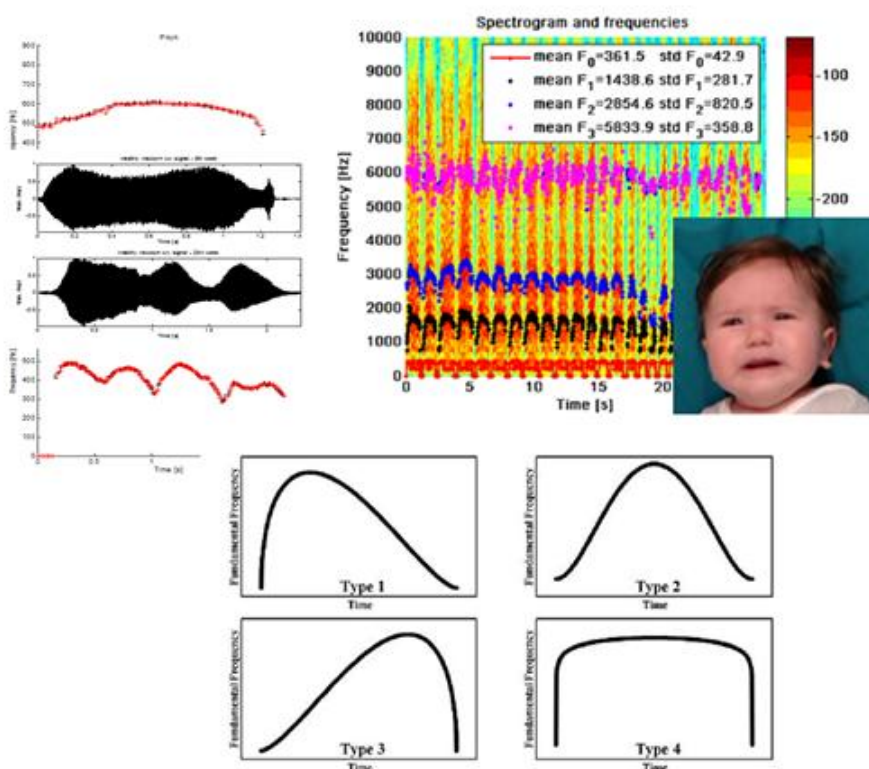


The Electrical Systems & Optics Research Division invites you to:
Applied Optics Group Lunchtime Seminar

Non-invasive tool for early detection of Autism Spectrum Disorders: automatic methods for cry analysis

Silvia Orlandi

(University of Firenze and University of Bologna)



12.00pm Tuesday 11th Nov 2013

2nd Floor Lecture Theatre

Tower Building. All welcome

Applied Optics Group Lunchtime Seminar:

Non-invasive tool for early detection of Autism Spectrum Disorders: automatic methods for cry analysis

Autism Spectrum Disorders (ASDs) are characterized by pathological difficulties in social interactions, verbal and nonverbal communication and repetitive behaviour. ASD prevalence rates from 1/150 to 1/88 (APA et al. 2013; CDC 2012) suggesting that ASD represents a significant public health problem. The diagnosis of ASD will not be made until the first clear signs of the disease become evident. This normally happens at the end of the 2nd year of life, when a lack of communicative skills and social deficiencies are most noticeable (Bryson et al. 2008; Dawson 2008; Dawson et al. 2010).

The aim of this seminar is to illustrate techniques for early detection of ASDs and the relative analyses for the extraction and classification of features from audio recordings of new-born's cry. The fundamental frequency, melody and formants are analysed in cries of control subjects, in order to find objective reference indices of pathology and, of high-risk infants, siblings of children already diagnosed with ASD.

Silvia Orlandi received her Master degree in biomedical engineering at the University of Firenze, in 2011. She is enrolled for the period 2012-2014 in the Doctoral School in Bioengineering of University of Bologna and University of Firenze. She is currently attending the second year of the doctoral program.

She is part of the Italian grant project "Young Researcher 2008: Non-invasive tools for early detection of Autism spectrum disorders" supported by the Italian Ministry of Health Grant (GR3).

This grant project, coordinated by Maria Luisa Scattoni (Dept. of Cell Biology and Neurosciences, Istituto Superiore di Sanità, Roma, Italy) and in collaboration with Claudia Manfredi and Silvia Orlandi (Dept. of Information Engineering, University of Firenze, Firenze, Italy) and Andrea Guzzetta and his team (Dept. of Developmental Neuroscience, Stella Maris Scientific Institute, Pisa, Italy), aims to detect early markers of Autism Spectrum Disorders (ASDs) through the study of infant crying and GMs during the first six months of infant's life. This project aims to identify normative ranges for acoustical and motor parameters in a population of about 200 healthy new-born/infants, both male and female (control group). The control group will be compared with 15-20 "high-risk" new-born/infants. Infants were audio and video recorded at home five times during the first six months of life according to a specific protocol.

She is spending a period of 4 months at the Laboratory of the Group of Biomedical Engineering, University of Nottingham, under supervision of the assistant professor Leandro Pecchia (School of Engineering, University of Warwick).

References

- American Psychiatric Association -APA (2013). Diagnostic and Statistical Manual of Mental Disorders (Fifth ed.). (pp. 74–85). Arlington, VA: American Psychiatric Publishing.
- Bryson, S. E., Zwaigenbaum, L., McDermott, C., Rombough, V., & Brian, J. (2008). The Autism Observation Scale for Infants: scale development and reliability data. *J Autism Dev Disord*, 38(4), 731-738.
- Center for Disease Control and Prevention -CDC (2012). Prevalence of autism spectrum disorders-autism and developmental disabilities monitoring network, 14 sites, united states. *MMWR Surveill Summ.* (Vol. 61, pp. 1-19).
- Dawson, G. (2008). Early behavioral intervention, brain plasticity, and the prevention of autism spectrum disorder. *Dev Psychopathol*, 20(3), 775-803.
- Dawson, G., Rogers, S., Munson, J., Smith, M., Winter, J., Greenson, J., et al. (2010). Randomized, controlled trial of an intervention for toddlers with autism: the Early Start Denver Model. *Pediatrics*, 125(1), e17-23.
- Esposito, G., & Venuti, P. (2009). Comparative analysis of crying in children with autism, developmental delays, and typical development. *Focus on Autism and Other Developmental Disabilities*, 24(4), 240-247, doi:10.1177/1088357609336449.
- Manfredi, C., Bocchi, L., Orlandi, S., Calisti, M., Spaccaterra, L., & Donzelli, G. P. (2008). Non-invasive distress evaluation in preterm newborn infants. *Conf Proc IEEE Eng Med Biol Soc*, 2008, 2908-2911.
- Osterling, J., & Dawson, G. (1994). Early recognition of children with autism: A study of first birthday home videotapes. *J Autism Dev Disord.*, 24, 247-257.
- Phagava, H., Muratori, F., Einspieler, C., Maestro, S., Apicella, F., Guzzetta, A., et al. (2008). General movements in infants with autism spectrum disorders. *Georgian Med News*(156), 100-105.
- Zwaigenbaum, L., Bryson, S., Rogers, T., Roberts, W., Brian, J., & Szatmari, P. (2005). Behavioral manifestations of autism in the first year of life. *Int J Dev Neurosci*, 23(2-3), 143-152.