Curriculum Vitae

Matteo Spezialetti

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Work Experience

2020	**Position:** Researcher (RTD-A) at Department of Information Engineering, Computer Science and Mathematics, University of L'Aquila **Project:** Optimization of computational resources in TPS (Treatment Planning System) for hadron therapy **P.I.:** Prof. Filippo Mignosi
2019-2020	**Position:** Research fellow at Department of Electrical Engineering and Information Technology, University "Federico II" of Naples **Project:** Automatic evaluation of the experience during multi-agent human-machine and human-robot interaction, using biometric signals for process features extraction **P.I.:** Prof. Silvia Rossi
2018-2019	**Position:** Research fellow at Department of Psychology, University "La Sapienza" of Rome **Project:** The body in the brain at rest: MEG studies **P.I.:** Prof. Viviana Betti
2013	**Position:** Term-contract worker at Department of Life, Health and Environmental Sciences, University of L'Aquila **Project:** Design and implementation of a communication system for people with lacking sensory/motor skills, based on the analysis of EEG signals **P.I.:** Prof. Giuseppe Placidi

Teaching

2021/2022	Compilers (F0151, 6CFU); Skill Computer Science (B0487, 3CFU)
2020/2021	Introduction to Computability and Complexity (F0150, 6CFU); Information Retrieval (DT0211, 3CFU)
2019/2020	Compiler Laboratory (DT0275, 3CFU); Theory of Languages (DT0269, 6CFU)

Education

2018	**Degree:** Ph.D. in Health and Environmental Sciences (Molecular and Ultra-structural Imaging) at Department of Life, Health and Environmental Sciences, University of L'Aquila **Thesis:** Emotion driven brain computer interfaces: alternative pathways for people in minimally conscious state **Tutor:** Prof. Giuseppe Placidi

2016	**Position:** Visiting student at Faculty of Engineering, University of Porto **Tutor:** Prof. João Manuel RS Tavares
2014	**Degree:** Master's Degree in Computer Science (110/110 and honors) at Department of Information Engineering, Computer Science and Mathematics, University of L'Aquila **Thesis:** Recognition and classification of EEG signals of emotions: development of a brain-computer interface
2012	**Degree:** Bachelor's Degree in Computer Science (107/110) at Faculty of Science, University of L'Aquila **Thesis:** Development of applications for supporting rehabilitation using the system iisu^{TM} - depth sensing camera
2004	**Degree:** High School Diploma (90/100) at Liceo Scientifico Andrea Bafile, L'Aquila

Publications

Journals

E. Theodoridou, L. Cinque, F. Mignosi, G. Placidi, M. Polsinelli, J.M.R.S. Tavares, M. Spezialetti. Hand tracking and gesture recognition by multiple contactless sensors: a survey. IEEE Transactions on Human-Machine Systems. IN PRINT

M. Spezialetti, G. Placidi, S. Rossi. Emotion recognition for human-robot interaction: recent advances and future perspectives. Frontiers in Robotics and AI, 2020; 145

R. Aragona, F. Marzi, F. Mignosi, M. Spezialetti. Entropy and Compression: A Simple Proof of an Inequality of Khinchin-Ornstein-Shields. Problems of Information Transmission, 2020, 13-22. DOI: 10.1134/S0032946020010020

M. Rescigno, M. Spezialetti, S. Rossi. Personalized models for facial emotion recognition through transfer learning. Multimedia Tools and Applications, 2020; 1-18. DOI: 10.1007/s11042-020-09405-4

M. Spezialetti, L. Cinque, J. M. Tavares, G. Placidi. Towards EEG-based BCI driven by emotions for addressing BCI-Illiteracy: a meta-analytic review. Behaviour & Information Technology, 2018; 37(8):1:17. DOI: 10.1080/0144929X.2018.1485745

G. Placidi, L. Cinque, M. Polsinelli, M. Spezialetti. Measurements by A LEAP-Based Virtual Glove for the Hand Rehabilitation. Sensors, 2018; 18(3):834. DOI: 10.3390/s18030834

G. Placidi, M. Polsinelli, M. Spezialetti, L. Cinque, P. Di Giamberardino, D. Iacoviello. Self-induced emotions as alternative paradigm for driving brain–computer interfaces. Computer Methods In Biomechanics And Biomedical Engineering: Imaging & Visualization, 2018, p. 1-8, DOI: 10.1080/21681163.2018.1479312

