A Survey Paper on IOT Based GPS Tracking System for Children's Security

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ABSTRACT

Child trafficking has become a global problem due to its mysterious and pervasive nature. Malicious activities like this thrive when children are not given the opportunity to respond to or follow up on such incidents. Many of these solutions mandate the use of electronic detector. Electronic detectors often leave users vulnerable as they appear exposed to traffickers. This article proposes a hidden and portable patch based on embedded systems to greatly reduce the likelihood of such incidents. This wearable patch can be attached to clothing and uses the Internet of Things (IoT) to constantly monitor a child's whereabouts and generate voluntary and involuntary responses to alert parents far away in an emergency.can make. I warn

you. Parents can also remotely change which areas their child can enter. This paper describes how such patches can be concealed and used on shoes, and the experiments and results that support this.

I. INTORDUCTION

Human trafficking is the act of recruiting or harboring persons for forced labor or commercial necessity, using fraud or force . In 2016, more than 40 million people worldwide were affected by this serious and widespread crime. It remains one of the most complex criminal activities and is very difficult to detect and prosecute, largely due to its covert nature. Even when discovered, victims are generally reluctant to speak up or take action, largely due to lack of resources, awareness, lack of accurate information, and even social stigma. The United Nations reports active human trafficking in 106 countries , making it the third most profitable criminal activity in the world .The Global Slavery Index 2016 reports that there are 18.3 million people in modern slavery in India. Unlike adults, children act subconsciously and without consent. Almost zero chance of escape. An important step in such scenarios is to recognize the occurrence of a human trafficking incident as early as possible. As such, children should be constantly monitored and followed up using proactive mechanisms and real-time responses so that potential trafficking can be discovered and introduced to parents as soon as possible. Take action to thwart the attempt. Devices used to implement such mechanisms should preferably be indistinguishable from and non-interfering with their use. Wearable and intelligent tracking devices that are camouflaged or hidden under clothing may prove more effective in such scenarios. Existing wearable solutions have limitations such as: B. High demand for communication bandwidth, high power consumption, manual operation, etc. Low-cost, low-power embedded systems can be used as an alternative to such devices. With the advent of such systems and a wide range of sensors, the Internet of Things (IoT) can now be used for a wide variety of services.

II. RELATED WORK

Some attempts to combat human trafficking/personal protection have reportedly taken the form of sophisticated mechanisms. They either need to carry tags or consume high communication bandwidth and power while working continuously and autonomously. Most of these devices are GPS-based and use basic mechanisms to collect and communicate the wearer's coordinates. However, such GPS-based devices tend to perform poorly indoors or near buildings. They are also affected by weather conditions , Peyto et al. used a hidden device that reacts in the event of an attack. Responsive to stress/aggression, but not always positively usable in child trafficking cases. anti-trafficking mechanisms must be proactive. Mood Bidori et al. Their solution specifically targets child safety, but this mechanism requires active parental involvement. Parents must manually ping her child's wearable device to get her status. Such systems lack real-time response and are difficult to use. Rafflesia et al. proposed an application for use on smartphones that alerts parents based on the child's situatio

III. PROPOSED SYSTEM

The proposed system smart shoe system integrates a smart patch assembly on shoes, a Wi-Fi network, an Internet router, a cloud server and a smart phone. Here, we describe the implementation of the proposed system from the perspective of children and parents. A. Children's page This page is about the smart shoe, its configuration and operation. A Node Micro Controller Unit (NodeMCU) embedded in the shoe forms the main controller. The device offers an open-source software and hardware development platform based primarily on a low-cost system-on-chip (SoC) that includes a CPU, RAM, and Wi-Fi module. With its relatively small footprint, this inexpensive controller can be considered a near-ideal node for IoT. A pressure sensitive resistor to detect shoe occupancy, an accelerometer with a gyroscope sensor

(MPU6050) to detect covert gestures, a buzzer to confirm gestures, and a power supply (battery) are all connected to the NodeMCU. Configure the remaining components of the smart shoe circuit. Figure 1 shows the layout of the circuit within the shoe. Circuits are strategically placed throughout the shoe to reveal them hidden. The power supply for the circuit is a 3.3V LiFePO4 battery. To track the child's current zone, we used a cluster of WiFi networks to locate the child between allowed and forbidden zones. His Internet router was also used to connect the Internet across these zones to deliver responses to the Guardian.This router is not used for smart shoe searches as it needs to cover all zones to provide internet connectivity. His NodeMCU microcontroller in the shoe incorporates his Wi-Fi module that handles Wi-Fi network detection and internet communication tasks. Shoe occupancy is detected with a pressure sensitive resistor. This type of sensor changes its conductance when flexed or loaded. The sensor was embedded under the tongue of the shoe where the laces were tied. Additional shoe tongue and foot pressure applied to the sensor by tying the shoe laces changes its conductance.

