher: University of the Aegean.

The purpose of the book "Data Science with R" is to educate readers in Data Science using the programming language R. The book provides everything necessary to start the journey in Data Science with a way that makes the content easy to understand. We will see why Data Science is used everywhere today, its fields of application, its history and its future. The R programming language will be introduced with an extension to basic Data Science work. We will look at tools, techniques, technologies and libraries for Data Science.

Readers will also learn to do Descriptive Analytics, Data Munging, calculate various statistical measures and do Data Visualization. They will learn Computational Methods and Technologies (Hadoop and MapReduce) for Big Data Analysis. Also, they will get to know popular Machine Learning packages. Using Machine Learning algorithms, readers will learn to do Predictive Analytics, which is a basic task and feature of Data Science.

Publisher: University of Aegean, 2020

Blockchain Technology.

Ioannis Stylios, Spyros Kokolakis. (2020). Blockchain Technology. Textbook, Publisher: University of the Aegean.

The book 'Blockchain Technology' is a comprehensive guide to blockchain technology and its practical applications. Readers will acquire the necessary skills on blockchain technology to understand its benefits and design practical solutions for both business and public administration. The contents of the book are divided into 3 thematic sections. In the first section, readers will learn the basic features of blockchain technology. In the second section they will learn the prerequisites for designing and developing a blockchain application and the most popular platforms. In the third section they will learn how blockchain technology can change existing business models and business processes. Finally, we present existing cases of use such as: finance, public services, property titles and supply chains.

Publisher: University of Aegean, 2020

Digital Transformation: Services and Technologies.

Spyros Kokolakis, Ioannis Stylios et al. (2020). Digital Transformation: Services and Technologies. Textbook, Publisher: University of Aegean.

The book is addressed to public and private sector executives, but also to young entrepreneurs who want to acquire the basic knowledge that will enable them to participate in the digital transformation of the economy, society and the state. The book covers the basic principles of computer science, software development, modern networks and telecommunications, internet and global web technologies, digital business and digital marketing, security and privacy issues, and the social implications of digital transformation.

Publisher: University of Athens, 2019

Blockchain Developer.

Ioannis Vlahos, Ioannis Stylios, (2019), Blockchain Developer. Textbook. Publisher: University of Athens.

Blockchain technologies are one of the cutting-edge areas of Information and Communication Technologies (ICT) that captures the interest of both the scientific community and companies operating in most fields. This interest stems mainly from the plethora of new possibilities offered by blockchain technologies in many different fields, from health and economics to energy and the Internet of Things. The book aims to present systematically and comprehensively the technologies of blockchains and to provide the reader with the necessary knowledge for the development of decentralized applications using blockchain technologies.

Publisher: University of Athens, 2019

Digital Energy.

Ioannis Vlahos, Ioannis Stylios, (2019), Digital Energy. Textbook. Publisher: University of Athens.

The book aims to present how Information and Communication Technologies (ICT) transform electricity companies horizontally, but also to delve deeper into those sectors that are being transformed drastically. It is addressed not only to those who deal exclusively with the electricity sector, but also to those whose subject matter is related to ICT. Also, the book is structured to be independent, as it provides all the necessary information in such a way as to cover a possible knowledge deficit regarding either Electricity Power Systems (EPS) or related ICT. The book begins with a detailed description of the evolution of EPS in recent years, describing the transformation of traditional EPS into the modern form of smart grids. The book then focuses on the impact of ICT, and especially the Internet of Things, on electricity. Issues related to smart metering systems, cloud computing and big data, as well as ICT applications in the optimal operation and management of EPS are also examined in depth. Also, the transformation brought about in the energy sector by the technologies of decentralized information recording systems (distributed ledgers) and blockchains is presented in a detailed way.

Publisher: University of Athens, 2019

Blockchain and Energy.

Ioannis Vlahos, Ioannis Stylios, (2019), Blockchain and Energy. Textbook. Publisher: University of Athens.

