To whom it may concern,

In this report I will outline a method of data acquisition from ICU machines via the use of a digital camera and machine learning methods of optical character recognition (OCR).

Currently, automated data retrieval directly from the PowerLab machine would require the purchase of proprietary software, and perhaps also proprietary adaptors and data logging hardware. Examples of such software include *MetaVision-ICU* by iMDsoft and a few other software packages.

The method we propose is to use a digital camera with webcam support (for real-time imaging) to take images of the ICU monitor in rapid succession. We can then run an image matching algorithm to account for the stability of the camera (so that all images are aligned, regardless of possible motion of the camera). We then split the large image in to smaller images of the digits, and use machine learning methods such as the "random forests" technique to identify the digits and thus extract the data. In principle, it should be possible to do this at a relatively high speed, hopefully within 30 seconds or less, to allow for continuous data logging. The data can then be saved to databases, text files or Excel files. Once written, the same software could be used with multiple cameras and multiple monitors.

If this works effectively we could also try writing further data analysis and visualisation tools to provide all the functionality of commercial software packages. This would be relatively simple and furthermore the program could be updated remotely, allowing software problems to be fixed without the need to travel.

This solution would use entirely free and open source software. The only costs incurred in the set-up itself would be that of a webcam (about 400 pesos, but I could bring a webcam with me if necessary), and a computer on which to run the data analysis (if there is not one already available).

Alternatively, we could try interfacing with the digital output of the Powerlab machine directly. This uses a proprietary connection, however one could use a microcontroller board such as an Arduino Uno (about 500 pesos) to read the output individually, and then try to reconstruct the data itself. This could be very difficult however, as there is no way of knowing how the data may be formatted before attempting it, and it would also involve the use of much more electronics, and therefore could require more time.

I would be free to assist with these efforts in Mexico City in person, from the 22nd July to the 11th August. However, my flights would cost somewhere between 1100 and 1600 GBP (∼21000 - 30000 Mexican pesos) in total.

Yours sincerely,
James McMurray

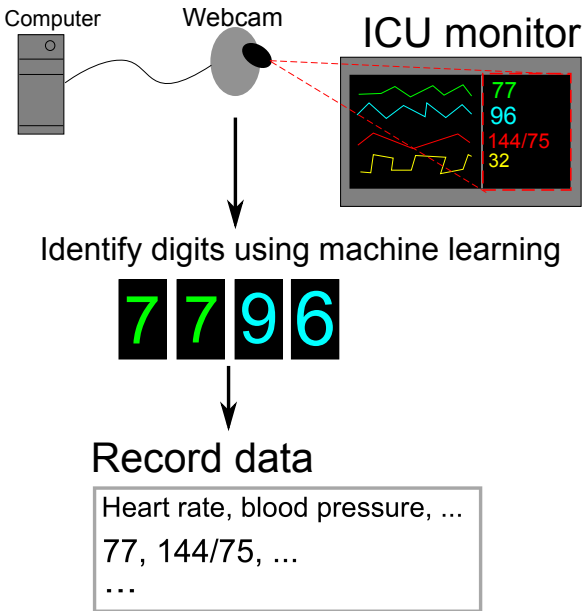

Figure 1: A simplified schematic of the plan.