

Pregnant Female Anthropometry from CT Scans for Finite Element Model Development

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ABSTRACT

Over 1500 fetal losses occur each year in the United States due to motor vehicles crashes. Pregnant occupants involved in motor vehicle crashes are at risk for pregnancy-specific injuries. In this study, anthropometry data is collected from a CT scan of a pregnant abdomen. Masks of the fetus, uterus, placenta, and each of the abdominal organs are created by segmentation of the CT slices and three-dimensional volume renderings are informed. From these masks, the volume and Hounsfield unit ranges for each abdominal organ are recorded. The total volume of the uterus in the 3rd trimester is measured as 3378 cm³ and the pregnant female is predicted to be 5th percentile size by measuring the T8-T12 distance using CT scans. By measuring the length of bones on the fetal skeleton from CT slices and the 3D rendering, the gestational age of the fetus is estimated to be 32 weeks by comparison with literature values. Measurements of each of the abdominal organs are also obtained from the 3D rendering in order to create a blueprint of the pregnant anatomy. The masks developed and the anthropometric measurements taken will later be used to develop a more accurate pregnant female finite element model for use in the automotive industry.