

Design of an alert system as a lighting device for homes

*Jeffrey Sebastian^{1,2} Yadia Yvette Colindres^{1,3} Yeh-Liang Hsu^{1,2}

¹Gerontechnology Research Center, Yuan Ze University

²Mechanical Engineering Department, Yuan Ze University

³Information Communication Department, Yuan Ze University

1. Introduction

Alert systems are required in environments such as homes and care-homes for older adults. Most commercially available alert systems, such as Lifefone, Tattletale and Medical Guardian's alert systems (Figure 1), share common characteristics. They consist of an alert button and a receiving module. To trigger an alert by push-button in case of emergency is their main function. This research takes a different approach into the design of an alert system that is not based on a button trigger. "Drop" will be used to exemplify this approach and attempt to integrate an alert system into a daily use item such as a lamp and have other ways of interaction through visual stimuli by lighting.



Figure 1. Commercial Alert Systems, Tattletale, Lifefone and Medical Guard (from left to right)

2. Drop, a multipurpose alert system

Drop (Figure 2) is a water drop shaped lamp that can be placed in various areas in the household. With an ergonomic design that fits the hands for easy handling, it includes a set of sensors that allow interaction with the user. These sensors are strategically located so the user can also trigger the alert system concealed inside Drop. The light emitted by Drop is generated by an array of LEDs that are programmed to adapt to the user's needs by changing color, intensity and behavior. Drop contains a series of sensors that allow the user to use it as an ambience light or as an indicator and an alert system (Figure 2a). Through touch sensors the user is able to change the mood or color of the lamp.

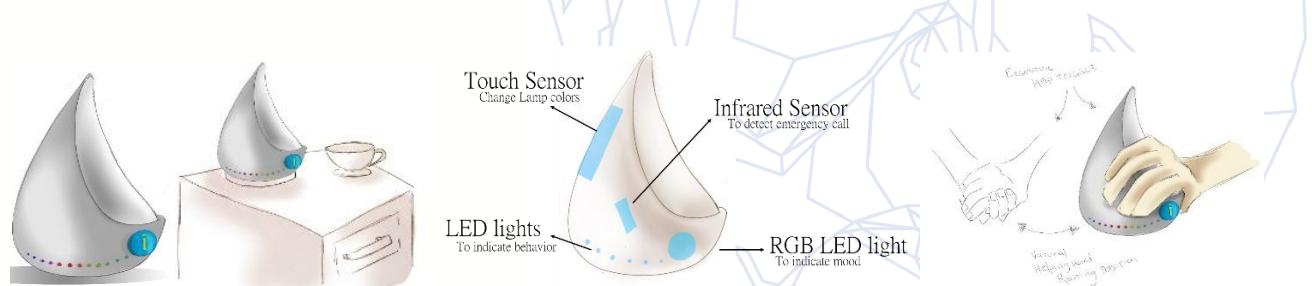


Figure 2. Drop, a multipurpose alert system

Drop's emergency call system triggers without a button, just by covering the opening of the lamp, the infrared sensor can detect such action and interpret the situation. The position of the hand while

triggering the emergency is based on the “safe hand” position (Figure 2b). This safe hand position is the orthopedically natural hand rest position (Lee & Jung, 2014; Daniels, et al. 2015). This way of triggering is suitable especially for those users that might suffer of a muscular dystrophy and are not able to press buttons. Through a smart phone App, the care giver can receive an alert sent by Drop immediately. The caregiver can then respond to the alert through the App. Drop allows the user know help is on the way through changing the color from red to green, being red the color of the light when the emergency call is triggered. By having Drop turn green, a reassuring feeling can be sent to the older adult in a struggle.

Figure 3 presents the information structure of Drop. The local interaction of Drop can be triggered by touch sensors placed around Drop’s structure while the alert system depends on the IR sensor inside the lamp. Both sensors are connected to the microprocessing unit that has as an output to RGB LED lights and a wifi module that connects to a cloud server through an access point (AP) in the home. The cloud server is connected to the cloud messaging service that will notify the mobile device carried by the caregiver. The mobile device will also send respond signal to the cloud server and the microprocessor will interpret the data and output it to the RGB LED light.

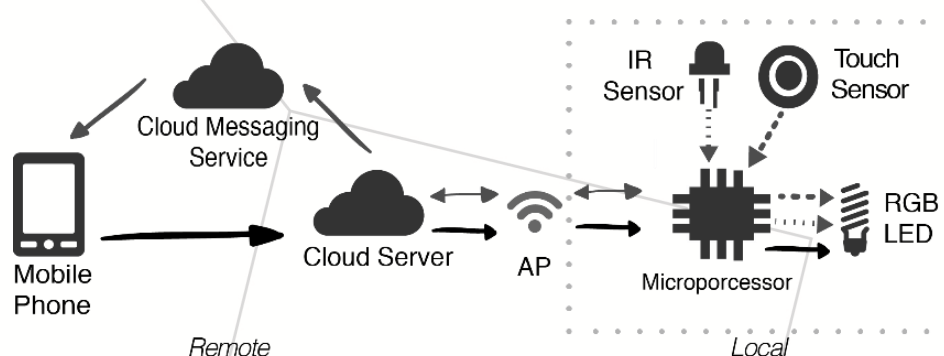


Figure 3. Drop’s information structure

3. Conclusion

Due to its design, Drop is not limited to be used by older adults but also by other users that might need an alert system at home. Being this alert system concealed inside an ambient lamp, also allows the users to have these triggers in different areas of their homes without disrupting the ambiance of such households. Drop’s ergonomic design allows users to use the orthopedic safe hand position to trigger the emergency alert. Drop is now in a prototyping stage and we are to test the scenarios with real users in the near future. The non-button based design of Drop allows the user to have different ways of interacting with an alert system.

References

1. Medical Alert System & PERS | LifeFone. (n.d.). Retrieved April 24, 2015, from <https://www.lifefone.com/>
2. Portable, Wireless Security. (n.d.). Retrieved April 24, 2015, from <https://www.tattletale.com/>
3. Medical Guardian, L. (n.d.). Medical Alert Systems, Devices & Alarms for Seniors in Emergencies | Medical Guardian. Retrieved April 16, 2015, from <https://www.medicalguardian.com/>
4. Lee, K. S., & Jung, M. C. (2014). Flexion and extension angles of resting fingers and wrist. *International Journal of Occupational Safety and Ergonomics*, 20(1), 91-101.
5. Daniels, J., Zook, E., & Lynch, J. (2015, April 1). Hand and Wrist Injuries: Part I. Nonemergent Evaluation. Retrieved April 27, 2015, from <http://www.aafp.org/afp/2004/0415/p1941.html>