M. Carrieri, A. Petracca, S. Lancia, S. Basso Moro, S. Brigadoi, M. Spezialetti, M. Ferrari, G. Placidi, V. Quaresima. Prefrontal cortex activation upon a demanding virtual hand-controlled task: a new frontier for neuroergonomics. Frontiers in Human Neuroscience, 2016; 10. DOI:10.3389/fnhum.2016.00053

S. Basso Moro, M. Carrieri, D. Avola, S. Brigadoi, S. Lancia, A. Petracca, M. Spezialetti, M. Ferrari, G. Placidi, V. Quaresima. A novel semi-immersive virtual reality visuomotor task activates ventrolateral prefrontal cortex: a functional near-infrared spectroscopy study. Journal of Neural Engineering. 2016; 13(3):36002-360015. DOI: 10.1088/1741-2560/13/3/036002

G. Placidi, D. Avola, A. Petracca, F. Sgallari, M. Spezialetti. Basis for the implementation of an EEG-based single-trial binary brain computer interface through the disgust produced by remembering unpleasant odors. Neurocomputing, 2015; 160:308-318. DOI:10.1016/j.neucom.2015.02.034

D. Iacoviello, A. Petracca, M. Spezialetti, G. Placidi. A real time classification algorithm for EEG - based BCI driven by self induced emotions. Computer Methods and Programs in Biomedicine, 2015; 122(3):293-303. DOI:10.1016/j.cmpb.2015.08.011

F. Pistoia, A. Carolei, D. Iacoviello, A. Petracca, S. Sacco, M. Sarà, M. Spezialetti, G. Placidi. EEG-detected olfactory imagery to reveal covert consciousness in minimally conscious state. Brain Injury, 2015; 29(13-14):1729-1735. DOI:10.3109/02699052.2015.1075251

G. Placidi, A. Petracca, M. Spezialetti, D. Iacoviello. A modular framework for EEG web based binary brain computer interfaces to recover communication abilities in impaired people. Journal of Medical Systems, 2016; 40(34). DOI: 10.1007/s10916-015-0402-4

D. Iacoviello, A. Petracca, M. Spezialetti, G. Placidi. A classification algorithm for electroencephalography signals by self-induced emotional stimuli. IEEE Transactions on Cybernetics. 2015; 1-10. DOI:10.1109/TCYB.2015.2498974

M. Ferrari, S. Bisconti, M. Spezialetti, S. Basso Moro, C. Di Palo, G.Placidi, V. Quaresima. Prefrontal cortex activated bilaterally by a tilt board balance task: a functional near-infrared spectroscopy study in a semi-immersive virtual reality environment. Brain Topography, 2014; 27(3):353-365. DOI:10.1007/s10548-013-0320-z

S. Basso Moro, S. Bisconti, M. Muthalib, M. Spezialetti, S. Cutini, M. Ferrari, G.Placidi, V. Quaresima. A semi-immersive virtual reality incremental swing balance task activates prefrontal cortex: a functional near-infrared spectroscopy study. Neuroimage, 2014; 85(1):451-460. DOI:10.1016/j.neuroimage.2013.05.031

G. Placidi, D. Avola, M. Ferrari, D. Iacoviello, A. Petracca, V. Quaresima, M. Spezialetti. A low-cost real time virtual system for postural stability assessment at home. Computer Methods and Programs in Biomedicine, 2014; 117(2):322-333. DOI:10.1016/j.cmpb.2014.06.020

D. Avola, M. Spezialetti, G. Placidi. Design of an efficient framework for fast prototyping of customized human-computer interfaces and virtual environments for rehabilitation. Computer Methods and Programs in Biomedicine, 2013; 110(3):490-502. DOI:10.1016/j.cmpb.2013.01.009

Conferences

M. Spezialetti, R. Dei Filippo, R. Gimenez De Lorenzo, G.L. Gravina, G. Placidi, G. Proietti, F. Rossi, S. Smriglio, J.M.R.S. Tavares, F. Vittorini, F. Mignosi. Optimizing Nozzle Travel Time in Proton Therapy. IEEE 35th International Symposium on Computer Based Medical Systems (CBMS 2022)