The book aims to present the convergence of blockchains and the electricity sector that results in the creation of new applications and innovative business models. It is addressed not only to those who deal exclusively with the electricity sector, but also to those whose subject matter is related to ICT technologies. Also, the program is structured in such a way that it is independent, as it provides all the necessary information to cover a possible deficit in knowledge regarding either the Electricity Systems or the related ICTs. The program begins with a detailed description of blockchains and distributed ledgers, as well as related concepts and technologies. At the same time, readers are introduced to the world of cryptocurrencies and how they create new financial tools that are directly applicable in the field of electricity. A detailed presentation of the public blockchain Ethereum platform is given and the concepts of smart contracts and decentralized applications are thoroughly described, together with their applications in various fields, from identity management and health, to the sectors. Internet of Things (IoT) and energy. The program then focuses on a detailed description of the evolution of Electricity Systems in recent years, describing the transformation of traditional Electricity Systems into the modern form of smart grids, while presenting the effect of the various forms of distributed energy production, the energy storage systems, as well as the ever-increasing penetration of electric vehicles. Finally, a detailed presentation of the applications of blockchains technologies in the field of electricity. The role of blockchains in the digital transformation of electricity companies is analyzed, and their various applications are analyzed with references to ongoing projects around the world, as well as the emerging limitations and

challenges. The book is completed with the presentation of issues related to the regulatory framework and data protection.

Publisher: University of Athens, 2019

Data Science with Python.

Ioannis Stylios. (2019). "Data Science with Python". Textbook, Publisher: University of Athens.

The purpose of the book "Data Science with Python" is to train students and professionals in Data Science using the Python programming language. The book provides everything you need to start your journey in data science in an easy-to-understand way. We will see why data science is used everywhere today, its application areas, its history, and its future. There will be an introduction to the Python programming language and an expansion to basic data science tasks. We will see tools, techniques and technologies as well as libraries for Data Science, such as NumPy, Pandas, and Matplotlib, so readers can get the most out of it. Readers will also learn to perform Descriptive Analytics, calculate various statistical measures, and visualize the relationships between various variables. Also, they will become familiar with popular Machine Learning and Deep Learning packages available for Python, such as Scikit learn, TensorFlow and Keras. With the use of machine learning algorithms, readers will learn to do Predictive Analytics, which is a core task and characteristic of Data Science.

Publisher: University of Athens, 2019

IT & Cyber Security: Threats Management and Security Policies.

Ioannis Stylios. (2019). "IT & Cyber: Security: Threats Management and Security Policies". Textbook, Publisher: University of Athens.

Threat of an Information System (IS) is defined as anything that results in the loss or destruction of data or material damage to its infrastructure. Threat is the loss or corruption of system data, the disruption of the operational functions of the IS, the loss of sensitive information, the illegal monitoring of the IS activities and Cyber Security violations. Threats can be intentional, accidental, or caused by natural disasters. Common types of non-physical threats are Viruses, Trojans, Worms, Spyware, Key Loggers, Adware, Denial of Service Attacks, Distributed Denial of Service, data Phishing and more. To protect Information Systems from the above-mentioned threats, an organization must have taken security measures. Knowing how to identify threats on computer security is the first step in protecting Information Systems. The book "IT & Cyber Security: Threats Management and Security Policies" aims to academically train students and professionals in the specific subject area to be able to write and execute Information Security Policies, Disaster recovery plans, and Security Awareness programs. In the book, we will present the common threats of an information system and how we can protect against them. Various concepts will be introduced about Ethical Hacking, attacks, vulnerability assessment and the tools used in this process. We will examine ways to manage risks and disaster recovery. We will see what kind of security measures must be taken to protect facilities, equipment, resources and the Information System in general.

Publisher: University of Athens, 2019

Internet of Things and Machine Learning Applications.

Ioannis Stylios. (2019). "Internet of Things and Machine Learning Applications". Textbook, Publisher: University of Athens.

