CREATING AN ARCORE POWERED INDOOR NAVIGATION APPLICATION

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Abstract: Indoor navigation is a collection of methods and techniques for navigating within a closed space building such as houses, buildings, etc. consisting of different sections separated by walls. There have been experiments with many different technologies for creating internal navigation, such as Wifi and Bluetooth, magnetic fields, dead count, visual-based visual effects, and combinations of these. Some require additional hardware to operate, but others may work out of the box. We are launching a solution using the latest technology available to the general public with our mobile phones, which is SLAM or the Localization And Mapping algorithm available from ARCore from Google.

Keywords: Indoor Navigation, Simultaneous Localization and Mapping (SLAM), histogram of targeted gradients (HOG)

I. Introduction

Internal Navigation: The concept of providing internal navigation has been handled by many using a variety of technologies. However, it had not yet come fully resolved and the meaning of this can be accurate. The in-house navigation app requires you to be able to direct the user between small corridors and rooms, which is not easy to do with available technology. The app uses an internal configuration system (IPS), which can use different types of sensory information to detect objects or people within a large area. All of these sensors only work well in certain situations, which makes it difficult to create a standard IPS for internal navigation, such as GPS for external navigation. No well-designed and fully integrated indoor system can be used for navigation. However, people have experimented with many different technologies to build IPS, such as Wifi and Bluetooth, but also magnetic fields, dead calculations, visual-based configurations, and combinations of these. Some require additional hardware to operate, but others may work out of the box.

However, if you are interested, many good papers summarize and compare available home space techniques can be found. This paper will explore the latest technology available to most people through our mobile phones, namely SLAM or Simultanious Localization And Mapping. More specific: SLAM algorithm available on ARCore at Google.

II. Problem Statement

When we talk about internal navigation, we are talking about navigation technology that does not include GPS, due to its limitations on major problems and in the building. This technology is
used in a variety of applications ranging from finding your terminal easily at an unknown airport, to finding the required store in a mall with only 30 minutes left. Going to an unfamiliar grocery store, there will be a hot breeze with the product navigation app. Consider the following house roaming case: you have a job interview with the Company and you have already successfully gone to the venue. However, the Company is large and has only 5 minutes left to arrive at the interview on time. Following the “Blue Dot” version you disconnect your AR-enabled Smartphone and head towards the Raccoon office. There are endless possibilities

III. Applicable Technology

Introduction
This work consists of four main sections namely, and last. The whole face solution is divided into the following main modules:
1. ARCore-based local performance
2. QR code reset
3. Navigation (NavMesh)
4. detection.care detection

3.1: ARCore
ARCore is Google's platform to build a real-world experience that is unpopular with taxpayers. Using a variety of APIs, ARCore enables your phone to sense its location, understand the world and share information. Some APIs are available for Android across iOS to enable shared AR authentication.

ARCore uses three key skills to integrate visual content with the real world as seen with your phone's camera:
1. Traction tracking allows the phone to straighten and track its position relative to the ground
2. Understanding the environment allows the phone to detect the size and location of all types of areas: horizontal, vertical, and angular areas such as the floor, coffee table or walls
3. Equilibrium allows the phone to adjust current lighting conditions
1) Motion tracking:
1) Movement tracking:
a) ARCore uses a process called SLAM to understand where a phone is connected to the world around it. ARCore detects visual cues in a captured camera image called feature points and uses these points to calculate its change in location. Visual information is combined with seamless measurements from the device IMU to measure the position (location and position) of the camera relative to the ground over time.
By aligning the virtual reality camera that renders your 3D content with the camera capabilities of the device provided by ARCore, developers are able to render visual content with the right perspective. The provided visual image may be overshadowed by the image captured on the device's camera, making it appear that the visual content is part of the real world.
2) Understanding nature
ARCore is constantly improving its understanding of the real world by discovering features and aircraft. ARCore looks for collections of feature points that appear to be lying in a normal horizontal or vertical position, such as tables or walls, and makes these areas available in your application as aircraft. ARCore can also determine the boundaries of each aircraft and make that information available to your application. You can use this information to place objects that sit on a flat surface. Because ARCore uses feature points to locate aircraft, flat, uncluttered surfaces, such as white walls, may not be clearly visible.

Deep understanding
ARCore can create in-depth maps, images that contain data about distance between locations from a specific location, using a primary RGB camera from a supported device. You may use the information provided.

3) Easy measurement
ARCore can get information about the brightness of its location and provide you with medium resolution and color correction for a given camera image. This knowledge allows you to illuminate your material objects under the same conditions and environment, which increases the sense of reality.
It is common together to reduce light conditions. This machine reduces the decrease in accuracy due to changes in light. The SVM model is trained using a number of HOG vectors on multiple faces.

3.2: QR Code Repositioning
QR code configuration (reset).
After using the previous step, you will have a green dot that will follow you accurately on the map. The only thing required is to synchronize the first location that will be handled in this phase.

Using the ZXing Library, QR codes can be scanned using the phone camera. In order to use the ZXing library individually, zxing.unity.dll needs to be placed in the plugin folder. The dll can be downloaded from here.

QR codes are translated into a simple series, similar to the words used for game items representing the locations on the map. These empty game items are placed in the desired location and are used only for their conversion.
3.3: NavMesh Navigation
Unity NavMesh Navigation
Having an accurate location, we move on to another important aspect of internal navigation, namely finding a way. Finding the right way to the destination can be achieved in a number of ways. You can create the right routes in advance and take the route closer to where the person is standing (it will benefit the AR navigation view). Alternatively, make a map model of a map frame and create an A * algorithm. Or, if you are using Unity, you can use NavMesh components. With the help of NavMesh components, we can show you where the mobile is going and finding the way can be easily done using the built-in functions. This is often used by Unity in making the NPC move locally, but is also suitable for internal navigation.

NavMesh walkable area is indicated in blue.

3.4: AR View
Demonstration of unpopular reality method Finally, we come to the final stage of our in-house navigation app, which shows the route we will take using augmented reality.
Vision
The goal achieved at this stage is an arrow that appears in front of the user that indicates where the user needs to go as soon as the location is selected. There is a collision around the arrow and every time a green dot emerges from the collision, the front arrow is removed and a new one appears in front of the user with the correct angle. The old arrow needs to be removed otherwise you will still see it on the walls as an example.
Calculate the angle and the arrow of the place
In the UpdateNavigation script below you see two game elements and one transform that helps determine the angle you will point to. The arrowhead, which is an invisible cube that is always placed a few units before the arrow point in the blue dot, the second point of the line provider (the trail to follow), and finally the text conversion itself (set it in the blue dot). The second point of the line provider is required, as the first is equal to the area of the green dot. Using the three variables obtained we can get three 2D points that can be used to calculate the angle (0-360 ° using atan2) between them.
The arrow that points to your destination.

After that, the child’s prefab conversion camera of the ARCore device is used to place the arrow in front of the user using an anchor. The anchor ensures that the object will remain in this position while the user leaves. Finally, the arrow is rotated to match the calculated angle.

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