

Development of Dental Software: Introducing ADTEC DICOM Viewer.

Chanjira Sinthanayothin¹, Krikamol Muandet², Bunyarit Uyyanonvara², Wichit Tharanon³

¹ National Electronics and Computer Technology Center (NECTEC), NSTDA

² SIIT, Thammasat University

³ Advanced Dental Technology Center (ADTEC), NSTDA

112 Thailand Science Park, Pahonyothin Rd, Klong 1, Klong Luang, Pathumthani, Thailand

E-mail: cephsmile@gmail.com

PURPOSE: The demand for image-processing software for dental applications has been increasing, especially in both image-acquisition and image-analysis techniques. The existing image-processing software is often limited by cost, lack of flexibility, and specific of machine owner data. We show how to develop the dental software which the input data is DICOM using C++ Builder™. The purpose of this paper is also introducing the ADTEC DICOM viewer functions for using with implant surgery and other applications.

METHODS: This paper presents the development of Dental software so called ADTEC DICOM Viewer based on paper work by Sinthanayothin [1][2], which enable to read the DICOM images as many as 512 frames from cone beam CT (i-CAT) and display in axial, coronal and sagittal views. The program developed using C++ Builder™. Function that allows the users to scroll through the axial, sagittal, and coronal slices using Trackbars or navigation lines has been developed. Zoom and Pan tools are also available in all views as can be seen in figure 1. ADTEC DICOM viewer also be able to create Panoramic View which is an image developed along the panoramic line. This panoramic line was created by fitting the user landmarks along the teeth with cubic spline technique. Then the Cross Section View is reconstructed as a cross plane image intersecting at a right angle with the panoramic line, relative position of mandibular canal, which is important in the implant treatment planning as shown in figure 2. TMJ view as can be seen in figure 3 is also another application for assisting diagnostic of TMJ abnormalities. Also on each image, distance measurement can be performed with the mouse as well.

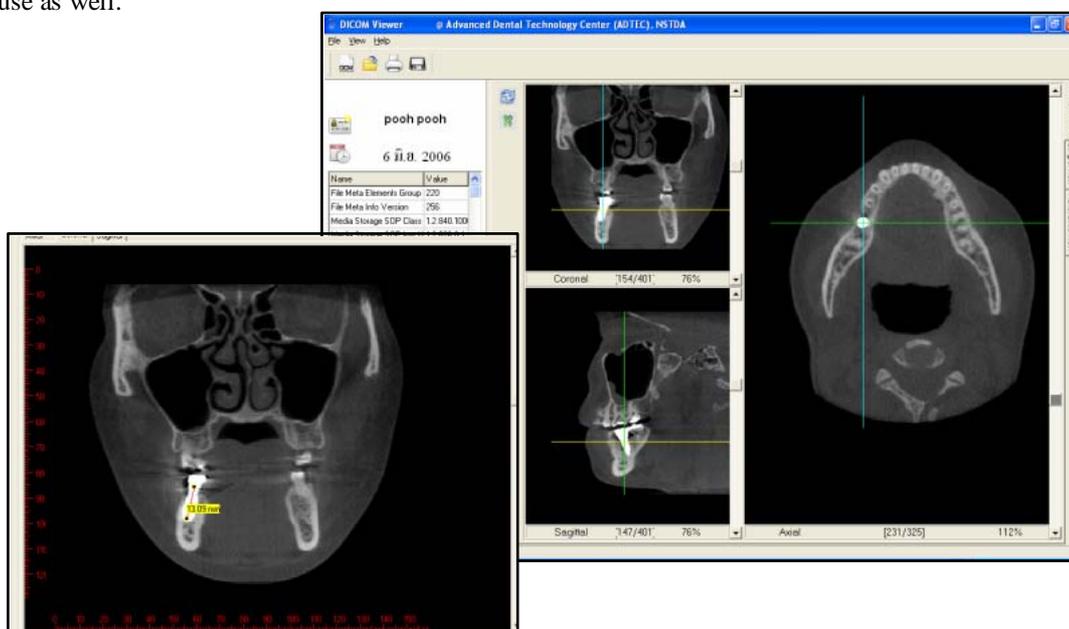


Figure 1: The Graphics User Interface of ADTEC DICOM Viewer, which displays in Axial, Coronal and Sagittal Views. All views were related by the navigation lines (green, blue and yellow lines) show the position on each plane. The users are also allowing measuring the distances in all views as well.

RESULTS: ADTEC DICOM Viewer is under the clinical evaluation at the Advanced Dental Technology Center (ADTEC). The workshop has been organized by ADTEC to give a tutorial on

ADTEC DICOM Viewer. Also software has been sent to the clinicians who passed the patients to take the CT-Scan at ADTEC as well. The feedback from most users are very well response.

