



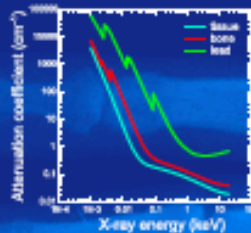
X-ray imaging via smart phone

Andy Edgar and Nicola Winch



X-ray imaging

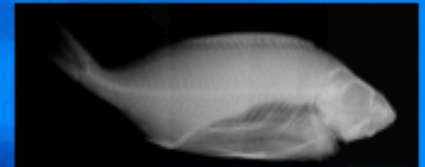
X-ray imaging is based on the attenuation of X-rays through an object. Different materials within the object show different X-ray attenuation and this corresponds to the varying shades of grey on the image.



X-ray images were traditionally stored on photographic film, but modern techniques such as those based on storage phosphor imaging plates, where the image is obtained using optical techniques, are now replacing film.

PXR 1.0 image reader

The dramatic improvements in digital camera technology, particularly in terms of light sensitivity and noise reduction has lead to a novel technique to record X-ray images using commercially available digital cameras and storage phosphor imaging plates. The image reader is highly portable and records images up to 180 x 240 mm and produces good quality images for moderate X-ray doses.



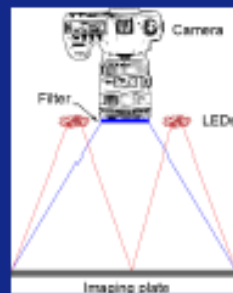
The basic imaging process for PXR 1.0

1. Irradiation



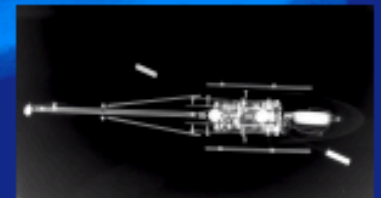
The object is placed between and imaging plate and the X-ray source. The image of the object is stored on the imaging plate.

2. Read out



The imaging plate is flooded with high intensity red light, which causes blue light to be emitted (proportional to image intensity) which is recorded by the camera.

3. Image



The resulting digital image can be further processed by software.

The next generation : PXR 2.0 Image Reader

Features

A major redesign has resulted in the PXR 2.0 which fits into a standard hard-shell case, and is fully battery powered for portable operation.



The PXR 2.0 is a self-contained imaging system which could be used for on-site medical emergencies, civil or military field medicine, rural veterinary practice, and for materials testing in remote locations.



Camera control and basic image transfer can be achieved using a smart phone - compatible with Android OS 2.33 and iPhone IOS 5.0 or later. Images can be transmitted for off-site analysis



X-ray movies can be recorded at slightly reduced resolution, eg, for monitoring fluid flow, blockages, etc.

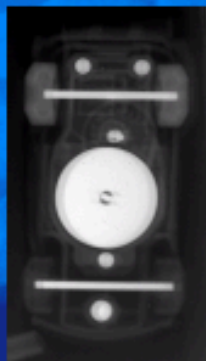
Images



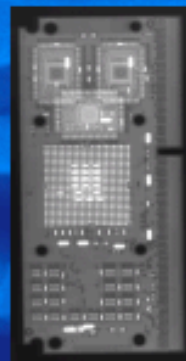
Camera lens



Toy bug



Toy car



Circuit board

Specifications

Image size:	Up to 300 x 220 mm ²
Read out method:	Optical/Digital
Digital Image:	14 bit, 2748 x 1835 pixels
Imaging Plates:	Standard commercial storage phosphor and intensifying screens, VUW phosphor plates
Image Read-Out:	Control and transfer by wifi (direct or LAN) or USB 2.0
Image readout time:	Approximately 30 seconds
Image location:	Recorded by GPS
Time-lapse Imaging:	Up to 1920 x 1080 @ 25 fps
Power:	4 AA alkaline batteries, plus one 7.2 V Li-Ion compact battery.
Weight:	9 kg, not including laptop.

For more information email Andy (andy.edgar@vuw.ac.nz), or Nicola (nicola.winch@vuw.ac.nz)