The Internet of Things (IoT) constitutes a new stage of the 4th Industrial Revolution which is taking place nowadays. The development in the area of IoT is expected to improve existing technologies or bring about innovations such as smart homes, smart cities, smart industry, energy, health, etc. IoT is a major innovation with great social and economic importance. It is a parallel internet (internet of the future), from self-organized networks (Ad-hoc networks), which is growing rapidly and is causing a new growing trend in the creation of new products and services in the market. Developing a background in the IoT architecture and applications is a key prerequisite for professional development in this field. This book is aimed at people who want to pursue a career in IoT or simply want to enrich their knowledge in a state-of-the-art subject. The book focuses on tools and basic concepts of machine learning and IoT architecture. By finishing the book, the reader will know:

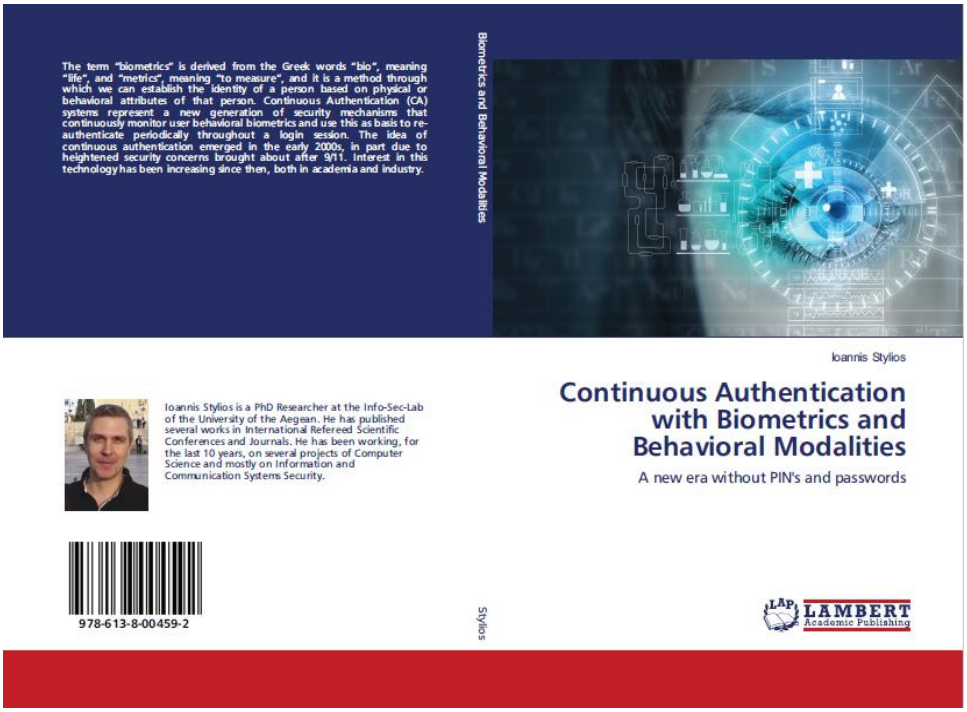
- The architecture of the Internet of Things, Ad-hoc networks and Sensor networks.
- Resources and tools for developing IoT applications, both at hardware, software and network interfaces.
- Popular Internet of Things applications.
- Cloud technology related to the Internet of Things.
- Machine learning techniques and tools in implementing intelligent applications.
- Basic security and privacy principles on the Internet of Things.

Lambert Academic Publishing Mar 2018

Continuous Authentication with Biometrics & Behavioral Modalities: A New Era without PINs & Passwords

Ioannis Stylios. (2018). "Continuous Authentication with Biometrics & Behavioral Modalities: A New Era without PINs & Passwords. ISBN: 978-613-8-00459-2. Publisher: Lampert Academic Publishing.

The term "biometrics" is derived from the Greek words "bio", meaning "life", and "metrics", meaning "to measure", and it is a method through which we can establish the identity of a person based on physical or behavioral attributes of that person. Continuous Authentication (CA) systems represent a new generation of security mechanisms that continuously monitor user behavioral biometrics and use this as basis to re-authenticate periodically throughout a login session. The idea of continuous authentication emerged in the early 2000s, in part due to heightened security concerns brought about after 9/11. Interest in this technology has been increasing since then, both in academia and industry.



PHD ABSTRACT

April 2016 - 2023

Biometric Authentication Methods, Information Systems Security and Privacy Issues.

Doctor of Philosophy - Ph.D. (HFRI scholarship) in Cybersecurity Data Science, under the supervision of Professor Spyros Kokolakis, at the Department of Information and Communication Systems Engineering (ICSE) of the University of the Aegean.

