

# GAIT LAB AT XAVIER INSTITUTE OF ENGINEERING



In a country, where almost every stream is imparted under different umbrellas or educational establishments, Xavier Institute of Engineering is surely a unique one, with having space where doctors, engineers and physiotherapists are open to work together. The newly created St. Xavier's Gait lab made this possible with letting students from engineering and medical background study under the same building or laboratory. The inception of St. Xavier's Gait lab happened after a renowned orthopaedic surgeon in Mumbai; Dr. Atul Bhaskar asked help from the XIE to establish a Gait Lab to study kinematic movements of children affected by cerebral palsy. Followed this, since there were no experts in this field in India, XIE approached Dr. Gerald Harris, professor of biomedical engineering of its sister institution, Marquette University,

Milwaukee, Wisconsin, USA, and the rest is a history. Acknowledging this wonderful initiative, as recently as 4 July 2019, the ABP News Network of Mumbai gave its coveted Educational Leadership Award to XIE for playing a leading role in serving the most ignored community of children.

In fact, as of today, XIE boasts on being the only engineering institute in India doing research on gait analysis that involves the analysis of children affected by cerebral palsy/diplegia, hemiplegia, neuro-muscular deficiencies, osteogenesis imperfecta, myelomeningocele, idiopathic in-toeing and clubfoot. Normally, a lab like this should be attached to a medical school or college but, since it requires engineers, it has been pioneered at XIE and already meeting with much success. The collaboration of XIE with Marquette University's Orthopaedic and Rehabilitation Engineering Centre (OREC)



still continues. Given this, notably, Dr. Harris, on behalf of OREC, sponsored the entire lab and also personally visited it at XIE and made sure that gait analysis was done correctly and scientifically. So far the analysis has been done for 67 children with the deformity, keeping the process absolutely free for low-income families. The Lab gives its report in the form of graphs that depict the kinematics of the hip, knee, and ankle and the orthopaedic surgeon, then, has the necessary data to decide on the surgery required, or it may lead to requiring only the stretching and /or lengthening of muscle and the shortening of bones. If required, surgical intervention is also done.

A typical graph is shown in Fig. 1; Fig.2 and Fig. 3 respectively, which shows the patient before and after the surgery. Even non-handicapped athletes are taking advantage of the Lab to understand their muscle kinetics. However, the ones to benefit most from the gait analysis are children with cerebral palsy, spina bifida and other neuromuscular conditions that cause difficulties in walking. Some children with small deformities tend to often make them big because of bone lengthening or muscle tightening, with the consequence that

increase of pain and weakness leads to walking disabilities. At the Gait Lab, these are the steps taken: after the physical examination is conducted, adhesive-backed markers placed on the patient's trunk, legs, and feet. High-end specialized cameras working in conjunction with reflective markers capture the patient's motion while the computer converts that motion into graphic data.

Static and video camera recordings are then made which are used to create a graph, as said before, pertinent to the functioning of the knee, ankle, and hip. A multi-disciplinary team makes recommendations based on the report given; the whole process is painless and usually completed within an hour and a half. The next exciting project that XIE received from Dr. Bhaskar is how to treat torticollis patients. It requires the application of machine or deep learning. Depending upon the angle at which the neck is bent, the neck muscle is to be elongated or stretched. XIE's true philosophy of doing more for God, and therefore doing more for others will continue to influence all those who are connected to Xavier's and its sister institutions in order to create an inclusive society.