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# Implementation of an IoT-Based Ecosystem Aware Smart Guide Platform In Indoor Museum

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**Abstract -** *Internet of things (IoT) will permit the client to understand the savvy environment and give the propelled administrations to the client. These administrations are utilized as a part of the historical center to upgrade the client encounter by giving the exhibition hall substance in more quick witted way. The general structure of the proposed framework design Localization administration is appropriated between the wearable gadget and the handling focus. The first identifies the present client's position and imparts it to the preparing focus. Here, the restriction data is put away and made accessible to different administrations. The data is additionally utilized locally (on the wearable gadget) to accelerate the picture handling calculation. This calculation can rapidly dissect the video outlines caught by the wearable vision gadget and recognize the objective question with high precision and unwavering quality. The substances required by the clients are given on a few intelligent stages by the handling focus.*

***Keywords*** **- Bluetooth Low Energy (BLE), Internet of Things (IoT).**

## 1. INTRODUCTION

Nowadays museums have been used an entertainment like cinemas or theatre. But in reality these museums preserve our diverse cultural heritage. They help us in education and in learning. In the ancient period the description for the art galleries will be provided by an audio guide or by providing a paper booklet. Here the drawback is people may feel bored to read the entire content in the given description. And in the case of audio guide the way of content delivery will differ from person to person. There is a chance that the guide may leave some content during their delivery. The content that is delivered must be uniform and effective.

To achieve this effective delivery of contents it should be made as automated and it will also reduce the human effort. The proposed system relies on a wearable device that interacts with an IoT-based smart environment, to act as museum guides combines image recognition and localization capabilities to automatically provide the users with cultural contents related to the observed art works. This wearable device capture the artwork and identify the location information with the help of Bluetooth low energy (BLE) infrastructure installed in the museum and provide these information to the processing center. Moreover, the system interacts with the server delivers the content to the user's smart phone. Finally, several location-aware services, running in the system, control the environment status also according to users' movements.

To achieve this process the processing center, user's smart device and the wearable device needs to be connected. Wireless connection is preferred to make this process easier and cost effective. In this infrastructure Raspberry Pi kit is used, this takes the major role in controlling the data transfer between the processing center and the user device and vice versa. In addition to this when the user enters the museum an application will be installed in the user's smart phone this application will act as an interface incase of the content delivery from the processing center to the smart phone. This application has other features like History and feedback. In history the contents or arts that are viewed in the museum will be available and in feedback the user experience in the museum can be shared.

### 1.1 PROBLEM STATEMENT

1. Museum and art galleries provide visitors either with paper booklets.
2. It is hard for museum's curators to catch the attention of tourists.
3. In the smarter museums the camera will take the video and all the frames will be compared with the all the arts in the museum. Here it will increase the load of the server and it will increase the comparison time.

## 2. RELATED WORKS

[6].This paper executed in a constant advanced video observing framework with information control. . The constant installed video observing framework sends video in youngster string catches video and encodes it in fundamental string, and they associate through a roundabout support line so as to lessen impact between