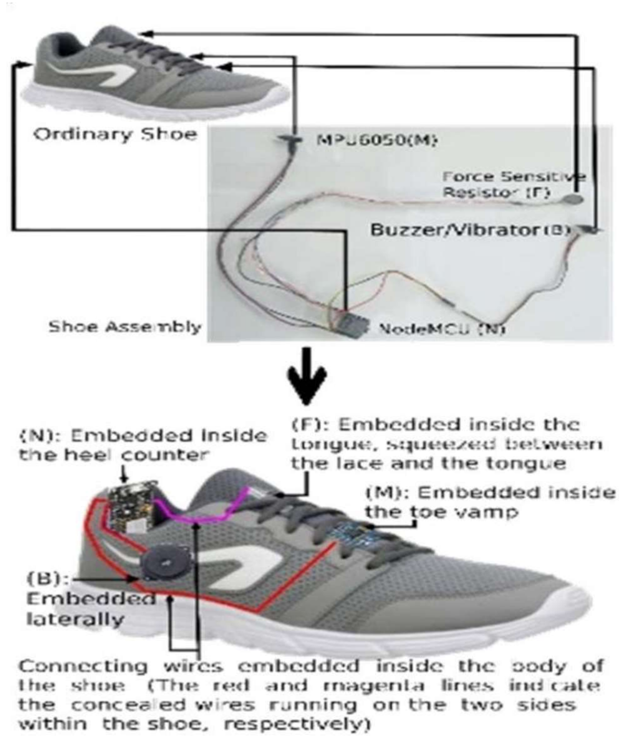

Fig. 1: Placement of the circuitry within theSmart Shoe

This change allows us to identify if the shoes are on or off. When the shoelace is untied, the pressure on the sensor is released, thus triggering the IER. When a child senses a threat, her VER can be generated by performing covert gestures with her feet detected by the MPU6050 sensor. A child may unintentionally perform this particular gesture and trigger her VER unwanted. To avoid/minimize such false alarms, this gesture should be clarified. Therefore, we performed a closed-loop analysis of gait patterns to find unique foot gestures that do not overlap with any of the routine foot movements (Figure 2). The graphs in Figures 2a through 3e show the profile of foot angle and acceleration during normal activity.Resting, walking, running, hopping, jumping. Respectively. Here we can observe that during normal motion (except at rest) the pitch curve in green cycles both above and below the roll in red and the α curve in blue. α is the 20x acceleration of the foot along the z-axis (measured against the acceleration of gravity g). After some experimentation, we found a unique combination of sensor roll, pitch, and foot α values. This ensures that covert gestures are distinguished from other normal foot movements. as shown In Fig. 2f, the relevant secret gesture is such that the pitch moves beyond both roll and α values and ensures that it remains the same long enough to be clearly identified. Physically, this gesture must be performed in two steps. In the first stage, you should lean your foot forward to the left for at least4 seconds. This causes the pitch to exceed the roll and alpha values. In the second stage, the foot should be tilted to the right for at least 4 seconds. This makes the pitch well below his two other values. Any deviation from this order invalidates the gesture, in which case the child must repeat these two action steps of hers. A buzzer notifies the completion of Phase 1 and Phase 2 separately and alerts your child to the occurrence of VER. A buzzer will let you know if your child does the first step unconsciously. In such cases, the child must ensure that it does not complete the second stage, thereby aborting her VER generation process. B. Guardian Side The current implementation requires the Guardian to install her two third party applications.We use MQTT Dash and Blynk on smartphones to enable remote connectivity to smart shoes via the CloudMQTT server. The MQTT Dash application is configured with two interfaces, "Allowed Zone List" and "Current Zone", as shown in Figure 4a. Allowed Zone List is a text field that can be used to send the list of allowed zones to the smart shoe. This list replaces the previous list and updates the allowed zones. If this interface is not being used to send the list, you will see the latest list of allowed zones. The Current Zone interface shows his SSID of the Wi-Fi network your child is currently connected to. In Figure 3a, "SCHOOL-LIB" and "SCHOOL-GND" are the SSIDs of the Wi-Fi networks corresponding to the allowed zones, and "SCHOOL-PARKING" is the SSID of the Wi-Fi networks within the allowed zone. is. Where are your kids currently wearing their smart shoes? The Blynk application is used to manage emergency notifications (i.e. IER and VER) are sent from the smart shoe. The response is received from the smart shoe in the form of a notification containing the reason for the response, the SSID, and the Basic Service Set Identifier (BSSID) of the Wi-Fi network the childis currently connected to, as shown in Figure

