International Journal of Latest Engineering Science (IJLES) E-ISSN: 2581-6659

DOI: 10.51386/25816659/ijles-v7i6p101

Volume: 07 Issue: 06 November to December 2024 www.ijlesjournal.org

Augmented Reality Travel Guide

Jayakrishnan M, Rohith B, KiranBabu, Dr.Sanaj M S

Adi Shankara Institute of Engineering and Technology, Kalady, Kerala

ABSTRACT

The AR Travel Guide project is a groundbreaking venture in computer science, aiming to transform traditional travel experiences through augmented reality (AR) technology. The project focuses on developing a versatile mobile app for iOS and Android, seamlessly integrating AR into the travel landscape. Users explore diverse destinations using their smart phones or tablets, enjoying an enriched, interactive experience. The app serves as a dynamic companion, offering information by pointing devices at landmarks, attractions, or objects, with curated content managed through a robust database and content management system.

Intricately designed AR components, such as 3D models, are intelligently blended with the physical world using geolocation markers and image recognition technology. User interface design prioritizes intuitive navigation and accessibility, enhancing interaction. The app features comprehensive navigation tools, GPS integration, and real-time maps for user exploration. Rigorous testing, user feedback, and continuous refinement are integral to the project's lifecycle.

Deployment involves publishing the app on major platforms, with strategic marketing effort store a cha global audience. Beyond showcasing technology, the project highlights the transformative potential of computer science in real-world encounters. Ongoing maintenance ensures the AR Travel Guide remains a relevant and captivating resource for travelers seeking an interactive journey of discovery.

INTRODUCTION

The AR Travel Guide redefines travel companionship by seamlessly blending cutting- edge technology with immersive exploration. Acting as a virtual compass, it revolutionizes navigation and engagement with travel destinations. Leveraging AR, this guide transforms static maps into dynamic, real-time visualizations overlaying relevant information onto the physical environment. It amalgamates geolocation data, multimedia content, and intuitive interfaces, transcending traditional boundaries to create a personalized and informative digital landscape.

At its core, the AR travel guide is an indispensable tool for modern explorers, offering a dee per connection to surroundings. It enables confident navigation through unfamiliar terrains, providing historical facts, 3Dmodels,andvisualcontentasusersexplore. This fusion of physical reality and digital augmentation redefines sightseeing, allowing travelerstouncoverhiddenstoriesandimmerse themselves in destination culture.

The guide becomes a gateway to experiential journeys, empowering users to curate adventures based on personal preferences. It fosters an interactive community, facilitating user-generated content and building a vibrant and interconnected travel community. In essence, the AR travel guide encapsulates modernexplorationbyintertwiningtechnology with the timeless allure of discovery, fostering a deeper understanding of diverse landscapes and cultures worldwide.

LITERATURE SURVEY

TOWARDSPERVASIVEAUGMENTED REALITY:CONTEXT-AWARENESSIN AUGMENTED REALITY

The authors develop a comprehensive Augmented Reality (AR) classification system by merging existing high-level categories with bottom-up individual factor analysis. They incorporate context sources, targets, and controllers from prior work, addressing adaptation factors in AR systems. High-level concepts in human-computer interaction, including human, environmental, and system factors,areintegrated.Domainexpertsidentify contextfactorsrelevanttoARthroughopenand axial coding steps, considering surveyed papers.Theresultingtaxonomyaccommodates the flexibility of certain factors belonging to multiple parent categories, offering a nuanced understanding of AR adaptation based on a combination of established frameworks and new insights.

DOI: 10.51386/25816659/ijles-v7i6p101

Volume: 07 Issue: 06 November to December 2024 www.ijlesjournal.org

AUGMENTEDREALITYIN REALITY

The development of Visual SLAM, such as Parallel Tracking and Mapping (PTAM), brought real-time 3D capabilities to AR, breakingfreefromthe2Dconstraints.Efficient computer vision algorithms, including binary features, tracking algorithms, and pose estimation, further enhanced AR's real-timetrackingandrecognition.Deeplearning, exemplified byAlexNet, transformed semantic understanding in AR, allowing for improved recognition of objects, faces, and scenes. The passage concludes by highlighting trends in AR, including advances in 3D environment perception and semantic understanding, poised to expand AR's capabilities and user experiences.

