Appendix B:

Project Design Specification—Hand Hygiene

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Function:

The purpose of the device is to eliminate the spread of vegetative bacteria and fungus from computers to healthcare professionals since it may transfer to patients and cause infections. This device will minimize the amount of time that healthcare professionals spend washing their hands and also help prevent hospital-acquired infections in patients.

Client Requirements:

- Eliminate vegetative bacteria and fungus on keyboards and healthcare professional's hands
- Easily retro-fitted to a variety of keyboards
- Minimize environmental mess created by atomized alcohol-based solution
- Protect user's skin to prevent spread of bacteria
- Passive system so the user does not need to remember to trigger the device

Design Requirements:

1) Physical and Operational Characteristics
    a) *Performance requirements* The device will decontaminate a computer keyboard and the user's hands at the same time. The device will be used every time the computer if used, up to 40 times per clinician per day.
    b) *Safety* The disinfectant solution used will not harm the user's hand. It must protect against dry skin, which cracks and allows bacteria to colonize and spread. The solution may have to conform to FDA requirements. The electronic parts must be protected to ensure that short circuits do not result in fires. If the disinfectant is flammable it should be protected from potential sparks or other fire hazards
    c) *Accuracy and Reliability* The disinfecting solution should be spread evenly over the keyboard and user's hands and be able to kill vegetative bacteria and fungus.
    d) *Life in Service* The device must be able to withstand repeated use by multiple users. The entire device must be able to be moved without affecting its performance. It should be designed to be in use for a maximum of five years.

e) *Shelf Life* The device may be stored in warehouses prior to shipment to hospitals and clinics. These conditions may be dark, dusty or slightly damp. The device should be able to withstand these conditions without degrading. Additionally, the electronic parts should be protected. The disinfectant solution will have a shorter shelf life.
f) *Operating Environment* This device will be mostly used in healthcare settings, such as clinics and hospitals. It may also be used in laboratories. The device must be able to withstand normal levels of heat, humidity, dust, and air conditions. The device will be mounted onto a computer on wheels. Therefore, it must function with small shocks and movements associated with moving the whole device.
g) *Ergonomics* The device must not impede the workflow in anyway, either by taking up too much space or preventing users from using a keyboard normally. Also, the device should not interfere with hand washing procedure.
h) *Size* The device must be able to fit on a computer on wheels without affecting the performance of the user.
i) *Weight* The product should be as lightweight as possible, to ensure that the computer on wheels will be able to hold its weight in addition to the computer.
j) *Materials* The device should be constructed with cost-efficient material that will not be damaged or degraded over the product's lifetime. All materials should comply with FDA regulations if needed, and should not contain any hazardous materials.
k) *Aesthetics* The device should be as compact as possible to reduce the amount of space it takes up. All electronic parts should be safely covered.

2) Production Characteristics
   a) *Quantity* Only one unit is currently needed. However, it is designed with the intent of mass-production in the future.
   b) *Target Product Cost* The price of production of the prototype should be less than $1000. However, if the device is mass-produced, it should be affordable for all hospitals and low enough to encourage the use of this passive system of hand hygiene.
3) Miscellaneous
   a) *Standards and Specifications* The device may have to follow FDA standards. It should also meet ergonomic standards for use with keyboards. It should be designed with the purpose of mass-production.
   b) *Customer* The device will be used in hospitals and clinics by healthcare professionals. It should have precautions to prevent accidental sprayings, which may harm users.
   c) *Patient-related concerns* It should not interfere with the computer, which contains patient's medical data. The device may have an indicator to facilitate refilling when the disinfectant solution is finished. The device should not interfere with the user's workflow.
   d) *Competition* There are currently no similar products that exist. While FDA approved disinfectants may be competition, they do not have the same function as this device (to also disinfect the keyboard). These disinfectant solutions will be incorporated into the device.