Hell everyone,

As part of our final project at Imperial (first year), we had to complete a kernel for the Raspberry Pi, meaning building from scratch an emulator, an assembler, flashing an LED and doing an extension on our own.

After discussion and research made for our extension, we chose the idea of using the Pi as a controller to lighting systems. We did choose this idea knowing that it has the potential to amaze and grow with commercial significance (one of the main factors that we believe it is that no one ever used a Raspberry PI as a DMX Show Controller.

The challenge for us was to use the Pi to simulate a controller that was able to generate outputs in this particular format. We needed to be able to read the data byte by byte from each memory allocation, adding the required padding to the data obtained, before finally outputting the data in a serial fashion. What was more challenging was the fact that we would have to do all of this in a timed fashion, as the protocol only accepts signals of valid time frames. This meant that we had to find a way to output serial data at the speed, which we state, to the Pi.

We used our own assembler as the operating system for the Pi, by writing an entire assembly file consisting of instructions, stating the behaviour of the Pi. In the assembly file, the output pin was set then cleared, and we manually written data into memory addressed and polled from it. If our design works, then hopefully these instructions would enable the GPIO pins stated in the file to be outputting serial, industrial standard data.

A more detailed report on our extension, as well as the implementation, can be found at: [www.f](http://www.f) and a demo of our final product can be foud at: https://www.youtube.com/watch?v=ou4OAfCO0nw&feature=youtu.be