User authentication technology plays a critical role in securing access to online services. Authentication systems only identify the user at the beginning of the session (entry-point authentication), so they are vulnerable to attacks that occur after the initial authentication. These systems defend against such attacks by performing an additional authentication step at critical points in the session but are unpopular with users due to repetitive authentications. Mobile devices and their applications use the entry-point authentication model to authenticate users which has been heavily criticized for being vulnerable to attacks that occur after the initial authentication. An important concern is to determine whether the mobile device is in the hands of the legitimate user and, correspondingly, whether the legitimate user is the one using the sensitive services. In response to these concerns, we present research on the development and evaluation of a Continuous Authentication (CA) system based on Behavioral Biometrics (BB). CA technology is an additional security measure that monitors users' biometric behavior by continuously re-identifying the user during a login session. In this Ph.D. thesis, we present an extensive systematic literature review that maps the research area and a new theoretical framework for investigating the key factors that show us the user requirements that influence the adoption of BBCA technology. We also present a new scientific paradigm and a new behavioral biometrics collection tool. Finally, we present the BBCA methods and systems we have developed and solved different open security and usability problems.

The scope of our survey is wide, ranging from reviewing BB and CA technologies to data collection methodologies and relevant machine learning models. The main goal is to offer a sufficient background on BBCA technology for mobile devices, of interest to both researchers and practitioners. Our purpose is to present all the significant elements for enabling researchers to conduct their research. The first goal is to present a classification of all seven categories of BB and CA on mobile devices and an analysis of BB collection methodologies, feature extraction and the existing publicly available datasets. The second goal is to present a literature review on machine learning models performance in seven types of BB for CA. Further, we conduct another review that showed the vulnerability of machine learning models against well-designed adversarial attack vectors and we highlight relevant countermeasures. Finally, our discussions extend to lessons learned, current challenges and future trends.

In this thesis, we investigate the effect of various factors on behavioral intention to adopt technology (Behavioral Intention - BI) through a new integration of a modified Technology Acceptance Model (TAM) and the Diffusion of Innovation Theory (DOI). We also created a new theoretical framework with constructs such as Security & Privacy Risks (SPR), Biometrics Privacy Concerns (BPC), and Perceived Risk of Technology Use (PROU). We conducted an empirical Structural Equation Modeling (SEM) investigation. Our research was designed to address the trade-off between users' concerns about the privacy of their biometrics and their protection from risks.

In this thesis, we present research related to the design and evaluation of new approaches to continuous authentication using touch gestures and dynamic typing. We developed a new scientific paradigm and a new behavioral biometrics collection tool, called BioGames paradigm and BioGames App, respectively. The BioGames science paradigm proposes a user-friendly methodology for collecting behavioral biometrics by playing simple mobile games. We implemented an experimental test of collecting behavioral biometrics. Our results showed that the data collected is consistent and according to the BioGames paradigm. We examined each behavioral biometric case separately and investigated whether we can improve the performance results with a feature-level fusion of touch gestures and dynamic typing. We used Multi-Layer Perceptron (MLP) and Long Short-Term Memory (LSTM) and compared their performance. We have shown that the fusion of touch gestures and dynamic typing at the feature level improves the performance of systems and solves security and usability issues. We found that the MLP is superior to LSTM in this context. The MLP achieved Accuracy 98.3% (increased 21.1%), EER 1% (error reduction by 23.7%), TAR 99.4% (increased 46%), TRR 97.4% (increased 10%), FAR 2.6% (reduced by 10.5%), and FRR 0.6% (reduced by 46%).

Keywords: Behavioral Biometrics, Continuous Authentication, Deep Learning, Technology Acceptance Models, Mobile Devices

Online available: https://www.didaktorika.gr/eadd/handle/10442/53367

MASTER THESES

10 July 2020

Designing a digital and robotic learning environment for interdisciplinary approach to the concept of pattern.

Master of Education (MEd) in Didactics of Mathematics, Sciences and ICT in Education: Interdisciplinary Approach. University of the Aegean, Faculty of Humanities, Department of Preschool Education Sciences & Educational Design, Rhodes (Greece).

