

Creative Invention Research of Thousand-Mile Tracking Band

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Abstract—The infrared wrist band which can detect signs of life contains a built-in water-proof anti-pressure GPS for location detection, and an RFID for identity recognition. If those who take aerial, water, or land transport wear this wrist band, in case of emergency, with the help of this band, rescue teams can find survivors in the shortest time possible to reduce casualties.

Keywords—GPS, RFID, infrared, creative invention.

I. INTRODUCTION

Aerial and water transportation are convenient, but many dangers are concealed in them. Although the probability of being in a tragic accident is not high, once in such a perilous situation, serious consequences and casualties may arise. Secondly, climbing and diving are favorite recreations of many people, but when life-threatening situations occur, they might not be able to help themselves or call for help which often causes precious time for search and rescue to be lost, thus leading to unfortunate tragedies.

This article reasons that it is necessary to consider a design that can assist in providing personal safety during air and maritime transport which can facilitate immediate rescue during unfortunate situations, thus, reducing the number of casualties. Furthermore, this product design can also be provided to hiking enthusiasts or divers so that they can immediately ask for help whenever needed and keep themselves safe.

II. LITERATURE REVIEW

Tests on the use of GPS combined with sensor for more accurate or reliable technology have been conducted for many years, such as enhanced GPS performance which allows detected results to be closer to the actual situation [2]. GPS is being used more frequently to track daily activities and medical health care. Therefore, it is expected that more accurate and functional information would be provided to users [9]. However, GPS is extremely sensitive to shielding objects and cannot detect covered entities, which is the area that needs the most urgent improvement [3]. Using GPS to simulate real road conditions to calculate the shortest path allows motorists to minimize the time to reach their destinations [5].

Secondly, RFID is used for identification, monitoring, and tracking, however, there is still an urgent need to improve its use in covered surroundings [1]. The application of RFID during industrial production processes helps improve

efficiency and customer service [6]. Furthermore, since RFID technology has been widely applied in cloud shopping transactions, security and confidentiality issues are extremely important [7]. Its function as a tracking device must also be clarified by relevant authorities to check whether there is violation of the security and confidentiality agreement [4].

In addition, researchers have applied developed technology to solve blurry infrared images and the problem of insufficient light [10]. Robust principal component analysis (RPCA) and non-subsampled Contourlet transform (NSCT) are also applied to solve situations where current infrared and visible images fusion algorithms cannot efficiently extract the object information in the infrared image while retaining the background information in visible image [11]. The application of infrared for maritime surveillance is very important, but because of its shortcoming, characteristics of fuzzy system theory must be utilized for image segmentation and processing [8].

III. CREATIVE DESIGN

Everyone has creative ideas, but the crucial point is whether or not they can be implemented. Creative thinking training and method application contribute to the extension and development of ideas. In people-centered design thinking, the emphasis is on the maintenance of human safety. Limited resources are utilized for best protective effect, and various high-tech equipment are used in emergency relief. This is nothing more than providing and maintaining human security in the hope of rescuing lives without delay.

Modes of transportation are improving with the development of human civilization. Whether it be fast speed aerial travel or tourism travel by sea, technological developments arise with each passing day. But every so often, newspapers and magazines report about distressing news like delayed rescues of accident victims. Often, these tragedies happen because of incomplete information, such as not knowing the exact location of the victim or whether or not there are vital signs, which delays the golden opportunity for conducting rescue. The creative idea in this article combines GPS for positioning, RFID for proof of identity, and infrared imaging in the product design for maintenance of safety. This device can be worn on the hand by fastening the buckle and is used for receiving signals from the central master control system. It can make possible the rescue of victims in the shortest possible time.

IV. DESIGN RESULTS

The creative invention product design mentioned in this study is worn on the hand. Waterproof material is used to cover built-in information, then position of signal is transmitted in order to facilitate rescue of victims. The following is the schematic diagram of the product (figure 1), usage diagram (figure 2), poster design (figure 3), and poster submitted to an international poster exhibition (figure 4). In addition, this creative idea has passed the creative works selection of Chienkuo Technology University and received subsidized funding to participate in the 2016 8th European Exhibition of Creativity and Innovation and competition. It was also given a proof of entry in competition (figure 5), won a gold medal (figure 6), and received the Turkey Special Award (figure 7). Lastly, photograph of the creators is shown (figure 8).