AUGMENTEDREALITYINAPUBLIC SPACE: THE NATURAL HISTORY MUSEUM, LONDON

It involves the use of handheld devices in the AttenboroughStudiotocreateanAugmentedIt Reality(AR)system.Thesedevicesareusedto engagewithvirtualcontentrelatedtodinosaurs, early humans, and more. To achieve personalized AR, custom handheld devices were developed, equipped with features like cameras, 3D capabilities, touchscreens, and robustness to withstand handling by schoolchildren. The AR system was designed from scratch, separating input/output components and utilizing infrared LEDs as markers. The use of a single forward-facing camera and an algorithm allowed for marker location and camera pose determination. This approach addressed challenges related to motion blur and non-black backgrounds, enabling a seamless AR experience for the audience in the studio.

MAKING AUGMENTED REALITY PRACTICALONMOBILEPHONES, PART 1

The passage explores challenges in mobile device software architecture, particularly on phones, emphasizing constraints like limited memory and bandwidth. It stresses the necessityforleanersoftwareframeworksdueto theseconstraintsanddiscussesdesigndecisions to address them, including avoiding excessive use of templated C++ code.Tailoring software formobilephonesisdeemedcrucialforoptimal performance, and the passage advocates for specializedlibraries.Ittoucheson multithreading benefits, abstraction for device portability, challenges of using emulators, and proposes testing mobile AR applications as native PC apps before deployment. Additionally, it highlights parallel execution strategies to optimize tasks and enhance efficiency in the mobile context

MAKING AUGMENTED REALITY PRACTICALONMOBILEPHONES, PART 2

Optimizing augmented reality (AR) applications on mobile phones centers around minimizingfloating-pointoperationsduetothe absence of dedicated floating-point units in most mobile CPUs. It suggests replacing double-precision with single-precision types and implementing fixed-point solutions, particularly for trigonometric operations using lookuptablesandinterpolation.Benchmarking and profiling are recommended to identify and focus optimization efforts on the most time- critical sections of algorithms. This approach also considers the benefits of fixed-point algorithms in terms of cache coherence and memory bandwidth optimization, aiming to achieve better performance. Additionally, the methodologyadvisestreatingnetworkingasan optional feature, given the sporadic and low- bandwidth nature of mobile network connectivity, and explores the potential of outsourcing intensive tasks to servers when connectivity is available. It anticipates the evolution of mobile hardware to include more specialized units and suggests cross-platform standard APIs for improved access to these features in the future.

DEVELOPINGAGENERIC

AUGMENTED-REALITYINTERFACE

The "Tiles" interface for augmented reality (AR) is designed around a central concept— tiles, which function as physical handles for interacting with virtual objects. Unlike traditional icons, tiles decouple physical propertiesfromtherepresenteddata,servingas universal containers for any digital data. The interface employs two tile classes: operation tiles for defining functionality and tools, and data tiles as generic data containers. Users manipulate tiles for diverse operations and spatial arrangement of virtual objects in an augmented workspace.

Supporting collaborative interaction, Tiles seamlessly integratesphysicalandvirtualtools,promoting flexibility for various AR applications while emphasizing a balanced approach with other interactivemediainthe augmented workspace.

RELATED WORKS

DOI: 10.51386/25816659/ijles-v7i6p101

Volume: 07 Issue: 06 November to December 2024 www.ijlesjournal.org

In the rapidly evolving landscape of AugmentedReality(AR)travelguides,various applications and projects have emerged, showcasing the transformative potential of blending digital information with the physical world. Google Maps has pioneered AR navigation, providing users with real-time directionsoverlaidontheirsmartphonecamera view. This feature enhances the navigation experiencebyofferingvisualcuesintheactual environment.

Wikitude, as an AR platform, empowers developers to craft location-based AR experiences, making it suitable for creating immersive travel guides. TripScout merges traditional travel guides with AR, offering guided walking tours enriched with overlays providing information on landmarks, historical sites, and local recommendations.

Blippar, recognized for its AR platform, has been leveraged in travel-related campaigns. Users can scan landmarks or objects to unlock additional information, multimedia content, and interactive experiences. Airbnb has exploredAR to enhance the travel experience, introducing features that allow users to visualize potential rental spaces with augmented furnishings.

Apps like Field Trip by Niantic Labs and AR CityexemplifythefusionofARwithcitymaps, providinguserswithcomprehensive informationabouttheirsurroundings,including local guides, restaurant recommendations, and navigation assistance. Furthermore, cultural institutions and museums globally have adopted AR to offer immersive experiences, overlaying information, 3D models, and interactive elements on exhibits.

