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**Cynaptix
Technologies**

**Digital Imaging
Division**



CyPACS_{gen.medicine}™

Modern healthcare delivery creates and uses a variety of electronic files—images (digital & analogue), video, audio and signal data—for diagnosis and treatment. As such, it is critical that all of this information is available to physicians, nurses and clinicians in a consistent manner. Integrating medical images with patient data is an essential component of an electronic medical record. CyPACS from Cynaptix consolidates all digital files into a single well-managed unit, which can be used as part of an enterprise-wide information management initiative.

Picture Archival and Communication System for General medicine & Clinical Radiology

CyPACS gen.med™

Image Management

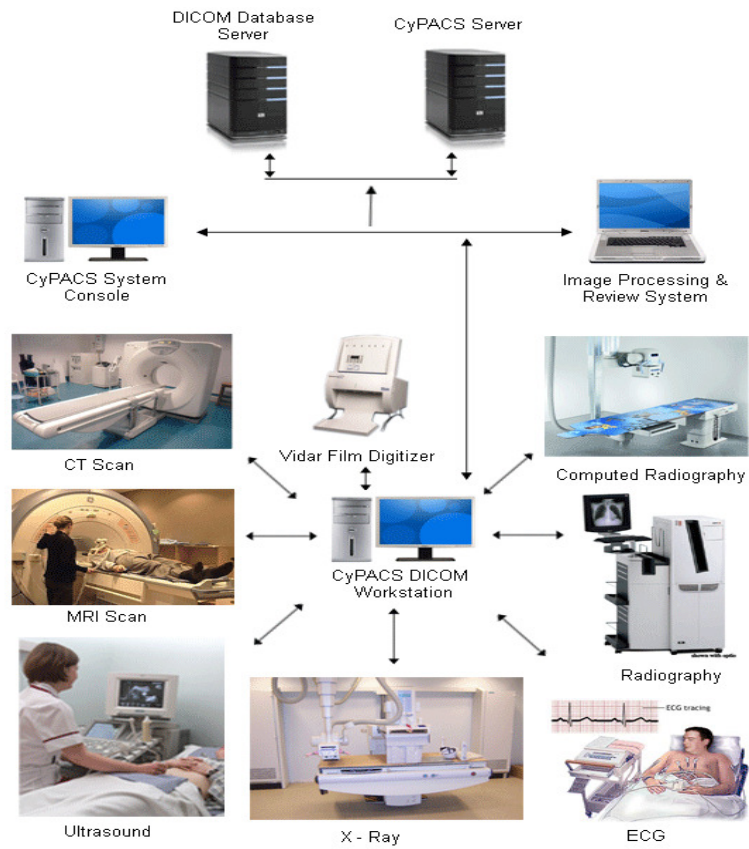
The system provides the ability to store many different types of images, both DICOM and non-DICOM. DICOM images in a hospital environment are acquired using standard DICOM protocols and managed as DICOM objects. The DICOM modalities say for example, visible light standard provides support to retinal image storage and management of ophthalmology fundus microscopy images. The system provides the ability to store any of these images as either DICOM or non-DICOM, depending on the needs of the facility for departmental and enterprise uses. The system manages in a single repository, all patient data including image files, which are contextually relevant, accurate and up to date. All data are then made available to electronic healthcare records system or hospital information system or radiology information system. High resolution film digitizer can be integrated to transfer X-ray films (images) to the system.

