Summary 1:

Digitalquest: a mixed reality approach to scavenger hunts

DigitalQuest is a framework developed to provide designers with ability to create mobile AR multiplayer "scavenger hunts." DigitalQuest provides an editor that allows designer to define and position custom virtual objects to positions in the real world locations obtained through Google map. It also allows designer to define the logic for the appearance of these objects (tap within certain proximity, solving a previous quest item, etc.). Users are able to access the content via a sensor-based application rendered on Android or iOS. The application creates a parallel virtual world overlapping with the real world by converting GPS coordinates to virtual 3D positions. Origin is defined by user's initial location and successive locations are calculated in relation to that using data from accelerometer, gyroscope, and compass to obtain a rotation vector to define the orientation of the camera in virtual 3D space. Using data from GPS, WiFi, and cellular network triangulation to get location information, along with the rotational vector, the camera is moved to the current location. To account for GPS instability, sensor fusion algorithm from ROAMFREE framework is used to calculate approximate position using other available sensors. This framework could be used to design wide range of games, educational, tourist, and promotional applications for the general population in an outdoors environment.

our technique to utilize camera and motion sensors on the mobile phone to enable an appropriate level of user engagement within this game. We are able to obtain realistic augmentations with accurate positioning by leveraging sensor fusion and through the use of filters that compensate for sensor noise, using image processing only for error correction or in special situations. The initial success of this project leads us to believe that DigitalQuest could be used to design a wide range of creative multi-user mixed reality applications.},