G Placidi, A Di Matteo, F Mignosi, M Polsinelli, M Spezialetti. Compact, Accurate and Low-cost Hand Tracking System based on LEAP Motion Controllers and Raspberry Pi. International Conference on Pattern Recognition Applications and Methods (ICPRAM 2022)

M. Spezialetti, F. Lapenna, P. Caianiello, F. Fracchiolla, F. Muciaccia, G. Placidi, G. Russo, F. Mignosi. Using Deep Learning for Fast Dose Refinement in Proton Therapy. IEEE International Conference on Systems, Man, and Cybernetics. DOI: 10.1109/SMC52423.2021.9658879 (SMC 2021)

G. Placidi, G. De Gasperis, F. Mignosi, M. Polsinelli, M. Spezialetti. Integration of a BCI with a Hand Tracking System and a Motorized Robotic Arm to Improve Decoding of Brain Signals Related to Hand and Finger Movements. International Symposium on Visual Computing (ISVC 2021)

F.A. D'Asaro, M. Spezialetti, L. Raggioli, S. Rossi. Towards an Inductive Logic Programming approach for explaining black-box preference learning systems. International Conference on Principles of Knowledge Representation and Reasoning (KR 2020).

S. Sangiovanni, M. Spezialetti, F.A. D'Asaro, G. Maggi, S. Rossi. Administrating Cognitive Tests Through HRI: an Application of an Automatic Scoring System Through Visual Analysis. International Conference on Social Robotics (ICSR 2020)

A. Pizzuti, S. Della Penna, M. Spezialetti, M. Corbetta, V. Betti. Distinct MEG functional connectivity and topology changes distinguish between voluntary hand and foot movements, Organization of Human Brain Mapping (OHBM 2020)

G.R. Tizzano, M. Spezialetti, S. Rossi. A Deep Learning Approach for Mood Recognition from Wearable Data. 2020 IEEE International Symposium on Medical Measurements and Applications (MeMeA). DOI: 10.1109/MeMeA49120.2020.9137218

M. Polsinelli, P. A. Banchetti, A. Cacchio, V. Calvisi, C. Marini, G. Placidi, M. Spezialetti, L. Cinque. Hand movement parameters calculated by the LEAP based Virtual Glove. 2018 IEEE International Symposium on Medical Measurements and Applications (MeMeA). DOI: 10.1109/MeMeA.2018.8438764

G. Placidi, M. Polsinelli, M. Spezialetti, L. Cinque. BCI driven by self-induced emotions: a multi-class study. 2018 IEEE International Symposium on Medical Measurements and Applications (MeMeA). DOI: 10.1109/MeMeA.2018.8438817

G. Placidi, L. Cinque, M. Polsinelli, M. Spezialetti. Forces Calculation Module for the Leap-Based Virtual Glove. ICBBT '18 Proceedings of the 2018 10th International Conference on Bioinformatics and Biomedical Technology. DOI: 10.1145/3232059.3232063

P. Di Giamberardino, D. Iacoviello, G. Placidi, M. Polsinelli, M. Spezialetti. A Brain Computer Interface by EEG Signals from Self-induced Emotions. VI Eccomas Thematic Conference On Computational Vision And Medical Image Processing (VipImage), 2017. DOI:10.1007/978-3-319-68195-5_77

G. Placidi, L. Cinque, P. Di Giamberardino, D. Iacoviello, M. Spezialetti. An affective BCI driven by self-induced emotions for people with severe neurological disorders. W3AS 2017 - Automatic Affect Analysis and Synthesis Workshop – Catania, 11/09/2017.

L. Cinque, A. De Santis, P. Di Giamberardino, D. Iacoviello, G. Placidi, S.Pompili, R. Sferra, M. Spezialetti, A Vetuschi. Design of a Classification Strategy for Light Microscopy Images of the Human Liver. ICIAP 2017 – International Conference on Image Analysis and Processing – Catania – 11-15/09/2017.

G. Placidi, L. Cinque, M. Polsinelli, M. Spezialetti. Characterization of a Virtual Glove for Hand Rehabilitation Based on Orthogonal LEAP Controllers. In Pattern Recognition Applications and Methods, Springer LNCS.