Benefits

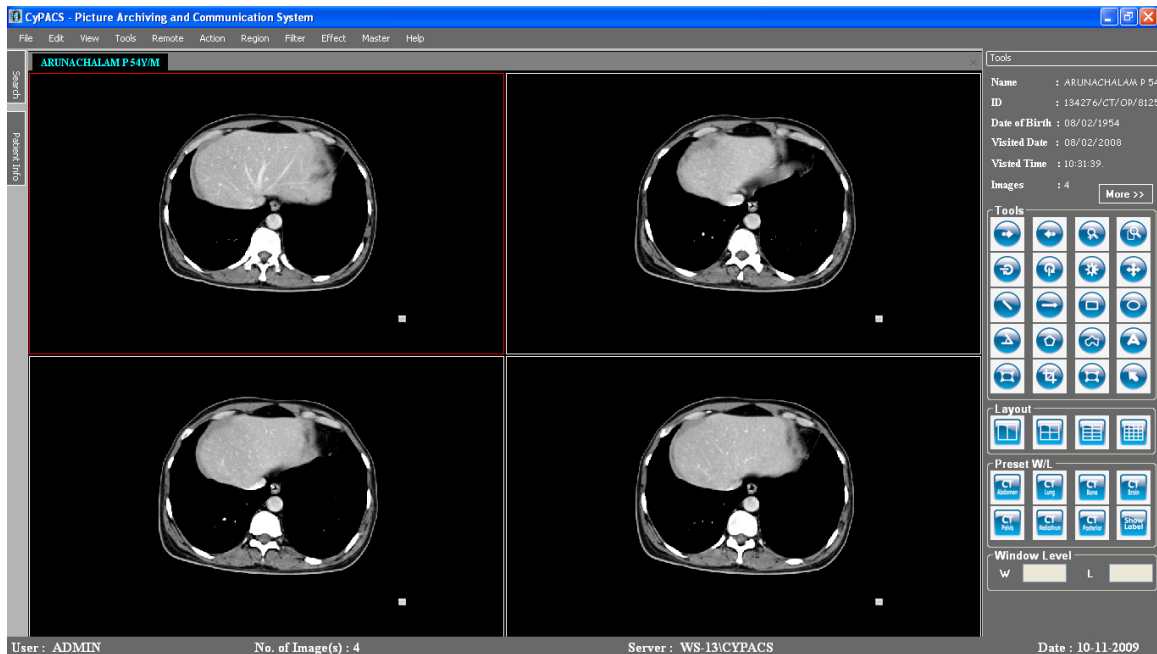
Images picked up from diagnostic imaging equipment are captured, stored and distributed by the system making image transfer and review by doctors from different specialties concurrently with ease. The information provided would consist of patient demographic data, clinical history, study info and image analysis details along with source images and markings (or annotations) made by physicians thereby simplifying review of a patient file by a Doctor from his office and then schedule a follow-up exam or recommend a treatment plan.

The biggest benefit derived from this system integration is breaking the physical as well as time barrier for information exchange and networking images throughout the hospital and physician offices. Once an examination is completed by radiographer/technician, clinicians and other ancillary staff accesses it multiple times. Physicians review the images as well as the transcripts several times – more so in a teaching and research institution. Physicians can possibly see more patients as they could easily review patient records from the office. Decreased operational costs for the hospital are possible.

CyPACS System Schematic



CyPACS Screenshot



Salient Features

1. Capture Image and live videos from TWAIN / WIA compatible devices and Video for Windows (VfW) driver, DV (Digital Video) driver and WDM driver sources.
2. Supports multiple Image formats (including BMP, JPG, TIFF) (Refer Annexure A and B). Supports multiple modalities (Refer Annexure C)
3. Supports Printing of Images to DICOM and Non-DICOM Printers.
4. Supports compression formats – JPEG2000, JBIG2, LZW, ZIPLIB, JBIG2 and etc.
5. Read/Write PDF Files – Optional
6. Advanced Image Viewer contains:
 - a. Reset Window Level, Position, Rotation, Zoom
 - b. Display overlay information on the images
 - c. Display medical grayscale and colored images
 - d. including MRI, CT, Digital X-Ray, Ultrasound and much more
 - e. Stacking or moving from one image to another in a series of images with a single mouse or button click.
 - f. Load and save the annotation information separated from the image
 - g. Built-in ruler that adjusts based on the DPI of the image and the zoom or scale factor.
 - h. Interpolated image display for higher quality.
 - i. Support to adjust the screen layout (2X2, 4X4)
7. Supports numerous Image Analysis and Processing Functions.

Web viewer

CyPACS provides for (optional) web viewing of images using internet explorer. This option is quite handy for physicians who could view the images from their homes. CyPACS provides the transport mechanism for image data for easy viewing.

System Requirements

1. CyPACS server

- a. Operating System: Windows 2003 Server, Windows 2008 Server
- b. Processor: Intel Pentium 4 @ 3.0 GHz or above
- c. RAM: 4 GB DDR2
- d. Hard Disk capacity: 160 GB (SATA 2)
- e. Database: Microsoft SQL Server 2005 (options - Oracle 10g & MySQL).

2. CyPACS DICOM work station

- a. Operating System: Windows XP Professional SP2, Windows 7
- b. Processor: Intel Pentium 4 @ 3.0 GHz or above
- c. RAM: 1 GB DDR2
- d. Hard Disk space: 40 GB

Contact

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Annexure A

CyPACS Working Model

Introduction

CyPACS addresses the needs of medical practice in terms of transport of images/results of diagnostic studies from image acquisition devices and study results/image review, visualization and image processing applications running from CyPACS work stations. Images are stored in a centralized repository and can be archived. Medical image acquisition device could function as DICOM client and as such can be used with CyPACS work station.

