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ENVIRONMENT DETECTION AND COLLISION AVOIDANCE BY UWB DESIGN ON HMD AND JOYSTICK

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Environment detection and collision avoidance by UWB design on HMD and joystick

For the wired VR HMD use case, due to there is wire which will limit the user's movement so when there are multi-players in the room to play the game together, they might NOT BE easy to get collision. In order to provide the better UX, there are more wireless VR HMD coming to the market, however, without the wire, the users might be easier to get collision in multi-players user scenario.

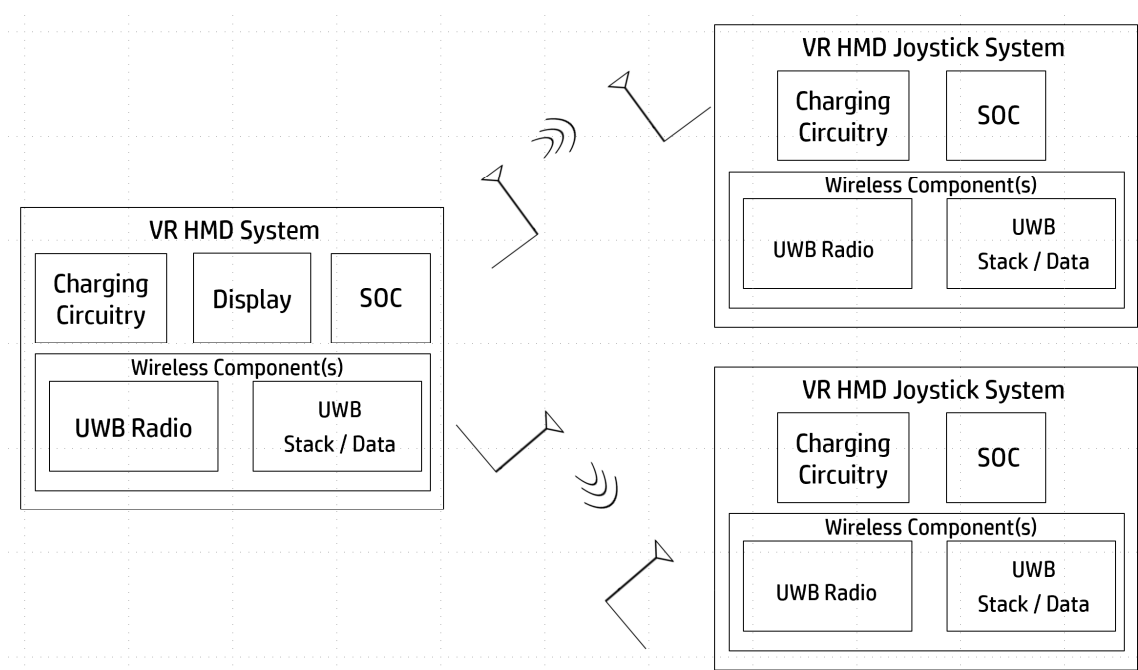
Wireless VR HMD is getting popular because the wired HMD will limit user's movement so the UX will be limited. However, with more and more multi-players game or multi-users training material coming to the market, lacking the users' location detection, and warning message, the user might hit / hurt the other users nearby, so it becomes a danger situation

UWB has very good performance on the range detection so in this disclosure, we are going to use this kind of design to easily solve the problem

UWB can be used for transmitting the data and/or distance measurement so by adopting the UWB in both of HMD and Joysticks can:

- Transmitting the Joystick movement data to HMD which can replace the current Bluetooth task in wireless Joysticks
- By ToF/TDoF and/or AoA/AoD tech. the HMD can know the distance from Joysticks and between Joysticks, this can let the UX be better and more realistic
- By ToF/TDoF and/or AoA/AoD tech. the HMD can also know the distance from peer HMDs so if the distance is very closed, the HMD can show the warning message to the display with direction/angle/distance to warn user as below
- By ToF/TDoF and/or AoA/AoD tech. the Joysticks can also know the distance from peer Joysticks so if the distance is very closed, the Joysticks will send the notification to HMD UWB and the HMD UWB will show the warning message to the display with direction/angle/distance to warn user

Function Block Diagram



Workflow / How this works

When user powers on the HMD and the Joysticks, the HMD UWB and Joysticks UWB will get connected for Joysticks movement report purpose

The UWB in the HMD and Joysticks will then start to use ToF/TDoF and/or AoA/AoD to detect each other's location/angle/distance and then use HMD's display to show the HMD and Joysticks location

In the meanwhile, the UWB in the HMD and Joysticks will also detect the peer's HMD and Joysticks by using ToF/TDoF and/or AoA/AoD to avoid the collision between users by showing the warning message in HMD's display if the peer HMD or Joysticks is getting too close to the user

Disclosed by Frank Chen, Andrew Huang and Chunghwa Wu, HP Inc.