Studies have shown that Educational Robotics (EP) can affect learning, especially in relation to the interdisciplinary approach in the STEM (Physics, Informatics, Engineering and Mathematics) fields. However, few studies have focused on teaching STEM concepts through an interdisciplinary approach and evaluating technology through Educational Robotics activities, especially in preschool, where educational robotics is often degraded by many teachers as a controversial educational tool. Pattern is a concept common to Mathematics, Music, Literature, Physics and Informatics and is an interdisciplinary concept in the field of STEM. The motif, in particular, is a repetitive module, a short idea or a short artistic element, e.g. (music) a short melodic or harmonic motif of the orchestra. But interdisciplinary and multi-sensory approaches to patterns in education are rare. This work aims to design an educational digital and robotic learning environment for the interdisciplinary approach to the concept of motif through the cognitive pillars: Mathematics, Informatics, Music combined semantically with the help of a fairy tale. The design includes the development of educational software and the construction of robots with the Lego WEDO educational robotics package. It also includes an interdisciplinary educational scenario that meets the standards of the construction model learning model. The script is based on a fairy tale starring animal-robot musicians, whom we named "Pam" and "Pam Pam," who play musical instruments. Students can, using the educational software of the present work, create their own rhythms which will be played by the robots with a drum and a xylophone. The purpose of the research is to investigate whether through a collaborative interdisciplinary teaching scenario, using educational robotics and constructional learning model, we can have positive learning outcomes and teaching benefits. The present work will test the design of an innovation (Educational software, robotics, teaching scenario) and will record the dimensions and difficulties of teaching a concept (Pattern). He will also study the effect of an educational robotics intervention on dimensions of teaching (learning outcomes, attitudes, misconceptions, quality of interaction, motivation) through qualitative and quantitative analysis.

Keywords: teaching script, constructionism, ICT, educational robotics, Lego WEDO, pattern, rhythm, interdisciplinarity, STEM, preschool age.

31 Mar 2016

Privacy Enhancing on Mobile Devices: Continuous Authentication with Biometrics and Behavioral Modalities.

Master's Degree in Information & Communication Systems Security. Faculty of Engineering, Department of ICSE, Samos (Greece).

Mobile phones are one of the most popular means of access to the internet. Users, via the telephone, connect to different services such as: Google, social networks, work accounts, banks accounts, etc. Those services, are oftentimes, left running on their device. This practice entails risks, such as, loss or/and the violation of their personal data. Also, the stealing of the device, after login, grants full access to sensitive data and applications. For

all the above reasons, Continuous Authentication (CA) systems have been suggested in literature. CA systems represent a new generation of security mechanisms that continuously monitor user behavior and use this as basis to re-authenticate periodically throughout a login session. In the present thesis a literature review was carried out on topics including the following: Continuous Authentication, Privacy, Users Attitudes, Biometrics, Behavioral Modalities. In the literature review we present a collection of selected published sources relevant to the topic of the thesis, which are accompanied by annotation, critical analysis of contents and apposition in some cases of the main conclusions of each study. The purpose of the literature review is the critical analysis of the contents and the detection of possible gaps in the literature on the particular topic.

In order to answer to the research questions that have been posed from these research areas we conducted two corresponding surveys with two original questionnaires in which we had a total of 304 participants from Greece and Cyprus. The purpose of these surveys has been to identify users' attitudes with regard to the protection of their sensitive personal data, as well as users' practices pertaining to certain behavioral modalities.

In the first survey, we examine whether users adopt some basic practices to protect their sensitive personal data themselves, or there is a need to further strengthen their protection. For purposes of statistical analysis, our main variable is age because we wanted to evaluate the significance degree regarding users' attitudes and practices among different age groups. Finally, we seek the factors that influence the attitude of users with respect to their practices for the protection of personal data through statistical hypotheses.

In the second survey, we analyze the most salient patterns characterizing user practices regarding certain behavioral modalities including: the way of using various applications, power consumption, touch gestures and guest users' habits. This can offer qualitative information, for the different behaviors / "characters" of users. What we want to see via our questionnaire is whether users do perform similar tasks at a certain time of the day. In addition, through this approach we want to examine under what basis the user's profile can be created in order to be used in further research regarding user's Continuous Authentication.