DICOM Standard

CyPACS uses DICOM which is the medical standard image file format. A DICOM image file may contain single frame acquired using any medical imaging modality such as X-Ray, CT-Scan, Ultrasound, etc. A DICOM image file contains text data pertaining to the patient details as well as the image data along with a set of metadata related to the image and the study carried out by radiology department. Most imaging devices produce intensity value per pixel of the image, coded in a 12 bit format stored in 16 bit fields. CyPACS Server is in fact a set of logical and physical servers – DICOM query parser, image server, and database server and optionally a router.

Data Security

It is possible to encrypt DICOM files before transferring to outside usage. The file could also be made 'anonymous' to hide patient related details. Apart from OS level security, database (usually Microsoft SQL Server or Oracle) level security is enforced to access the images. The image server could be implemented on a Windows / Linux box and separate security policy could be implemented.

Medical Image data access

Each image acquisition device is a potential DICOM compliant medical image source. In a radiological department, one or several DICOM servers can be set up to centralize data acquired in this site. Medical data are naturally distributed over the different acquisition sites. CyPACS router can talk to a central repository of data implemented by CyPACS Server.

In clinical practice, physicians do not access directly to image files. They identify data by associated metadata such as patient name, acquisition date, radiologist name, etc. The data are transferred mainly for visualization purposes. The physician quickly scans the image frames in the DICOM study and focuses on the slices he or she is interested in. In the medical image analysis community, the needs are quite different. One often needs to identify images through metadata too. Also physicians can mark on the images and annotate to bring forth certain clinical issues. These markings are stored separately linked to the physician who did the marking. While retrieving the image by the same

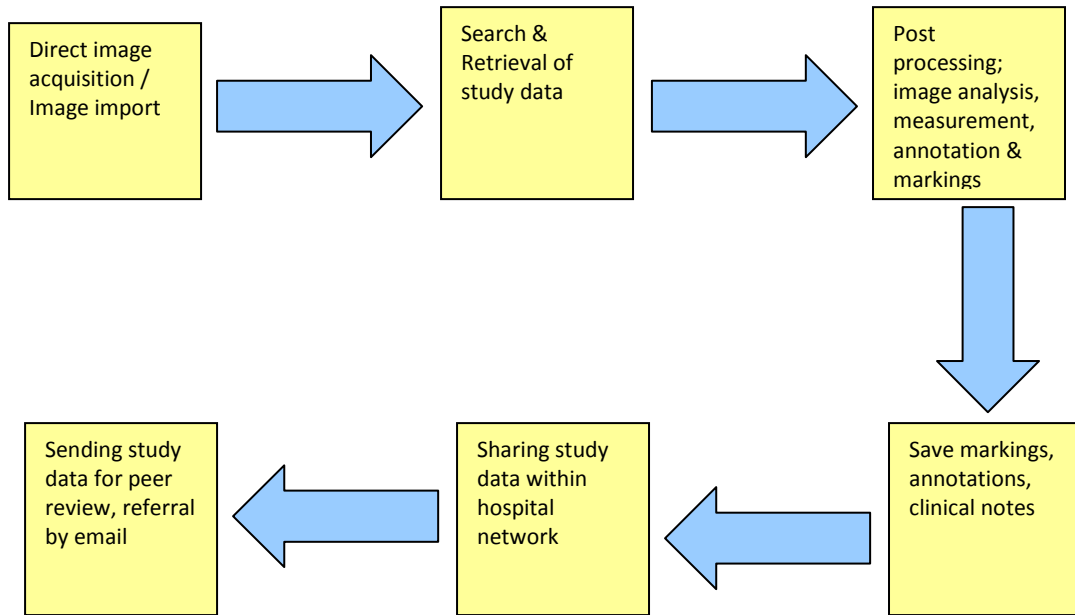
physician, the marking and annotation can be brought for viewing. Physicians from the other departments may be able to view the images (if they are authorized to) but not the markings of the other physician.

Medical data privacy

All medical data should be considered as sensitive to preserve patient privacy. In clinical practice, physicians taking part in the concerned patient healthcare should have access to the data of this patient.

Annexure B

CyPACS Workflow



CyPACS System Architecture

