

## Study and Implementation of 3D Acquisition and Post-processing Automation

The 3D models are used in many applications such as computer games, movies, medical, training simulators, augmented reality, archaeology and industrial inspection. The 3D models can be artificially generated using any off-the-shelf modelling software such as Maya. The artificial 3D models are sufficient for most of the entertainment industry such as computer games or movies. However, most of the applications such as archaeology or industrial inspection demand true representation of the real complex objects. The true representation of the real complex objects can be achieved by measuring real shape and photometric properties using computer vision techniques. This process involves several steps which require manual operations as well as technical skills. In addition to time required for manual operations, the processing time for large amount of data is considerable. Automating the 3D digitization process can improve efficiency and quality; while reducing operator skills and cost at the same time. Presently there is no fully automatic system available, although some semi-automatic systems have been developed.

The 3D digitization process can be divided into two general steps, i.e. Acquisition and Post-processing. The acquisition system generally comprises a 3D scanner mounted on a positioning system. The post-processing step includes registration, merging, hole-filling, cleaning and photometric and environment mapping. The automation of acquisition process requires automatic path or view planning in the presence of number of constraints with regard to the positioning system and the scanner. The automation of post-processing needs automation of registration, merging, hole-filling and cleaning etc. There are many efficient commercial solutions available for the automation of most of the post-processing steps, such as RapidForm from INUS Technologies. However, there is no commercial solution available for the automation of 3D acquisition process.

The crux of automatic acquisition is the automatic view planning. The view planning has no or little a-prior knowledge about the shape of the object to be digitized most of the time. However, some times view planning may have a complete or rough model of the object to be digitized. There is limited number of views available subject to the positioning system involved. The purpose of this project is to study and implement methods for 3D acquisition and post processing to automatically generate 3D models. Work concerns view planning problem, views registration, merging, holes filling etc.

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