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LSU Assistant Professor Xin Li Explores Computer-Aided Forensic Facial Reconstruction

For forensic law enforcement, facial reconstruction from skeletal remains plays an important role in identification of the dead where post-mortem deterioration makes it difficult.

Facial reconstruction has been typically conducted manually using clay--until now, that is.

Xin Li, assistant professor of the LSU Department of Electrical & Computer Engineering and Center for Computation & Technology, has received $10,000 from the Louisiana Board of Regents to develop new methods for computer-aided facial modeling and reconstruction. Li's proposal is titled "Surface and volumetric matching for forensic facial reconstruction from incomplete skulls."

As a nationally renowned center for facial reconstruction, the LSU Forensic Anthropology and Computer Enhancement Services (FACES) Lab has reported that currently one skull reconstruction usually takes an experienced and skillful specialist on average two weeks to finish. Furthermore, when the input skull data are incomplete, direct manual reconstruction becomes much harder. While manual methods remain of great interest for forensic identification, it is imperative to develop new computerized digital methods, which are also well justified by their rapidity and the decrease in subjectivity.

"New 3D data acquisition hardware allows precious models to be digitized accurately," said Xin Li. "Our plan is to develop novel data modeling and processing algorithms, so that shapes can be analyzed, edited, and synthesized for various scientific tasks within the digital environment, while reducing manual labor, time, and costs tremendously."

"By creating a unified digital forensic craniofacial reconstruction framework that integrates domain knowledge from specialists such as anthropologists, pathologists, and odontologists, three challenging problems can be solved. These being automation of skull assembly from fragile fragments, repair of damaged and incomplete skull models while preserving substrate details, and muscle/skin placement based on tissue depths," said Li.

Computer scientists and experienced forensic anthropologists will closely collaborate in this project to evaluate the effectiveness of this data modeling paradigm in completing facial reconstructions and advocate the smooth transition from current manual reconstruction approaches to digital methodologies.
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