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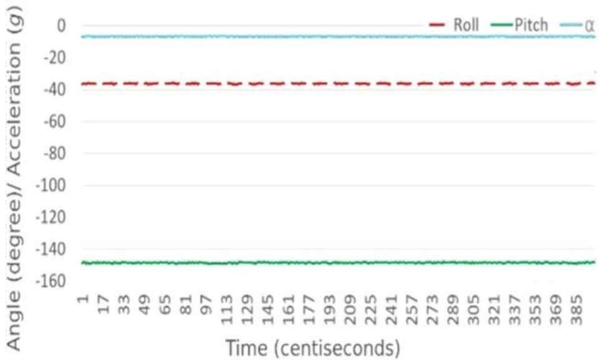
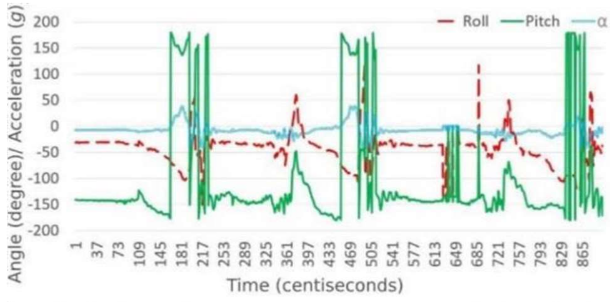
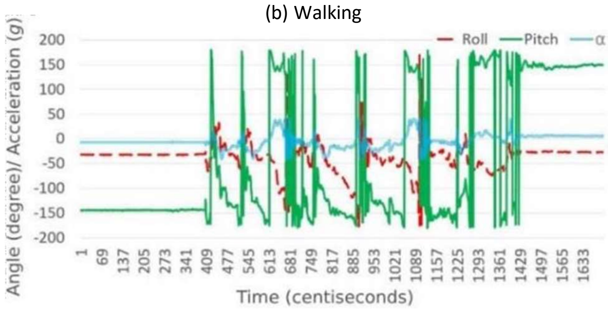


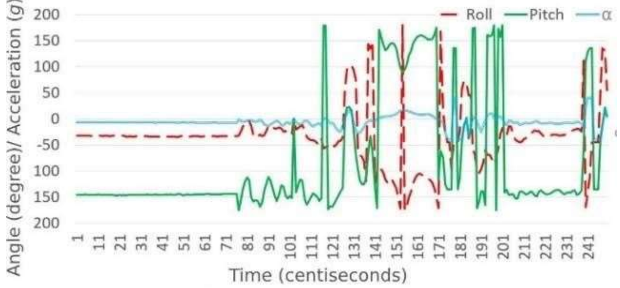
(a) Resting



(b) Walking



(c) Running



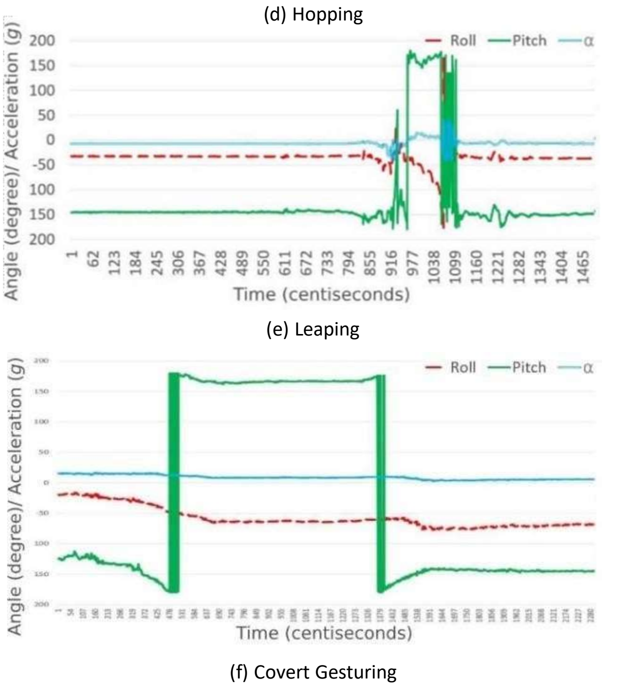
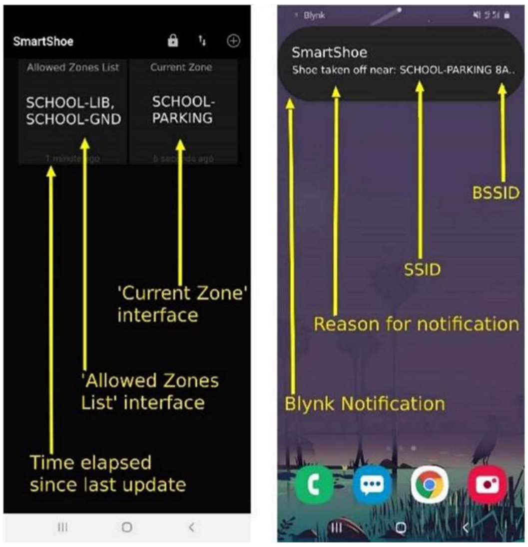