In the third part of our research work we present an Experimental Procedure and the Behavioral Biometrics Data Collection Architecture for mobile devices. In the present experiment we recorded modalities of movement imprinting the user's walk patterns. Our methodology imprints the modalities of movement, by the accelerometer and gyroscope sensors, of 10 volunteers in total. The procedure was designed in such a way so as to collect data from every participant for three sessions. The sessions recorded three sequences of 10 minutes each while the participant: walked and hold the device on his hand, walked and had the device on his pocket, was running and had the device on his pocket. These sessions were repeated for two days and gives us a total of 60 minutes' real use data of the smartphone for each user.

Keywords — Mobile Phones, Behavioral Biometrics, Users Attitudes, Continuous Authentication, Survey.

1. **Project name:** BioPrivacy: Development and validation of a Behavioral Biometrics Continuous Authentication System.

   Position: Researcher

   Affiliation name: University of the Aegean

   May 2020 – Present

   Project description: Cybercriminals are constantly developing new attacks and users are facing new dangers. The concept of risks includes both the possibility of violating the access control mechanism, e.g. with theft of the PIN, as well as the loss of personal data or assets (e.g. money in a bank account). The main weakness of traditional Session authentication schemes is that they establish the identity of the user only at the beginning of the session, so they are vulnerable to attacks that occur after the initial authentication. To address these shortcomings, the project aims to create a model of Continuous Authentication using Behavioral Biometrics Continuous Authentication (BBCA). BBCA technology constantly monitors, through behavioral biometrics, that the legitimate user continues to own the device throughout a session, without the need for repeated authentication with a fingerprint, a PIN, or a touch pattern. Our goal is to create an interactive prototype called bioPrivacy, and in the future to develop it into a Minimum Viable Product (MVP). Factors influencing end-user adoption must also be explored for the success of BBCA systems. For this reason, in the present study, we examine the effect of various factors arising from the Protection Motivation Theory. With this approach, we see the BBCA as a technology that protects the user. If the user does not feel adequately protected by the classic methods, then he will consider BBCA as a technology for extra protection. Exploring this factor is vital to tackling the problem of reduced use and utilization of BBCA technology.

2. **Project name:** "University - Industry Educational centre in advanced biomedical and medical informatics (CeBMI). Project no: 612462-EPP-1-2019-1-SK-EPPKA2-KA.

   Position: Technical scientist

   Company name: Telesig & University of Zilina.

   Jan 2020 – Present

   Project description: Biomedical and Medical Informatics (BMI) is a very dynamic field undergoing rapid evolution and centrally featured in health reforms across Europe. Emerging technologies in BMI are central to making healthcare more personalised, precise, reliable, safer and cost effective. The increased interest in BMI education and training is leading to transformative trends in creating new educational programs at higher education institutions in Europe offering a BMI degree. New emerging interdisciplinary domains are being added to the curriculum offering additional possibilities and challenges for engineers and system scientists to be involved, but at the same time imposing new demands on core teaching and learning competences.

   The development and implementation of the Centre-BMI to support educational process and courses appropriately addresses this pressing and real problem. This Centre will exploit new innovative cloud-based technology to support the creation and delivery of new courses/subjects in BMI that is complex and multidisciplinary. Courses will be offered both at the undergraduate and postgraduate levels to address a wide spectrum of core competency requirements. The Centre will provide an invigorating environment for the cooperation of technical, medical universities, and enterprises in BMI that will provide a pool of supplementary expertise, skills, and

competences in this area. Both universities and enterprises' contemporaneous participation in the project fosters a new trend of integrated medicine and IT educational provision relevant for the definition of an emerging innovative BMI-related professional profile that is well sought after by enterprises. This Centre will be open to other non-consortium partners that would like to be involved in cooperative activities helping to ensure the project's impact and sustainability.

The following educational institutions, organizations and enterprises from 9 European Union countries are involved in the implementation of the project:

- Zilinska Univerzita v Ziline (UNIZA), Slovakia.
- Leeds Beckett University (LBU), UK.
- Peter L. Reichertz Institute for Medical Informatics of the Technical University of Braunschweig (TUB-PLRI), Germany.
- Università Campus Bio-Medico di Roma (UCBM), Italy.
- Universidad Rey Juan Carlos (URJC), Spain.
- University of Oulu (UOULU), Finland.
- Universitat de Valencia (UV), Spain.
- Ostravska Univerzita (OU), Czech Republic.
- Hospital of Zilina (FNsPZ), Slovakia.
- Dr. Guido Kaufmann e.K. (DGKeK), Germany.
- STAPRO SLOVENSKO s.r.o. (Stapro), Slovakia.
- Amnim d.o.o. (Bioanim), Slovenia.
- TELESIG Ltd (TELESIG), Bulgaria.

