Director de tesis:	Dr. Rodolfo Martínez Manuel
Sinodales:	Dr. Luis Manuel Valentín Coronado (Sinodal Interno, Presidente del Jurado) Dr. Arturo Díaz Ponce (Sinodal Interno, Secretario) M.C. Juan Margarito Sarabia Torres (Sinodal Interno, Suplente) Dr. Rodolfo Martínez Manuel (Director de Tesis, Vocal)
Tesis:	"DESIGN, DEVELOPMENT, CHARACTERIZATION AND DEPLOYMENT OF A GROUND REACTION FORCE MONITORING SYSTEM FOR GAIT ANALYSIS"

Resumen:

Gait has a strong relationship with the neurological and biomechanical states of our body.

This relationship enables gait analysis as a powerful tool to develop auxiliary applications for clinical diagnosis and rehabilitation. On the present thesis, the design, development, characterization, and deployment of a system to monitor and analyze the ground reaction forces (GRF) produced during gait is described. The developed device consists of a sensor footwear integrated with Force Sensing Resistors (FSRs). The sensor footwear has two different modes: real time wireless transmission mode, and datalogger mode.

Furthermore, as far as we know, the importance of in-shoe sensor characterization was not reported in the literature, so we demonstrated the importance of in-shoe sensor characterization to compensate the error contributed by the inherent variability of the footwear's sole to the force/pressure measurements. Additionally, a self-calibrating algorithm was proposed and implemented on the sensor footwear to dynamically adapt the Force Measurement Range (FMR) of the sensors depending on the user's weight. The self-calibration algorithm improved the force measurements' resolution up to 16.66 times. Moreover, gait monitoring software for PC and smartphones (Android) was developed. The PC software was designed as a tool to visualize the GRF produced during gait on real time in consulting and rehabilitation rooms. The smartphone app was designed to take advantage of the datalogging mode of the sensor footwear to enable gait monitoring during daily life activities. Finally, the system was deployed on the consulting room of a specialist in Rheumatology, where it was tested during three months with real patients. During this assessment period, the system was used to acquire tests from 70 patients, thus, demonstrating the capabilities of the system to operate in clinical applications. Feedback from both patients and specialist will be used to improve the system on future work.