G. Placidi, L. Cinque, A. Petracca, M. Polsinelli, M. Spezialetti. A virtual glove system for the hand rehabilitation based on two orthogonal LEAP Motion Controllers. ICPRAM 2017 – International Conference on Pattern Recognition Applications and Methods – Porto 24-26/02/2017. DOI: 10.5220/0006197801840192

G. Placidi, L. Cinque, A. Petracca, M. Polsinelli, M. Spezialetti. Iterative Adaptive Sparse Sampling Method for Magnetic Resonance Imaging. ICPRAM 2017 – International Conference on Pattern Recognition Applications and Methods – Porto 24-26/02/2017. DOI: 10.5220/0006199105100518

M. Spezialetti, D. Iacoviello, A. Petracca, G. Placidi. A Virtual System for Balance Control Assessment at Home. ICTs for Improving Patients Rehabilitation Research Techniques. REHAB 2015. Communications in Computer and Information Science, 665: 12-25. DOI:10.1007/978-3-319-69694-2_2

G. Placidi, P. Di Giamberardino, A. Petracca, M. Spezialetti, D. Iacoviello. Classification of Emotional Signals from the DEAP dataset. In Proceedings of the 4th International Congress on Neurotechnology, Electronics and Informatics (NEUROTECHNIX 2016), Porto 7-8/11/2016, Pages 15-21. DOI:10.5220/0006043400150021

Petracca, M. Carrieri, D. Avola, S. Basso Moro, S. Brigadoi, S. Lancia, M. Spezialetti, M. Ferrari, V. Quaresima, G. Placidi. A virtual ball task driven by forearm movements for neuro-rehabilitation: prefrontal cortex activation

assessed by functional near-infrared spectroscopy (fNIRS). ICVR 2015 - International Conference on Virtual Rehabilitation – Valencia 9-12/06/2015, 162-163. DOI:10.1109/ICVR.2015.7358600

G. Placidi, A. Petracca, M. Spezialetti, D. Iacoviello. Classification strategies for a single-trial binary brain computer interface based on remembering unpleasant odors. EMBS 2015 - 37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society – Milan 25-29/08/2015; 7019-7022. DOI:10.1109/EMBC.2015.7320008

D. Iacoviello, N. Pagnani, A. Petracca, M. Spezialetti, G. Placidi. A poll oriented classifier for affective brain computer interfaces. In: Proceedings of the 3rd International Congress on Neurotechnology, Electronics and Informatics, 2015; 41-48. DOI:10.5220/0005606600410048

G. Placidi, N. Pagnani, A. Petracca, M. Spezialetti, D. Iacoviello. A virtual system for postural stability assessment based on a TOF camera and a mirror. REHAB 2015 - ICTs for improving Patients Rehabilitation Research Techniques – Lisbon 01-02/10/2015. DOI:10.1145/2838944.2838963

D. Avola, L. Cinque, S. Levialdi, A. Petracca, G. Placidi, M. Spezialetti. Innovative on-line handwriting identification algorithm based on stroke features. In: Computational Modelling of Objects Represented in Images. Fundamentals, Methods, and Applications, 2014; 400-411. DOI:10.1007/978-3-319-09994-1_39

G. Placidi, D. Avola, L. Cinque, G. Macchiarelli, A. Petracca, M. Spezialetti. Adaptive sampling and non linear reconstruction for cardiac magnetic resonance imaging. In: Computational Modelling of Objects Represented in Images. Fundamentals, Methods, and Applications, 2014; 24-35. DOI:10.1007/978-3-319-09994-1_3

D. Avola, L. Cinque, S. Levialdi, A. Petracca, G. Placidi, M. Spezialetti. Time-of-flight camera based virtual reality interaction for balance rehabilitation purposes. In: Computational Modelling of Objects Represented in Images. Fundamentals, Methods, and Applications, 2014; 363-374. DOI:10.1007/978-3-319-09994-1_36

S. Bisconti, M. Spezialetti, G. Placidi, V. Quaresima. Functional near-infrared frontal cortex imaging for virtual reality neuro-rehabilitation assessment. In: Computational Modelling of Objects Represented in Images III, 2012; 187-192. DOI:10.1201/b12753-34