information sending and encoding. [2].In this paper a novel Location-Aware Access Control convention in light of a coarsely characterized area range that is encased by covering territories of various get to focuses. It requires an area key for area claim is gotten from the covering access focuses' reference point data the way that a cell phone infers the area key empowers us to track the area of the cell phone. [1].In this paper, the heterogeneity of savvy gadgets and that can be effectively reached out to new future advances. Here the proposed framework gives a rearranged improvement device that permits even normal clients to grow new administrations for Smart Homes and versatile applications to straightforwardly cooperate with the home environment.[7].For an achievement of the aspirations towards an IoT this paper distinguish of most noteworthy significance to explore different mix styles for non-IP based gadgets as of now sent in home and building mechanization. Similarly, this paper contributes a diagram of different conceivable incorporation styles and gives a solid multi-convention combination design. [3].Components is proficiently distinguished through an organized sifting approach that recognizes stable focuses in scale space. In this paper picture keys are made that take into consideration nearby geometric disfigurements by speaking to obscured picture slopes in different introduction planes and at numerous scales. Last check of every match is accomplished by finding a low-leftover slightest squares answer for the obscure model parameters. [9].RANSAC is equipped for translating/smoothing information containing a huge rate of gross blunders this paper portrays the utilization of RANSAC to the Location Determination Problem (LDP). Its outcomes are inferred on the base number of points of interest expected to get an answer, and calculations are exhibited for registering these base historic point arrangements in shut shape.[5].This paper approximates or even beats already proposed plans as for repeatability, uniqueness, and vigor, yet can be processed and looked at much speedier. The paper presents exploratory outcomes on a standard assessment set, and in addition on symbolism got with regards to a genuine question acknowledgment application. [8].This paper uses the Web-of-Things (WoT) system, utilizing surely understood advances like HTTP and RESTful APIs to offer a basic and homogeneous application layer. While plotting the usage of a passage utilizing the standards of the WoT to uncover abilities of the KNX building system as Web administrations, permitting a quick incorporation in administration frameworks.[10].RFID based historical center guide (Electronic hand held gadget) is intended to supplant visitor advisers for a degree. It's a voice fueled gadget that stands up as the traveler is venturing out starting with one landmark then onto the next landmark (museum).This is accomplished by putting a RFID collector with the visitor (palm gadget). [4]. In this paper a structure is described to convey RFID-driven brilliant situations to give impromptu and customized substance, to guests in social settings. The work exhibits the building decisions, from both the perspective of the required equipment and the related association worldview. Finally, it displays a preparatory execution assessment to measure the delivered arrange movement.

## 3. SYSTEM ARCHITECTURE DIAGRAM

Admin will login using his user ID and Password. Admin will upload the infrastructure of the museum which means number of rooms in the museum is uploaded. Finally room number is assigned to the rooms by the Admin. Admin will use his or her login to classify the art works based on its type or its variety example period at which the art was made. Then the controller of the system will collect the multimedia contents like text file, videos and audios for each art work and assign the room for the art works .There is an additional advantage also, that is this content can be made available in many languages . Upload the art works and its corresponding multimedia contents to the server. Now when the user enters into the museum a wearable device composed of BLE and a camera will be given to the user. The camera that is provided will focuses the art and send it for image processing work. Location of the user and the art work is identified using BLE. Both the information is send to the processing center. This information will act as an input to the processing center. The given information is processed and the content is delivered to the user smart device like smart phone by using an app. In case any clarification the contents can be reviewed from history. Finally the feedback about the museum is given by the individual by using the app.

The above process has been explained as overall architectural diagram in the Fig3.1

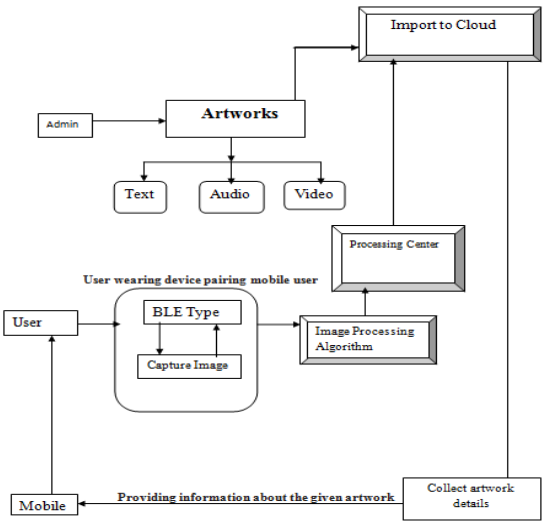


**Fig.1**: Overall Architecture Diagram

## 4. METHODOLOGY USED

- ✓ Assigning Room ID
- ✓ uploading contents
- ✓ Art work extraction
- ✓ Content retrieval and delivery

