$45 Billion Problem

SWARM INTELLIGENT Wireless Networked Wearable's & patient dispensers measures & reminds healthcare worker's hand-washing compliance, actions and reminds patients as well with wirelessly connected dispensers. (An Industry First)

Background --45 Billion Problem

As most anyone involved in medical care in an inpatient setting certainly knows, hospital-acquired (or "nosocomial") infections are a leading cause of morbidity and mortality. According to a study on the CDC website, the total cost of treating all healthcare-associated infections in the **United States is estimated between a mind-staggering $35 to $45 Billion dollars, and almost 70% of those infections are preventable.** The most expensive to treat was the Surgical Site Infections (SSIs), costing $34,670 per infection. (ref. 1)

Frequent hand washing is the best defense against **hospital acquired infections** referred to as **(HAI).** All healthcare professionals know they should wash their hands, but every year nearly (2) million people get infections while in US hospitals and around 100,000 of those people die. In addition to healthcare professionals, patients themselves also need to be reminded and have an easy to use bedside solution and capability. Therefore, why not combine both into an intelligent wireless tracking monitoring system. That's exactly what we are doing to solve this big problem.

Hospital-acquired infections (HAIs) burden patients, complicate treatments, prolong hospital stays, increase costs, and often are life-threatening (ref. 1). It is universally acknowledged that adequate hand hygiene is one of the most effective ways to prevent transmission of infections. However, despite tremendous effort, overall median compliance to hand hygiene protocols is 40%. Compliance rates are lower in intensive care units (30%-40%) than in other settings (50% - 60%), and are lower before (21%) than after patient contact (47%). (ref. 2)

Recently healthcare facilities can take advantage **of electronic** hand hygiene compliance monitoring systems and can use research-based and published benchmarks for the expected number of times medical staff should clean their hands based on the hospital type and size and the unit type, hourly patient census, nurse-to-patient ratio and the World Health Organization (WHO) and Centers for Disease Control and Prevention (CDC) for their hand hygiene guidelines, considered to be a higher clinical standard than simply cleaning hands before and after contact with the patient. This number could be quickly significantly decreased if healthcare professionals wash their hands at the right times and follow proper hand-washing technique - reminded and monitored both simultaneously using an **electronic** hand hygiene compliance monitoring system.

Hand –washing is most critical in stopping hosp, infections   **Courtesy of the CDC**

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Although HAI's have been mainly associated with the hands of healthcare workers, high-touch areas such as bedrails and equipment directly attached to the patient increases the risk of patients acquiring an HAI. However, patient hand hygiene research within the past 26 years have shown the presence of deadly bacteria on patient's hands and exposes the reality that patients rarely practice hand hygiene in the healthcare setting. Patients report that the major barrier to hand hygiene practice in the healthcare setting is accessibility. (ref. 3)

Low Cost Solution

That's why Bluetronix Inc. a small successful defense contractor funded by DARPA under the SBIR program is now developing a SWARM Intelligent wireless smart bracelet/wristband that monitors healthcare professionals' hand washing hygiene habits wirelessly & accurately in a small non-obtrusive package. No need for expensive obtrusive cameras and so-forth anymore. An industry first for market in 2015.

The company with its partners has also developed and looks to bring to market a patient monitoring reminder system that intercommunicates with the healthcare worker's wearable bracelet. Research also shows that patients rarely practice hand hygiene because they don't have access to sinks or hand sanitation dispensers. Patients have advised that they rarely ask their nurse for assistance because they perceive them to be too busy to assist in hand-washing. Shortly, a system will be available for the patient and a total system for both the healthcare workers and patients is pending for HAIs.

Many studies find that hospital worker's meet proper standards around half the time or less. Bluetronix is one of many companies trying to address this problem with technology; other solutions include dispensers that measure the amount of liquid used, chemical sensors that sniff out the presence of soap or sanitizer, and –an intelligent sensor-based systems that know the location of each cleaning station and a company developing a chemical-sensing monitor that can detect soap and alcohol-based sanitizers on workers' hands. The challenge is to develop a cost-effective system that's suited to the pace of clinical work and is not too complex to set up or use, or obtrusive as healthcare worker's request. (ref. 4) Bluetronix's recently developed HAI monitoring wearable wristband reads wireless intelligent sensors on hand-washing and sanitizing stations (an industry first). An accelerometer in the firm's wearable bracelet can detect how long an employee spends washing and how well; the wristband buzzes & lights once if done correctly and red lights and sounds if it's not done at a measured acceptable #. In addition, intelligent algorithms run the system for measurements, data tracking/logging in a state of the art micro-systems packaging.

It also collects data from the wearable intelligent bracelets through a wireless secure connection at the end of each shift, which gives hospital epidemiologists a chance to see how each employee is doing. Then the wireless reader for such a system needs to be very fast, "A lot of people wash halfway up their arm," a quoted healthcare worker says. Still, a successful system could provide a lot of valuable information, especially around the clock, the healthcare worker believes: *She says "The 24/7 aspect is fantastic, I think it is going to help drive change."*

The SWARM Intelligent band device has a built-in accelerometer and cleansing sensors that senses whether healthcare professionals wash their hands properly and in accordance with hand-washing guidelines. It alerts, confirms and logs if the healthcare professional has spent the appropriate amount of time washing up, and if the wearer finishes too early it will let the wearer know by **red** light *(not clean enough or washed or a* **blue** *light very clean 1-3 lights with 3 being the best (clean)).* A log and time will be collected every time for review and tracking.

SWARM INTELLIGENCE (SI) is artificial intelligence architecture and platform based upon biological networks that enables intelligence to any communications, wireless sensors, instrumentation, medical devices and other related equipment.

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$45 Billion Problem

HISTROY
DARPA-Defense Advanced Research Agency—(Military Super Think Tank)

The company has been funded for about almost ten years from the US Defense Dept such as DARPA, the US Army CECOM, NASA and AF Research Labs. Funding to date is close to 3.4 million dollars in awards, including company product, patent, and further research and development investment.

This unique design looks to replace visual observation from infection control specialists, which is unreliable, expensive and obtrusive in nature as well. Healthcare workers cannot be visually monitored at all times, and behaviors that are observed can't be considered normal since the worker knows he or she is being watched. The SWARM wearable-wristband will monitor healthcare professionals at all times, enabling infection control managers a more accurate picture of their employees' hand hygiene compliance and simultaneously saving lives. Very cool and low cost!

Patient Dispenser and wireless tracking
w/ Healthcare Worker wearable bracelet

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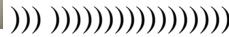
SWARM Intelligent Prototype Wearable Wristband w/ LEDs/sensors

SWARM INTELLIGENT Wireless Communications U.S. Patent 7,957,355
SWARM INTELLIGENT Wireless Tracking Systems U.S. Patent 7,813,326

The Company has developed intelligent IoT platforms and patented these unique technologies grounded in the field of *artificial intelligence (AI)* and modeled after the behavior of decentralized biological systems. The company's primary technologies are its *"Biomimicry"* based algorithms for wireless networks and data analytic solutions that emulate biological networks in a (self-forming, self-learning, self-reporting, & self organizing) architecture. These recently patented (AI)-software (SW) design structures accomplish complex network tasks through simple individual decisions made by each "device" or connection in a network without any centralized control, access points, IP addresses, security risks or required set-ups. Bluetronix Inc. is an US company that looks to release these products as described in 2016 with appropriate sponsorship.

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