These examples illustrate the diverse applications of AR in travel, from enhancing navigation and providing local insights to transforming cultural exploration and offering interactiveexperiences.Thedynamicnatureof this field ensures that new projects and applications continually emerge, shaping the future of augmented reality in the travel industry.

PROPOSEDSYSTEM

The proposed system for an augmented reality (AR) travel guide envisions a mobile application designed for both iOS andAndroid platforms, serving as the central interface for users. Leveraging markerless AR technology ensures a seamless integration with the real- world environment, allowing users to access informationspontaneouslywithouttheneedfor physical markers. Real-time location services, incorporating precise GPS and sensor-based tracking, contribute to providing accurate and contextually relevant information about the user's surroundings. The system's backbone includes a comprehensive Points of Interest (POI)database,regularlyupdatedtoencompass landmarks, historical sites, restaurants, hotels, and other relevant locations. AR overlays enhance the user experience by providing visually appealing and informative content, enriching the exploration of the physical environment with digital insights. Together, these components form a dynamic and user- centricARtravelguide,fosteringanimmersive and personalized journey for users seeking to discover and engage with their surroundings.

OBJECTIVE

TheprimaryobjectiveofanAugmentedReality (AR) Travel Guide is to redefine the conventional travel experience by seamlessly merging advanced technology with the art of exploration.ByleveragingARcapabilities,this innovative guide aims to offer users an immersive, interactive, and personalized journey through their chosen destinations. It endeavorstoenhanceexplorationbyoverlaying real-time information, historical insights, and multimedia content onto the physical environment,transformingmundanemapsinto dynamic,informativelandscapes.Furthermore, this guide seeks to empower travelers with intuitive navigation tools, allowing them to navigate unfamiliar terrains with ease while fostering a deeper connection to the cultural, historical, and architectural aspects of the places they visit. By creating a bridge between the digital and physical realms, the AR travel guide ultimately strives to revolutionize travel, offering a more enriching, engaging, and inclusive experience for adventurers of all kinds.

METHODOLOGY

SYSTEMARCHITECTURE

1. **ResearchandPlanning**:
   - *Destination Selection*: Identify the target city, region, or area for theAR travel guide.
   - *Content Gathering*: Gather information, historical facts, images, videos, and multimedia content relevant

DOI: 10.51386/25816659/ijles-v7i6p101

Volume: 07 Issue: 06 November to December 2024 www.ijlesjournal.org

to the chosen destination.

- *Define Features and Functionality*: Determinetheessentialfunctionalitiesofthe AR guide, such as geolocation-based information, 3D models, interactive elements, and user interface design.

2. **ContentCreation**:
   - *ContentDevelopment*:Developorsource3D models, images, videos, and other multimedia content aligned with specific locations or landmarks in the destination.
   - *Data Integration*: Organize and structure content for easy integration into the AR application.
3. **ARApp Development**:
   - *Choose Development Tools*: Select AR development tools like Unity3D, ARKit, ARCore, or Vuforia based on the project requirements and platform compatibility.
   - *App Architecture*: Design the app's architecture considering functionalities like GPS-based location tracking, AR object placement, and user interface design.
   - *Coding and Implementation*: Develop the appfunctionalitiesandintegratecontentinto the application framework.
4. **TestingandDebugging**:
   - *QualityAssurance*:Conductrigoroustesting to ensure the app functions smoothly across different devices and environments.
   - *Bug Fixing*: Address any bugs, glitches, or performanceissuesidentifiedduringtesting.
   - *User Experience Testing*: Evaluate user interface/experience to ensure it's intuitive and user-friendly.
5. **Deploymentand Launch**:
   - *AppSubmission*:PreparetheARtravelguide for deployment on relevant app stores (e.g., Google Play Store, Apple App Store) following their submission guidelines.
   - *Marketing Strategy*: Develop a marketing plan to promote the app through social media, targeted advertising, or collaborationswithtravel-relatedplatforms.
   - *Launch and Monitoring*: Monitor the app's performance post-launch, gather user feedback,andplanupdatesorimprovements based on user responses.
6. **ContinuousImprovement:**
   - *User Feedback and Updates*: Encourage user feedback and reviews to improve the app's functionality and content.
   - *Feature Enhancements*: Consider adding new features, expanding content, or integratingadditionalfunctionalitiesbasedon technological advancements or user demands.
   - *Maintenance*: Regularly update the app to ensure compatibility with new devices, operating systems, and emerging AR technologies.

