UNIVERSITY OF GENOA
DEPARTMENT OF INFORMATICS, BIOENGINEERING, ROBOTICS AND SYSTEMS ENGINEERING
MASTER'S PROGRAM IN BIOENGINEERING

Thesis Project Form

Title (tentative): Low-cost 3D scanning for monitoring post-operative conditions of paediatric patients affected by Poland Syndrome

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Description

Motivation and application domain

This thesis activity is part of the PNRR project Digital Health Solutions in Community Medicine (DHEAL-COM), aimed at strengthening and developing a Life Science Hub at a national for the co-creation of digital health services in which the needs of the individual are the starting point. Specifically, this work will involve the monitoring of pediatric patients suffering from Poland syndrome, a very challenging thoracic malformation. Indeed, it is about a rare congenital disorder that affects the development of tissues on one side of the body, typically the right side. The hallmark of Poland syndrome is the absence or underdevelopment of the pectoral muscles, which in turn can lead to a sunken or concave appearance on the affected side. This work of thesis aims at developing a quantitative image processing pipeline to measure post-operative outcome of these patients through 3D fast, portable and low-cost scanning, thus avoiding radiation exposure.

General objectives and main activities

Specifically, the main stages of the work will consist of:
â€¢ acquisition of patient images by systematic scanning using a low-cost 3D scanner

â€¢ possible reworking of the scan obtained on a CAD program in order to obtain a mesh

â€¢ processing of the acquired 3D mesh in order to extract clinical indicators of the severity of the pathology, according to the needs of clinical practice. In particular, volumetric variations should be computed pre- and post- operatively to assess the degree of improvement.

The ultimate aim of the proposed work is to ensure constant and more accurate supervision than just visual/photographic control by clinicians, and continuous monitoring of the patient in view of assessment and possible surgical planning.

Training Objectives (technical/analytical tools, experimental methodologies)

Image processing and statistical analysis of clinical data of pediatric patients affected by different thoracic malformations. Extraction of quantitative markers from imaging scans implies development of ad-hoc image processing pipelines (e.g. in Matlab or Python) specifically adapted to the age range under analysis and to the pathology.

Place(s) where the thesis work will be carried out: Neuroengineering and Systems Neuroscience Lab (DIBRIS),

Additional information

Maximum number of students: 2