3. **Project name:** "Biometric Authentication Methods, Information Systems Security and Privacy Issues."

   Position: Research Fellow, PhD scholar

   Company name: University of the Aegean

   Apr 2016 – 30 Sep 2019

   Project description: The goal of this project is that the users can safely make all his transactions through the mobile device and not need username and passwords to connect to their bank, Google, FB, work account, etc. Instead the device will constantly confirm that the legitimate user is still in possession of it and will prove to the online services its identity through its device which has already identified it. Also, It is also obvious that for the success of future investments on the implementation of BBCA systems it is necessary to determine the factors that affect technological acceptance. Assessing the key factors of technology acceptance is vital to address the problem of reduced use. For this reason, we examine the effect of various factors of behavioral intention through a new integration of the TAM model and the DOI theory. On this basis, we believe that user authentication can be made possible and effective through Behavioral Biometrics Continuous Authentication (BBCA) systems in order to begin the transition to a new era of authentication without the use of PINs and passwords.

4. **Project name:** ReCRED "Identity and Access Control Management".

   Position: Specialist Scientist - Researcher C

Company name: Cyprus University of Technology

May 2016 – July 2016

Project description: The main goal of ReCRED is to unify under the mobile personal devices the authentication and authorization mechanisms that provide access control for online services.

In layman terms, RECRED aims at obviating the need for a user to remember many hard to guess passwords so that he can access his Google, Facebook or work accounts. Instead, ReCRED will produce software solutions that enable the user to login to his mobile device in a usable and secure way (e.g., with a short PIN or through biometric authentication such as fingerprint scanning). Subsequently, the mobile device becomes a secure authentication gateway to online services employing state of the art cryptographic protocols for access control. Besides increased security, this approach has the additional advantage of providing user-friendly attribute-based access control, i.e., a user can prove parts of his identity, such as his age, without sacrificing his anonymity.

At the same time, ReCRED will add safeguards on the device which will continuously validate through behavioural biometrics (e.g., by analysing the user's walk patterns) that the rightful owner of the device still has the device in his possession and this has not been stolen. In case the device is lost, the user will have the ability to restore his cryptographic credentials on a new device.

The project is a collaboration between global telecommunication companies Telefonica and Verizon, the Romanian security solutions provider certSIGN, the mobile solutions provider UPCOM, the Web applications company WEDIA, the EXUS debt and origination solution provider, the Baker and Mckenzie law firm and the universities: CUT, UC3M, Roma Tor Vergata, UPRC.

The ultimate goal of the project is to assess and validate the aforementioned technologies with end-users and to have them adopted as commercial products by the involved companies.

5. **Project name:** 'STHRIZO'.

   Position: NOC Engineer

   Company name: University of Athens (UOA), Network Operation Center (NOC) / Special Research Account (ELKE).

   Sep 2008 – Dec 2014

   Project description: Horizontal support of schools, teachers and students on the way to “Digital School”, new services of “Greek School Network” (GSN) and Support of the “Digital School”. More specifically the University of Athens undertakes on-site and remote technical support as well as practical training of new and existing ICT infrastructure in all educational and support units in the following Departments of Education: Athens, Eastern Attica and Viotia.

6. **Project name:** "NET-REFOUND/034413: NetWorking Research Foundations and Trends."

   Position: Technical Scientist

   Company name: Centre for Research & Technology Hellas (CERTH)

   Feb 2009 – Sep 2009

Project description: The objective of the NetRefound is to develop the theory, methods and algorithms suitable for the modelling, analysis and design of future telecommunication networks. The long- term goal is the theoretical understanding of the collective interaction of a multiplicity of communicating nodes beyond the boundaries posed by specific telecommunication standards. This will lead to a quantitative characterization of the fundamental performance limits of these systems and eventually to algorithms for achieving them.