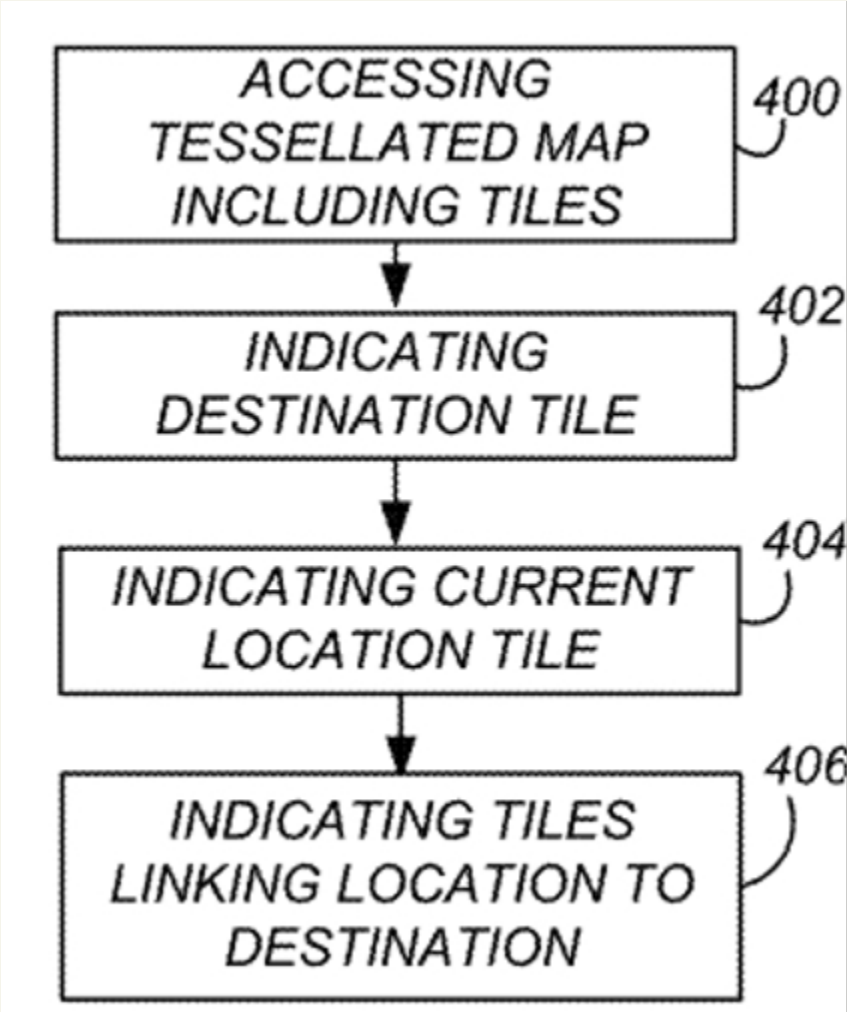




tessellated map made out of virtual tiles and having the user indicate their destination, this method is superior to existing indoor navigational applications as routing is not necessarily limited to predefined pathways and is instead dynamically generated. Dynamically generated routes allow for much more flexibility in response to congestion as well as changing enviroments, and often provide much more efficient directions than pre-generated pathways are capable of. The destination of the user is then placed onto a designated virtual tile, the location of the user is calculated via GPS and iBeacons when available through the utilization of bluetooth low energy (BLE) causing the tile they reside within to become known to the application as well as indicated to the user. The use of Geo-JSON files allows for the relatively easy creation of complex transit hub and plaza maps, as well as the use of existing maps already published by many existing locations. Geo-JSON formatting also allows for the creation of three-dimensional environments which greatly improves the usability of such navigation within multi-level environments. These methods of localization, primarily BLE and improved pedestrian dead reckoning, allow for greatly improved localization over existing GPS-based systems allowing for a decrease in positioning error from 5-10 meters all the way down to 3 meters, an up to 70% increase in accuracy. Once the current location and destination are known and indicated onto tiles, the tiles that link the user's current location and destination are then subsequently calculated and connected to provide a coherent route. The user is able to view their current location within this route at any time in reference to relevant landmarks either visually or in verbal form. The specific tiles at which the user is boarding a train, bus or accessing any other point of interest are clearly highlighted within the navigable space to avoid confusion. Through the use of this tile navigation a user is able to see exactly where they are and where they are going when navigating a transit hub or other densely packed walkable area. These methods of virtual tile routing can exist either in a standalone application or be added onto existing applications in order to greatly increase usability within the aforementioned complex transit hubs and plazas that are currently neglected by existing navigation applications.



APPLICATIONS

- transit hub navigation

- transit plaza navigation
- navigational aid for the impaired
- dense walkable environment visualization

ADVANTAGES

- simplifies navigation of transit hubs considerably over existing applications
- uses local routing directions rather than street level directions
- clearly labeled navigable areas relative to current standards
- improved user localization compared to GPS by up to 70%
- use of Geo-JSON a widely accepted format for web-based navigation
- possible three-dimensional mapping

INTELLECTUAL PROPERTY INFORMATION

Country	Type	Number	Dated	Case
United States Of America	Published Application	<a href="#">20210018321</a>	01/21/2021	2019-905

RELATED MATERIALS

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ [Camera-Based Reader for Blurry and Low-Resolution 1D Barcodes](#)
- ▶ [Inertial Odometry System and Methods](#)