Explosive Charge

Relay Smart
UNIVERSAL CHARGER
PROTECTING YOUR FUTURE.

Objective

» To statistically investigate mobile phone and charger temperatures and the demand for a safe alternative
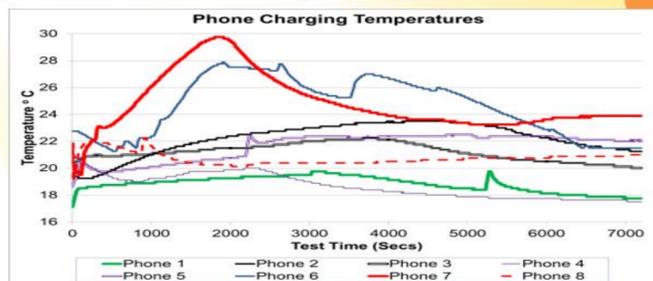
Investigation

» Our initial investigation led us to believe that this problem may not only be univariate. We would need to gather more information, rather than device temperature alone. We introduced three metrics; Room Temperature, Device Temperature and Humidity.

» After we developed a working proto-type of our product, "Relay Smart", we conducted further statistical analysis to determine the demand.

START HERE!

John Hooper Press

www.cso.ie **STATISTICIANS' FAVOURITE NEWSPAPER** - EST 2011

MOBILE PHONE EXPLOSIONS!

While recent mobile phone explosions have highlighted issues with device safety, two Irish secondary school students have identified issues as far back as 2007.

In June 2007 a mobile phone owned by a Chinese steel fabricator exploded due to the high temperatures in his workplace. In 2008 a young boy was killed in Ghana when he handled a mobile phone which had exploded while charging.

In 2014 a phone charger exploded on a bus in Wales creating a "mini fireball".

The two students propose a novel approach to address the issue. Their product "Relay Smart" uses the latest artificial intelligence technology to improve device safety. Relay Smart "learns" how a particular phone normally heats while charging. If deviations in charging are detected, charging is disabled and an alert issues.

Our Product Concept

Specification:
Dual Power Supply
Solar Panels or Electrical
Phone Surface Charge
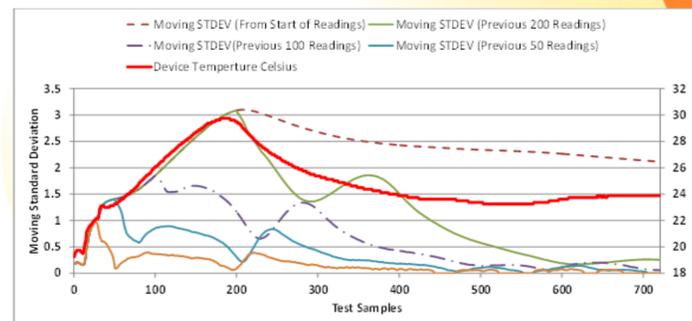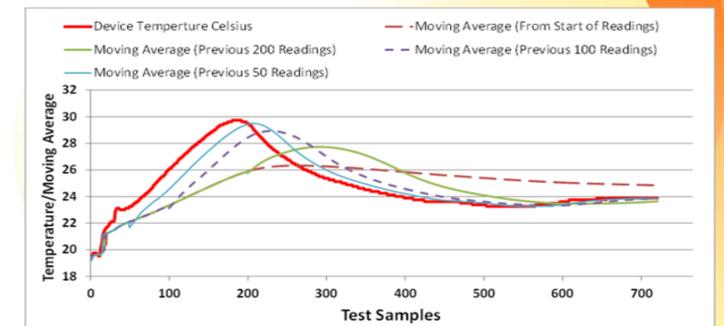Visual Charge Display
Adaptable Rest Angle

Experimental Temperature Recording

Tests determined the normal charging temperatures of a range of phones. Phones 6 and 8 are rapid charge phones.

Phone Charging Temperatures

Moving Standard Deviation Charging Temperature (Phone 7)

Moving STDEV (From Start of Readings) — Moving STDEV (Previous 200 Readings)
Moving STDEV (Previous 100 Readings) — Moving STDEV (Previous 50 Readings)
Device Temperature Celsius

Moving Average Charging Temperature (Phone 7)

Device Temperature Celsius — Moving Average (From Start of Readings)
Moving Average (Previous 200 Readings) — Moving Average (Previous 100 Readings)
Moving Average (Previous 50 Readings)

Summary Statistics

| Phone Identity	Minimum Temperature (Celcius)	Maximum Temperature (Celcius)	Average Temperature (Celcius)
1	20.62	30.5	25.58
2	19	26.5	21
3	19.3	23.5	22.2
4	19	33.38	30.5
5	21.3	25.25	23.9
6	19.6	31	26.7
7	15.0	19.8	16.5
8	17.0	22.3	19.1
9	21.5	26.5	24.26
10	15.3	20.9	17.0

Survey

» We conducted a simple random sample with a sample size of 200 students and teachers in our school of 1000+ students.

» We used class and teacher lists along with a number generator to select our sample participants.

Our research was a primary source as it was a survey/questionnaire. It was also an observational study as we, the researchers did not influence the outcome.

Have You Ever Experience Your Mobile Phone or Charger Overheating?
Yes, Don't Know, No
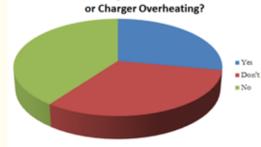
WOULD YOU BUY THIS CHARGER?
NO, MAYBE, YES
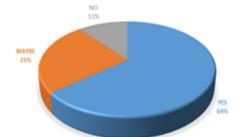
Conclusion

» Given the volume of mobile phone users and the resultant population size of our research question, our sample size of 200 limits our ability to give a firm conclusion with an accurate hypothesis and small margin of error. Despite the limitations, however, we are satisfied there is reason for us to further our investigation into "Relay Smart" as a safer alternative to charging.

Findings

» Our experimental analysis illustrates that modern rapid charge phones heat substantially more than non rapid charge phones.

» Our Objective Statistical analysis shows that a moving standard deviation applied to all recordings can effectively detect overheating phones

» Our subjective statistical analysis shows that 64% of respondents would buy our product.

END