The GPIO Pin Issue

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# Not enough gpio pins for controlling the device

The dispenser requires many GPIO pins for controlling the device. In the beginning of the project we assumed that Raspberry Pi 3 Model B that we use as the brain of our device had more than enough GPIO pins for controlling the whole device. This assumption proved to be wrong, when we calculated the amount of GPIO pin required to control the device. Multiple ICs and user interface required far more GPIO pins to control than we had assumed. This version of Raspberry Pi has ~27 GPIO pins. Some GPIO pins have more limited capabilities or have special purpose function that limits it’s use for GPIO. The 27 is maximum number if we assume that all the pins can be used without any limitation. The calculated number of GPIO pins required was 28.

# Solution

The solution for this issue was to create simple piece of hardware to control all user interface LEDs using only 2 GPIO pins. This hardware solution was a shift register that takes data in in series and outputs it in parallel. Without this the LEDs required 9 GPIO pins for controlling them. One less GPIO pin was required after our motor control IC broke and was replaced with circuit that requires only 2 GPIO pins for control.

# Required gpio pins

Original: motor control 3, 12 V power insert detection 1, 12 V power enable 1, cooling enable 1, printed temperature sensor 3, printed pressure sensor 3, ultrasonic 6, LEDs 9, digital temperature sensor 1. 28 pins in total.

New: motor control 2, 12 V power insert detection 1, 12 V power enable 1, cooling enable 1, printed temperature sensor 3, printed pressure sensor 3, ultrasonic 6, LEDs 2, digital temperature sensor 1. 20 pins in total.