Fig. 1. The schematic diagram of the product

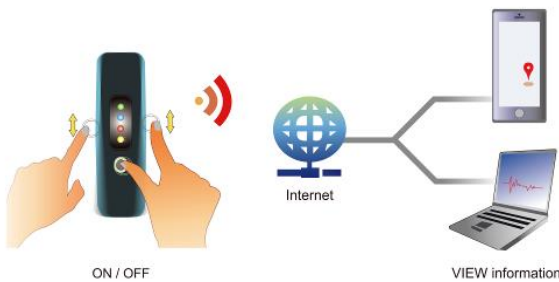


Fig. 2. Adjustable simulated light beam angle



Fig. 3. Poster design



Fig. 4. Poster design



Fig. 5. Proof of entry in competition



Fig. 6. Gold medal

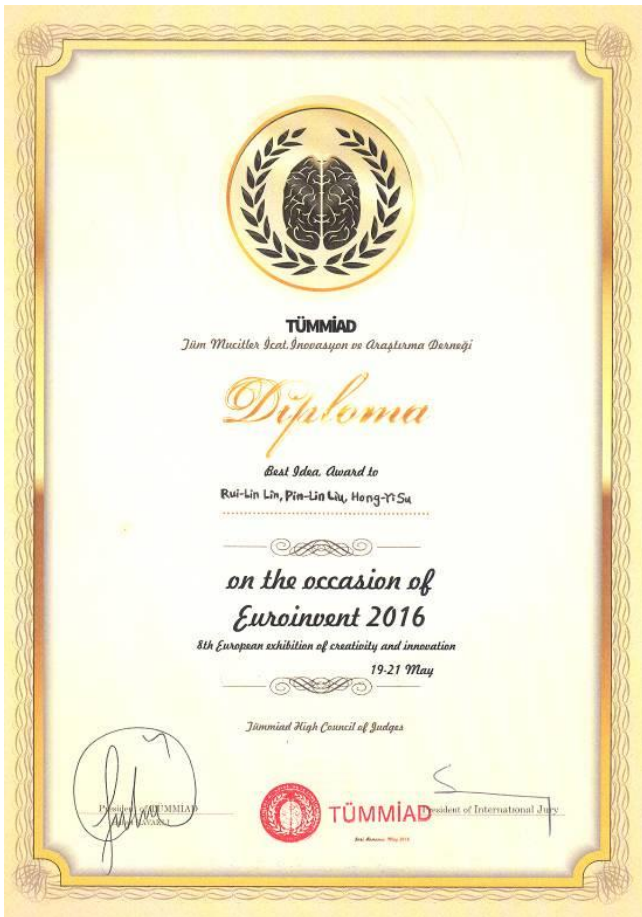


Fig. 7. Turkey special award



Fig. 8. Team for creators

V. CONCLUSIONS

In general, the results for the innovative research and development of this study are summarized and illustrated below:

(1) Problem identification: Problems from life situations were discovered and methods for improvement were suggested.

(2) Creative concept: GPS, RFID, and infrared were combined for timely rescue of victims.

(3) Effective use of resources: Accurate information is timely sent and received to help rescue operations.

(4) Commercial production: The design of this creative innovation can be provided as reference for mass production by related industries.

REFERENCES

- [1] A. Jedda, M. G. Khair, H. T. Mouftah, 2016, Decentralized RFID coverage algorithms using writeable tags, *Computer Networks*, 102 (19), June, pp. 96-108.
- [2] D. K. Schrader, B. C. Min, E. T. Matson, J. E. Dietz, 2016, Real-time averaging of position data from multiple GPS receivers, *Measurement*, 90, August, pp. 329-337.
- [3] H. Han, J. Wang, X. Meng, H. Liu, 2016, Analysis of the dynamic response of a long span bridge using GPS/accelerometer/anemometer under typhoon loading, *Engineering Structures*, 122 (1), September, pp. 238-250.
- [4] J. Munilla, M. Burmester, A. Peinado, 2016, Attacks on ownership transfer scheme for multi-tag multi-owner passive RFID environments, *Computer Communications*, 88 (15), August, pp. 84-88.
- [5] L. Knapen, I. B. A. Hartman, D. Schulz, T. Bellemans, D. Janssens, G. Wets, 2016, Determining structural route components from GPS traces, *Transportation Research Part B: Methodological*, 90, August, pp. 156-171.
- [6] P. M. Reyes, S. Li, J. K. Visich, 2016, Determinants of RFID adoption stage and perceived benefits, *European Journal of Operational Research*, 254 (3), November, pp. 801-812.
- [7] T. Cao, X. Chen, R. Doss, J. Zhai, L. J. Wise, Q. Zhao, 2016, RFID ownership transfer protocol based on cloud, *Computer Networks*, 105 (4), August, pp. 47-59.
- [8] X. Bai, M. Liu, T. Wang, Z. Chen, P. Wang, Y. Zhang, 2016, Feature based fuzzy inference system for segmentation of low-contrast infrared ship images, *Applied Soft Computing*, 46, September, pp. 128-142.
- [9] Y. Kestens, B. Thierry, B. Chaix, 2016, Re-creating daily mobility histories for health research from raw GPS tracks: Validation of a kernel-based algorithm using real-life data, *Health & Place*, 40, July, pp. 29-33.
- [10] Y. Li, Y. Zhang, A. Geng, L. Cao, J. Chen, 2016, Infrared image enhancement based on atmospheric scattering model and histogram equalization, *Optics & Laser Technology*, 83, September, pp. 99-107.
- [11] Z. Fu, X. Wang, J. Xu, N. Zhou, Y. Zhao, 2016, Infrared and visible images fusion based on RPCA and NSCT, *Infrared Physics & Technology*, 77, July, pp. 114-123.