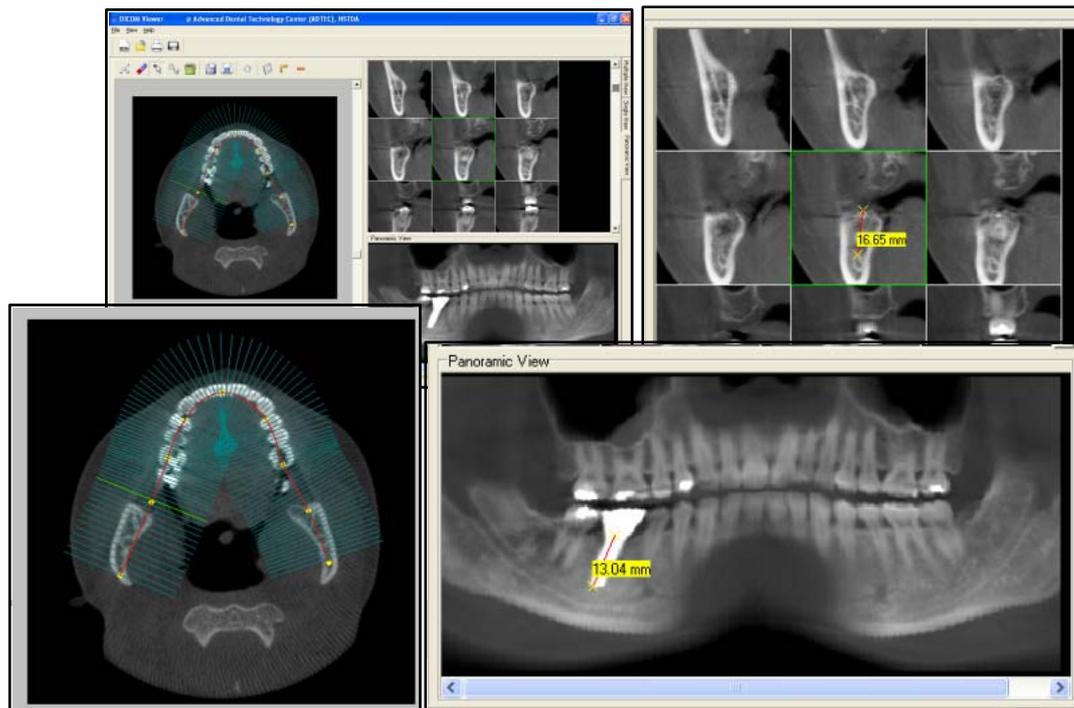


Figure 2: Axial, Panoramic and Cross Sectional views. Also all views, distance measurement can be performed in millimeters as well.

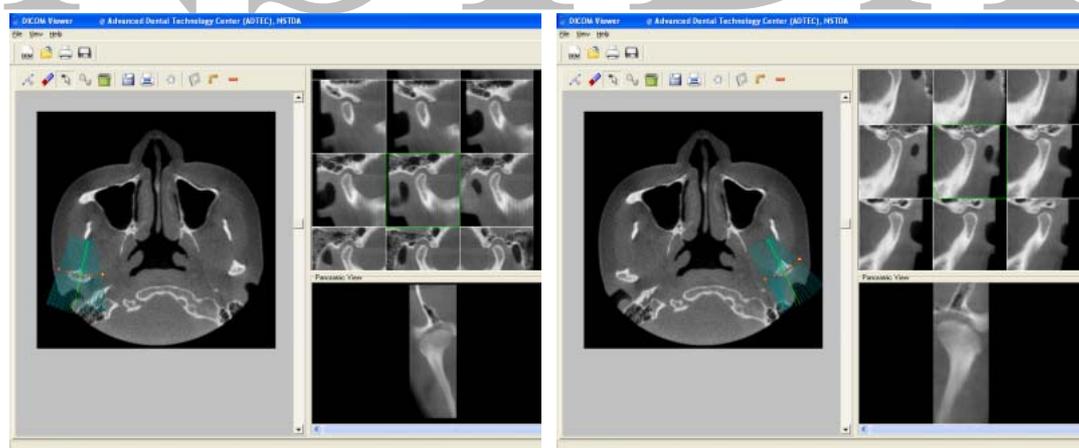


Figure 3: TMJ Planning Screen for the right and left condyle respectively.

CONCLUSION: From the clinicians responses, it has shown that ADTEC DICOM viewer is useful and easily to use in diagnosis of hard tissue in the dentomaxillofacial area. Especially an accurate view of implant treatment and surgery based on precise CT image measurement in specific area has been performed.

ACKNOWLEDGEMENT: This paper is a part of PACS for Dentistry project. Thanks to National Electronics and Computer Technology Center (NECTEC) for grant supporting on this project.

REFERENCES:

- [1] Chanjira Sinthanayothin, Wichit Tharanon. 3D surface rendering and creating panoramic view for dental application. CARS 2006 Computer Assisted Radiology and Surgery (CARS 2006). June 28 - July 1, 2006 Osaka, Japan. (Poster)
- [2] Chanjira Sinthanayothin, Wichit Tharanon, 3D Surface Rendering and Creating Panoramic View for Dental Application. ISBME2006 on 8-10 November 2006. (Full paper)