CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY

Name(s)

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Project Number

34670

Project Title

The Effect of Distance and Mode on Cell Phone Radiation Emission

Abstract

Objectives/Goals

The purpose of this experiment is to observe levels of radiation emitted by cell phones and see if they exceed the safe radiation limit set by the FCC which has been determined to be 5 watts. If a cell phone in calling mode is placed facing forward 0cm, 5cm, 15cm, and 30cm away from a microwave leakage meter, then the amount of radiation will be greater than a phone in texting mode at that same distance and angle. Also, the closer the phone is to the microwave leakage meter, the more radiation will be detected.

Methods/Materials

Methods: Ten cell phones were tested at four different distances (0cm, 5cm, 15cm, and 30cm) and in two modes (calling and texting). A jig was designed and constructed with a microwave leakage meter which measured radiation. Materials: adjustable cell phone holder, centimeter ruler, 4 oz of paint, ball bearing drawer slide, microwave leakage meter, foam paint brushes, Phillips head screw driver, wood screws, museum putty, 10 different cell phone models with no cell phone protective casing and 100% charged, slab of wood, blue masking tape, L-Bracket, Gorilla Glue.

Results

One major pattern in the data was that radiation levels rose as the cell phone moved closer to the microwave leakage meter. According to the graph comparing texting mode data, the median of all ten cell phones in texting is 0.05, the mode is 0.04, and the mean is 0.77949. According to the graph comparing calling mode data, the median of all ten cell phones in calling mode is 0.14, the median is 0.07, and the mean is 2.08825. The p-value of all of the data is 0 which signifies that there is a significant difference between the data.

Conclusions/Discussion

After testing and recording the results, the scientists learned that the closer the phone was to the microwave leakage meter, the more radiation was detected. Calling mode emitted a greater amount of radiation than texting mode because of its direct connection with the cell phone towers. Both alternative hypotheses were supported. A future study could include testing cell phones at each distance more times to produce a more accurate average.

Summary Statement

Cell phone radiation levels will be observed at four different distances and in two modes in order to see if the FCC's limit is exceeded.

Help Received

Friends and Family loaned cell phones; Parents provided work space; Home Depot employee suggested ideas to build jig; Teacher supported students