Throughout this methodology, it's essential to consider legal aspects, ensuring proper permissionsforcontentuse,aswellasfocusing on accessibility and inclusivity to cater to a diverse user base. Moreover, user engagement and community building should remain a priority to create a vibrant ecosystem around the AR travel guide.

FUNCTIONALREQUIREMENTS

FunctionalrequirementsforanAugmentedReality (AR) Travel Guide involve the specific features and capabilities that the application must possess to deliver a seamless and enriching user experience.Here'sabreakdownofessential functional requirements:

1. **Location-BasedServices:**
   - *Geolocation*:UtilizeGPStechnologyto accurately determine the user's location.
   - *LocationDetection*:Identifylandmarks, attractions,andpointsofinterestinthevicinity.
   - *Real-timeNavigation*:Providereal-time directionsandguidancetousersastheyexplore the destination.
2. **ARVisualizationandInteraction:**
   - *AugmentedRealityDisplay*:Overlayrelevant information, multimedia content, and 3D

DOI: 10.51386/25816659/ijles-v7i6p101

Volume: 07 Issue: 06 November to December 2024 www.ijlesjournal.org

modelsontothephysicalenvironmentthrough the device's camera.

- *Object Recognition*: Recognize and display informationaboutlandmarksorobjectsinthe camera view.
- *Interactive Elements*: Enable users tointeract withARelementsbytapping,swiping,orusing gesturesforfurtherinformationorengagement.

3. ContentManagementandInformation Display:

- *MultimediaContentIntegration*:Integrate text, images, videos, audio, and 3D models associatedwithspecificlocationsorattractions.
- *Contextual Information*: Display historical facts,culturalsignificance,orrelevantdetails about points of interest.
- *CustomizableContent*:Allowuserstoaccess and personalize the information they wish to vieworinteractwith.

4. UserInterfaceand Experience:

- *Intuitive Interface*: Design a user-friendly interfaceforeasynavigationandinteraction within the AR environment.
- *ClearInstructions*:Provideclearinstructions or guidance on how to use AR features and functionalities.
- *AccessibilityFeatures*:Ensuretheapplication is accessible to users with diverse needs and abilities.

5. CommunityEngagementand Sharing:

- *User-GeneratedContent*:Enableusersto contribute content, reviews, or recommendationsabouttheir experiences.
- *SocialSharing*:Facilitatesharingof discoveries, recommendations, or experiencesonsocialmediaplatforms.
- *CommunityInteraction*:Fostera community-drivenenvironmentwhere userscaninteract,share,andengagewith fellow travelers.

6. PerformanceandCompatibility:

- *DeviceCompatibility*:Ensurethe applicationfunctionsacrossvariousdevices and operating systems.
- *PerformanceOptimization*:Optimizethe app's performance to run smoothly and efficiently without lag or glitches.
- *Offline Access*: Provide offline access to certaincontentorfunctionalitiesforusers with limited internet connectivity.

7. PersonalizationandCustomization:

- *UserPreferences*:Allowusersto personalizetheirexperiencesbysetting preferences,interests,orfavoritelocations.
- *CustomToursorRoutes*:Enableusersto createcustomtoursorroutesbasedontheir interests and preferences.

8. DataSecurityand Privacy:

- *SecureDataHandling*:Implement measurestoprotectuserdata,especially location information and personal preferences.
- *PrivacySettings*:Provideoptionsforusers to manage their privacy settings and data sharing.

Thesefunctionalrequirementsarecrucialfor developingacomprehensiveanduser-centric AR travel guide that seamlessly integrates technologywithtravelexplorationwhile ensuring an engaging and informative experience for users.

DOI: 10.51386/25816659/ijles-v7i6p101

Volume: 07 Issue: 06 November to December 2024 www.ijlesjournal.org

NON-FUNCTIONALREQUIREMENTS

Non-functionalrequirementsinthecontext of an Augmented Reality (AR) Travel Guide encompass aspects beyond specific functionalities, focusing on the overall performance,usability,security,andscalability of the application. Here's a breakdown of essential non-functional requirements:

