Memorandum

To: The Boss
From: Carson Murray
CC: Prof Dougal

New Product Design

Here is a quick status update on that new product we are developing – the *Quad-Temp Thermal Alert System*. You may recall that we are developing it for detecting the perfect shower temperature. One attractive property of this new product is that it can be customized for so many different applications, just by changing out a few resistors. We can sell a gazillion of them for so many different uses!

The circuit diagram is quite simple, as shown below, and the Bill of Materials is short and inexpensive, as shown in Table 1.
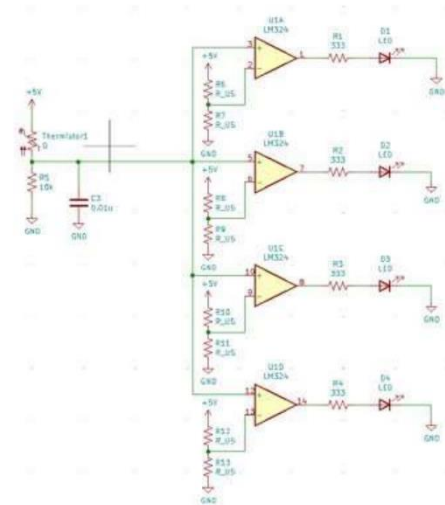

Figure 1: Circuit diagram

Component	Price
LEDs	10.99
LM324 Opamp	6.9
Resistors	10.99
Ceramic Capacitors	12.99
Electrolytic Capacitors	14.99
	Total: 56.86

Table 1: Components and their respective prices

We think we can produce these for less than $60 each, sell them for $100, and earn a per-item profit of $40! With a projected sales volume of 10M/yr, this will provide a big boost to our company profits.

For the perfect shower temperature application, we set the sensors up at 90° F, 98° F, 101° F, and 110° F. The lowest temperature sensor indicates that the shower temperature is too low. The second and third sensors indicate that the shower temperature is in between the recommended lower and higher bound temperatures. Lastly, the highest temperature sensor indicates that the shower temperature is too hot.

When we tested the prototype, we found that the sensors were activating at slightly different temperatures then what we desired. More testing would be needed to ensure that this product's sensors will be accurate. Best of all, our users will love the fact that one set of batteries will last. Assuming that our prototype draws at most 172 μA, a single 5V battery with a 4600mAh rating

would be able to last around 28,000 hours. This means that the user would not have to change the battery for at least 3 years.