iMED-Tour: An IoT-based Privacy-assured framework for Medical Services in Smart Tourism

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Abstract

Tourism is one of the key revenue generators in communities worldwide. In the present day, traveling has become a lot easier with all the information available through the Internet. However, there are still challenges in identifying the right medical resources while traveling to a new city for the first time. Through this research we have developed a cost-effective tour wearable, iMED-Tour, that can notify the user if they need to visit a hospital service in case of emergency and provide suggestions for the preferred medical services. The proposed framework was evaluated for its latency with regards to the wearable's performance and ability to find shortest path. The iMED-Tour wearable had an overall latency in the order of few milliseconds and the shortest path algorithm implemented in CupCarbon had a latency of 10 seconds.

Problem Overview

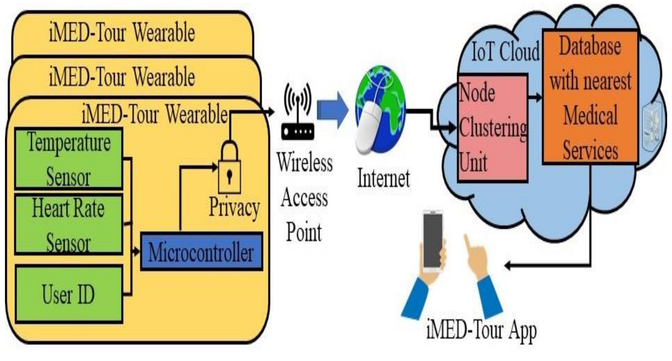

Figure 1. An Overview of the proposed IoT-based iMED-Tour framework

Research Work

The iMed-Tour framework aims in monitoring the iMED-Tour wearable user's health information, alert the user as and when required and find the medical services as per the user's need. The contributions of this research are:

- A novel IoT-based framework to reach medical services for tourists is proposed.
- A privacy-assured tourist wearable, iMED-Tour, has been designed.
- An algorithm to identify the nearest medical service in an environment has been proposed.
- The proposed privacy-assured iMED-tour wearable has been validated using a single-board computer and off-the-shelf components.

Proposed Algorithm

1. ***Pre-Execution:*** Obtain the priority of medical services during iMED-Tour app installation.
2. Based on user's input and previous recommendations, prepare a list of highly-recommended medical services.
3. Obtain the non-health data such as insurance, medical conditions, payment options (optional).
4. ***Upon Emergency button press:*** Determine Patient's current location as source node.
5. Determine the type of medical service.
6. Locate the Destination node based on the location and preferred medical service.
7. Find the shortest path from source node to the destination using A* algorithm.
8. ***Post-execution:*** Request User's status: Recovered or Still in recovery.
9. Request User's recommendation on the medical service through the mobile application.
10. Update the "Database of Medical Service" in the IoT Cloud.
11. Remind the user about payments/ follow-up/ paper-work, once recovery is reported.

Figure 2. Proposed Algorithm for iMED-Tour Wearable

Results

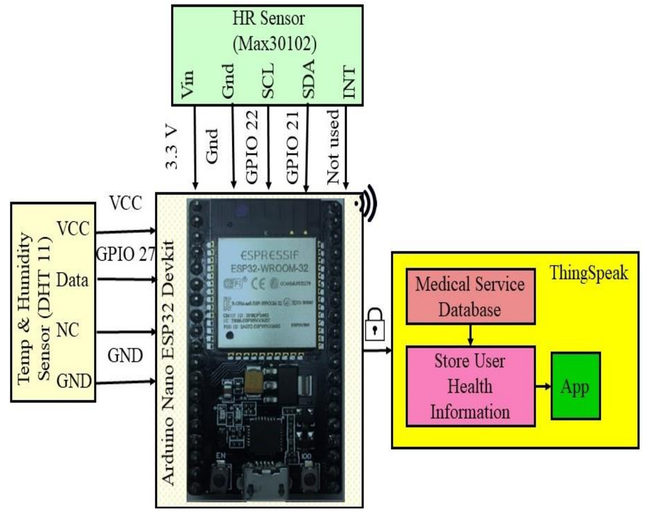

Figure 3. Components involved in the prototype of iMED-Tour wearable

The evaluation of the A* algorithm showed that the shortest path based on user priorities was determined in 10 seconds and the overall latency of the iMED-Tour wearable was in the order of few milliseconds.

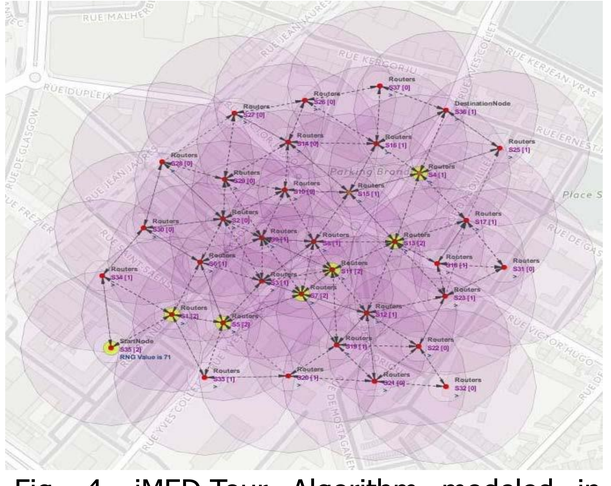

Fig. 4. iMED-Tour Algorithm modeled in CupCarbon

Conclusion and Future Research

The proposed framework was evaluated using a custom-built, iMED-tour wearable, which constantly monitors the user's health information and helps them remain connected to the iMED-Tour framework by transmitting the information in a privacy-assured method to the iMED-Tour application. Future research includes deploying the proposed algorithm as a mobile application and evaluating the overall performance. Additionally, a machine learning model is to be deployed for storing user's preferred medical services and recommendations.

References

[1] A. K. Tripathy, P. K. Tripathy, N. K. Ray, and S. P. Mohanty, "i-Tour: The future of Smart Tourism: An IoT framework for the independent mobility of tourists in smart cities", *IEEE Consumer Electronics Mag,* vol. 7, no. 3, pp. 32-37, May 2018.

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