1. **Performance:**
   - *ResponseTime*:Ensurequickandresponsive interactions with AR elements and information display.
   - *Stability*:Maintainstabilityandreliabilityof the application, minimizing crashes or unexpected shutdowns.
   - *Scalability*:Ability to handle increased user load or content without compromising performance.
2. **UserExperience:**
   - *Usability*: Design an intuitive and user- friendly interface for easy navigation and interaction within the AR environment.
   - *Accessibility*: Ensure the application is accessible to users with diverse needs, complying with accessibility standards.
3. *Consistency*:Maintainconsistencyindesign elements and interactions across different sections of the app.Securityand Privacy:
   - *DataProtection*:Implementencryptionand secure storage methods to protect user data, especiallylocationinformationandpersonal preferences.
   - *User Authentication*: Ensure secure user authentication methods to prevent unauthorized access.
   - *Privacy Compliance*: Adhere to privacy regulations and best practices for handling user data and information.
4. **CompatibilityandPortability:**
   - *Device Compatibility*: Ensure compatibility across various devices (smartphones, tablets) and operating systems (iOS, Android).
   - *Portability*: Enable easy installation and usage of the application without complex setup requirements.
5. **Reliability:**
   - *Availability*: Ensure the application is available and accessible to users whenever needed.
   - *Fault Tolerance*:Ability to handle errors or unexpected situations without complete system failure.
6. **PerformanceOptimization:**
   - *Optimized Resource Usage*: Efficiently utilize device resources such as battery, CPU, and memory to minimize drain and ensure longer usage.
   - *Bandwidth Management*: Optimize data usage to minimize network bandwidth consumption.
7. **Maintainability:**
   - *Code Maintainability*: Develop clean, modular, and well-documented code for easier maintenance and updates.
   - *Content Updates*: Provide a system for seamless updates and additions to content and features.
8. **Complianceand Standards:**
   - *Adherence to Standards*: Comply with industrystandards,guidelines,andbest practices related to AR development, data handling, and user experience.
9. **PerformanceMetricsandMonitoring:**
   - *Monitoring and Analytics*: Implement tools for monitoring application performance, user interactions, and analytics to gather insights for improvements.
10. **DisasterRecoveryandBackup:**
    - *Backup Mechanisms*: Implement mechanismstoregularlybackupuserdatato prevent loss in case of unforeseen events or technical issues.

Non-functional requirements are crucial for ensuringtheoverallquality,reliability,anduser satisfaction with the AR travel guide application.Balancingtheserequirementswith functionalaspectsisessentialtocreatearobust and user-friendly AR experience for travelers.

HARDWAREREQUIREMENTS

DOI: 10.51386/25816659/ijles-v7i6p101

Volume: 07 Issue: 06 November to December 2024 www.ijlesjournal.org

The hardware requirements for an Augmented Reality (AR) Travel Guide typically vary based on the complexity of the ARapplication,itsfeatures,andtheplatformon whichitoperates.Here's ageneraloverviewof the hardware needed for developing and using an AR travel guide:

DEVELOPMENTPHASE**:**

1. **DevelopmentMachine:**
   - *Computer***:** A powerful computer system (desktop or laptop) with sufficient processing power, RAM, and storage capacity.
   - *Operating System***:** Compatibility with the chosen development environment (Windows, macOS, Linux).
2. **ARDevelopmentTools:**
   - *AR Development Kit***:** Compatible hardware for AR development, such as AR-enabled smartphones or tablets, or dedicated AR glasses if developing for such platforms.
3. **SensorsandDevices:**
   - *Depth Sensors or Cameras***:** Depending on the complexity of the AR app, high-quality depthsensorsorcamerasmightbenecessary for advanced AR functionalities.

DEPLOYMENTANDUSERREQUIRE- MENTS**:**

1. **SmartphonesorTablets:**
   - *AR-enabled Devices***:** For users, the AR travel guide application should ideally run on AR-capable smartphones or tablets.
   - *Operating System***:** Compatibility with popular mobile operating systems (iOS, Android) if targeting multiple platforms.
2. **AugmentedRealityGlasses(Optional):**
   - *AR Glasses***:** If developing an AR travel guide specifically for AR glasses (such as HoloLens,MagicLeap,orotherARheadset devices), hardware requirements would revolve around these specific devices.
3. **InternetConnectivity:**
   - *Internet Access***:** Stable internet connection for real-time data retrieval, updates, and accessing additional content (if required).
4. **CameraandSensors:**
   - *Quality Camera***:** A device with a good quality camera to capture the physical environment accurately.
   - *Sensors***:**Utilizationofonboardsensorslike GPS, gyroscope, accelerometer for precise location tracking and orientation detection.
5. **BatteryLifeandPerformance:**
   - *Battery Efficiency***:** Optimization for lower power consumption to ensure a longer duration of use without excessive drain.
   - *Device Performance***:** Smooth performance without lags or overheating issues, especially when rendering AR elements.
6. **StorageSpace:**
   - *Sufficient Storage***:** Ensure enough storage spaceonthedevicetoaccommodatetheapp, additional content, and offline data (if applicable).