M. Spezialetti, D. Avola, G. Placidi, G. De Gasperis. Movement analysis based on virtual reality and 3D depth sensing camera for whole body rehabilitation. In: Computational Modelling of Objects Represented in Images III, 2012; 367-372. DOI:10.1201/b12753-68

Speaker Activity

M. Spezialetti, R. Dei Filippo, R. Gimenez De Lorenzo, G.L. Gravina, G. Placidi, G. Proietti, F. Rossi, S. Smriglio, J.M.R.S. Tavares, F. Vittorini, F. Mignosi. Optimizing Nozzle Travel Time in Proton Therapy. IEEE 35th International Symposium on Computer Based Medical Systems (CBMS 2022) (Virtual)

M. Spezialetti, F. Lapenna, P. Caianiello, F. Fracchiolla, F. Muciaccia, G. Placidi, G. Russo, F. Mignosi. Using Deep Learning for Fast Dose Refinement in Proton Therapy. IEEE International Conference on Systems, Man, and Cybernetics (SMC 2021). DOI: 10.1109/SMC52423.2021.9658879 (Virtual)

G.R. Tizzano, M. Spezialetti, S. Rossi. A Deep Learning Approach for Mood Recognition from Wearable Data. 2020 IEEE International Symposium on Medical Measurements and Applications (MeMeA). DOI: 10.1109/MeMeA49120.2020.9137218 (Virtual)

G. Placidi, M. Polsinelli, M. Spezialetti, L. Cinque. BCI driven by self-induced emotions: a multi-class study. 2018 IEEE International Symposium on Medical Measurements and Applications (MeMeA). DOI: 10.1109/MeMeA.2018.8438817

G. Placidi, L. Cinque, P. Di Giamberardino, D. Iacoviello, M. Spezialetti. An affective BCI driven by self-induced emotions for people with severe neurological disorders. W3AS 2017 - Automatic Affect Analysis and Synthesis Workshop – Catania – 11/09/2017

G. Placidi, L. Cinque, A. Petracca, M. Polsinelli, M. Spezialetti. A virtual glove system for the hand rehabilitation based on two orthogonal LEAP Motion Controllers. ICPRAM 2017 – International Conference on Pattern Recognition Applications and Methods – Porto 24-26/02/2017. DOI: 10.5220/0006197801840192

G. Placidi, L. Cinque, A. Petracca, M. Polsinelli, M. Spezialetti. Iterative Adaptive Sparse Sampling Method for Magnetic Resonance Imaging. ICPRAM 2017 – International Conference on Pattern Recognition Applications and Methods – Porto 24-26/02/2017. DOI: 10.5220/0006199105100518

G. Placidi, N. Pagnani, A. Petracca, M. Spezialetti, D. Iacoviello. A virtual system for postural stability assessment based on a TOF camera and a mirror. REHAB 2015 - ICTs for improving Patients Rehabilitation Research Techniques – Lisbon 01-02/10/2015. DOI:10.1145/2838944.2838963

[Poster] M. Polsinelli, P. A. Banchetti, A. Cacchio, V. Calvisi, C. Marini, G. Placidi, M. Spezialetti, L. Cinque. Hand movement parameters calculated by the LEAP based Virtual Glove. 2018 IEEE International Symposium on Medical Measurements and Applications (MeMeA). DOI: 10.1109/MeMeA.2018.8438764

[Poster] L. Cinque, A. De Santis, P. Di Giamberardino, D. Iacoviello, G. Placidi, S.Pompili, R. Sferra, M. Spezialetti, A Vetuschi. Design of a Classification Strategy for Light Microscopy Images of the Human Liver. ICIAP 2017 – International Conference on Image Analysis and Processing – Catania – 11-15/09/2017.

Research Funding

2021 Design and development of an optimization pipeline for proton therapy. Research Starting Project, University of L'Aquila. 3000€

2018 From the brain to the hand. Analysis and classification of movement encoding and functional synergies at the neuronal level and in spontaneous activity. Research Starting Project, University "La Sapienza" of Rome. 2000€

Other Activities

PC member of 1st Workshop on Machine Ethics and Explainability - The Role of Logic Programming (MEandE-LP2021)

Reviewer for the international journals "Methods of Information in Medicine", "Frontiers in Computational Neuroscience", "Frontiers in Robotics and AI", "Computers in Biology and Medicine", "Data in Brief", "Brain Sciences".