Detection of developmental dysplasia of the hip (DDH) in infants and children is important as it leads to permanent hip instability. Current methods for detecting DDH, such as ultrasound and x-rays, are relatively expensive and need qualified medical personnel to administer the test. Furthermore, x-ray ionizing radiation can have potential harmful effects. In the current study, an acoustic non-invasive and simple approach was investigated for detection of DDH. Different benchtop simplified models and pig models were constructed and tested. Models were stimulated with band-limited white acoustic noise (10^-2500 Hz) and the response of the models was measured. The power spectrum density, transfer function, and coherence were determined for different hip dysplasia levels and for normal cases. Results showed that the power spectrum density, transfer function, and coherence were affected by dysplasia occurrence. Effects appear larger for more severe dysplastic hips. This suggests that the proposed approach may have potential for DDH detection.

Major: Mechanical Engineering

Educational Career:
Bachelor of Mechanical Engineering, BS, 2014, Bangladesh University of Engineering and Technology

Committee in Charge:
Hansen Mansy, Chair, Mechanical and Aerospace Engineering
Alain Kassab, Professor in Department of Mechanical and Aerospace Engineering
Sang-Eun "Sam" Song, Associate Professor in Department of Mechanical and Aerospace Engineering

Approved for distribution by Hansen Mansy, Committee Chair, on October 21, 2019.

The public is welcome to attend.