The specific hardware requirements may vary based on the AR travel guide's features, complexity, targeted devices, and the AR developmentplatformchosenforcreatingthe application.It'scrucialtoconsiderthehardware limitationsandcapabilitiesoftheintendeduser deviceswhiledesigninganddevelopingtheAR travel guide application.

CONCLUSION

In conclusion, an Augmented Reality (AR) Travel Guide represents a groundbreaking fusion of cutting-edge technology and the timeless allure of exploration, revolutionizing the way individuals engage with and

DOI: 10.51386/25816659/ijles-v7i6p101

Volume: 07 Issue: 06 November to December 2024 www.ijlesjournal.org

navigate through travel destinations. By seamlessly blending the physical world with digital enhancements, this innovative tool redefines the conventional travel experience, offering users an immersive, informative, and personalized journey.

The AR travel guide's development involves a meticulous process encompassing extensive research,contentcreation,andtheutilizationof advancedARdevelopmenttools.Itsfunctional requirements focus on delivering an enriching experience,combininglocation-basedservices, AR visualization, interactive content, and community engagement. Additionally, non- functionalrequirementsensuretheapplication's performance, usability, security, and compliance with industry standards.

This transformative technology empowers travelers to delve deeper into their surroundings, offering contextual information, historical insights, and interactive elements overlaid onto the physical environment. It fostersadeeperconnectiontoculturalheritage, historical landmarks, and local traditions, enhancing the overall travel experience.

Moreover,theARtravelguide'ssuccesshinges on its ability to cater to diverse user needs, ensuringaccessibility,scalability,andseamless compatibility across various devices and platforms. By prioritizing user experience, privacy,andperformance,thistoolbecomesan indispensable companion, encouraging exploration and fostering a vibrant community of engaged travelers.

Ultimately, the AR travel guide not only transcends the limitations of traditional guidebooks but also embodies the evolving landscape of travel technology, offering a gatewaytoamoreimmersive,informative,and interconnected travel experience for adventurersseekingtouncovertherichtapestry of our diverse world.

REFERENCES

[1] Gavalas D, Kenteris M (2021) A web- based pervasive recommendation system for mobile tourist guides. Pers Ubiquit Comput 15(7):759-770. doi:10.1007/s00779-011-0389-x

[2] GhianiG,PaternòF,SantoroC,SpanoLD (2019)UbiCicero:Alocation-aware,multi device museum guide. Interacting with Computers 21(4):288-303. doi:http://dx.doi.org/10.1016/j.intcom.200 9.06.001

[3] Noguera JM, Barranco MJ, Segura RJ, Martínez L (2022) A mobile 3D-GIS hybrid recommender system for tourism. Information Sciences 215 (0):37-52. doi:http://dx.doi.org/10.1016/j.ins.2012.05.010

[4] Viana W, Miron A, Moisuc B, Gensel J, Villanova-Oliver M, Martin H (2020) Towards the semantic and context-aware management of mobile multimedia. Multimed Tools Appl 53 (2):391-429. doi:10.1007/s11042-010-0502-6

[5] Hsu H-H, Liao H-T (2019) A mobile RFID-based tour system with instant microblogging.Journal of Computer and System Sciences 77 (4):720-727. doi:http://dx.doi.org/10.1016/j.jcss.2010.0 2.011

[6] Kenteris M, Gavalas D, Economou D (2022) An innovative mobile electronic tourist guide application. Pers Ubiquit Comput 13 (2):103-118

[7] Kenteris M, Gavalas D, Economou D (2021) Mytilene E-guide: a multiplatform mobile application tourist guide exemplar. Multimed Tools Appl 54 (2):241-262. doi:10.1007/s11042-010-0519-x

[8] HopkenW,FuchsM,ZankerM,BeerT (2020) Context-Based Adaptation of Mobile Applications in Tourism. InformationTechnology&Tourism12 (2):175-195. doi:10.3727/109830510x12887971002783

[9] Peres R, Correia A, Moital M (2021) The indicators of intention to adopt mobile electronic tourist guides. Journal of Hospitality and Tourism Technology 12 (2):120-138