Fig. 2 (a)-(f): Angular (Roll, Pitch) and Acceleration (α) profiles of the foot wearing the *Smart Shoe* over different routine activities and the covert gesture



(a) MQTT Dash (b) Blynk

Fig. 3(a)-(b): Snapshots of the two apps running on the Guardian's smartphone

IV. CONCLUSION

This study shows smart IoT child safety and tracking devices that help parents locate and monitor their children. If the sensor reads an abnormal value, an SMS will be sent to the parent's mobile phone, and her MMS will also be sent with reference to the photos taken by the serial camera. The future scope of work is the implementation of IoT devices that ensure a complete solution of child safety issues and child health monitoring using temperature sensors that detect the child's body temperature and ambient temperature. If there is an abnormal temperature rise or fall in the child's body or environment, the user will be notified according to the coded time delay as shown in the picture. It displays temperature and humidity values and notifies users based on predefined values in case of abnormal falling or rising scenarios.

V. REFERENCES

[1] M Byrne, S Parsh, and B Parsh, 'Human Trafficking', Available at: https://journals.lww.com/nursingmanagement/Fulltext/2019/08000/ Human Trafficking Impact, Identification, and . 5.aspx .

[2] Forced Labor, Modern Slavery, and Human Trafficking, Available at: https://www.ilo.org/global/topics/forced-labour/lang--en/index .htm.

[3] Child Trafficking in India, Available at: https://www.theguardian.com/global-development/2015/apr/28/childtrafficking-india-domestic-labour-chhattisgarh

[4] “Human Trafficking”, available: https://migrationdataportal.org/themes/human-trafficking.

[6] Global Slavery Index, available: https://www.globalslaveryindex.org/2018/findings /countrystudies/india/.

[7] "Smartthings Tracker", available at: https://www.samsung.com/us/smart-home/smartthings-tracker/.

[8] S.-C. Kim, Y.-S. Jeong and S.-O. Park, “Rfid-Based Indoor Tracking to Keep Seniors Safe in Smart Home Environments,” Personal Ubiquitous Comput , vol. 17, no. 8, pp. 1699– 1707,

[9] K.-Y. Chen, M. Harniss, J. H. Lim, Y. Han, K. L.Johnson und S. N. Patel, “ulocate: A Ubiquitous Location Tracking System for Older Adults with Disabilities,” Proceedings of the 8th International Conference on Body Area Networks, Ser. Bodynet’13 ICST, Brussels, Belgium, Belgium: ICST (Institute for Computer Sciences, Social-Informatics and Telecommunications Engineering), 2013, S. 173–176.[Online]. Verfügbar: http://dx.doi.org/10.4108/icst.bodynets.2013.253584

[10] C.-T. Huynh, H.-Q. Nguyen, X.-Q Pham, T.-D. Nguyen und E.-N. Huh, "Cloud-Based Real-Time Location-Tracking and Messaging Systems:A Childcare Case Study," Proceedings of the 9th International Conference on Ubiquitous Information Management and Communication, ser. IMCOM '15. New York, NY, USA: ACM, 2015, S. 23:1-23:7. [online]. Available at: http://doi.acm.org/10.1145/2701126. 2701161

[11] Freydkin, D. (2020) Best locator and gps tracker for kids. Paternal. Available: https://www.fatherly.com/gear/gpstrackers-kids

[12] His four location-based technologies compared: How can they improve operational efficiency?- Sensorless. (March 15, 2020). Verfügbar: https://www.sensolus.com/four-geolocation-technologies-comparedhow-can-they-improve-your-operational-efficiency

[13] Comparing tracker technologies (GPS, RFID, Bluetooth, Wi-Fi). (April 4, 2019). Verfügbar: https://gpstrackerinfo.com/comparing-location-tracker-technologies

[14] J. Patel und R. Hasan, “Smart Bracelets: Towards Automating Personal Safety Using Wearable Smart Jewelry,” 2018 15th IEEE Annual Consumer Communications & Networking Conference (CCNC),Las Vegas, NV, 2018, S. 1-2, Doi: 10 1109/CCNC.2018.8319327

[15] Moodbidri und H. Shahnasser, “Child safety wearable device“, 2017 International Conference on Information Networking (ICOIN), Da Nang, 2017, S. 438–444, doi: 10.1109/ICOIN. 2017.7899531Electrical Engineering and Computer Science (ICECOS), Pangkal Pinang, 2018, pp. 379-384, doi: 10.1109/ICECOS.2018.8605200