### 4.1 ASSIGNING ROOM ID

This is the very basic module in creating a smart museum. Here rooms are created with a specific Low power Bluetooth device fitted on each room. The rooms are assigned with BLE Id (Bluetooth Id) as their name. The Bluetooth device is helpful in sensing the user presence in the room with their signal strength and latter can be used for narrow down the processing. The museum administrator has the login credentials and they can update the art works for each rooms based on their type. The rooms are classified based on their type (ex. Historical room, Technical rooms). Each and every room can have any number of artworks included. Rooms will be added in similar fashion. Another advantage of assigning ID to the rooms is if there is more based on the ID of the BLE received the art that is viewed by the user is compared only with the arts that is present in that particular room of the ID received. Thereby the server load is reduced by reducing the comparison and the comparison time is also reduced.

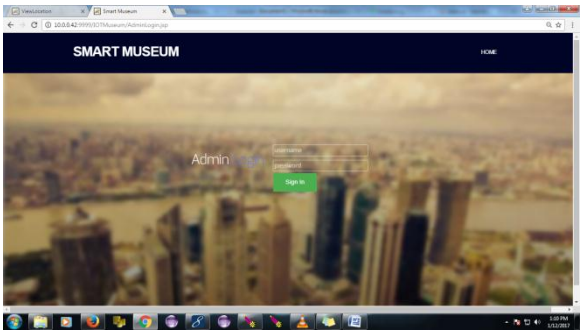


**Chart -1**: Assigning Room ID

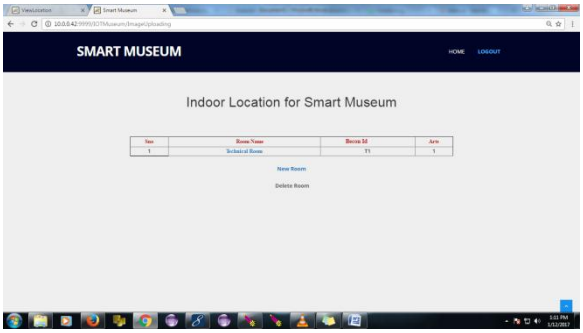


**Chart -2**:uploading contents

### 4.2UPLOADING CONTENTS

A Server is set for handling large volume of data's. The multimedia content for each artwork with particular room BLE id are added. For each artwork administrator can upload any number of videos, audios and textual information. These work will be done by the administrator or the controller by logging using their ID . The content can be in uploaded in any language it is based on the area of the museum that is the content can be uploaded in the local language also. The multimedia contents are directly uploaded to cloud here the cloud meant the server. Users are provided with a smart android application After processing to display the detailed information about the artwork this application is used. This android application acts as an interface between the user and the processing center to deliver the contents about the viewed art work.


**Chart -3**:uploading contents

### 4.3 ART WORK EXTRACTION

This process is distributed between the wearable device and the processing center. First we detect the room in which the user is currently present by the Signal strength of his mobile Bluetooth device. For that the user mobile device can be sensed by the low power Bluetooth device present in each room. All the users are provided with a wearable device attached with a camera. It can quickly analyze and take snaps by using the wearable vision device and identify the target object with high accuracy and reliability. Here, the localization information is stored and made available to other services. The information is also used locally (on the wearable device) to speed up the image-processing algorithm. We use background subtraction algorithm to eliminate the background contents and the artwork alone will be extracted from the frame. To do this Raspberry Pi kit is used. Here this is used to control the function of the camera. Background subtraction algorithm is also feed into

the Raspberry pi using the memory chip. By using this algorithm only the similar snaps will be identified and that similar image alone will be send to the processing center. After sending the image to the processing center the image seen by the user will be notified to the user's smart device. To get this the user smart phone the processing center and the wearable device needs to be wirelessly connected. The result of the processing activity will be seen on the next stage.


**Chart -4:**logging through mobile


**Chart -5:**delivery of art

### 4.4 CONTENT RETRIEVAL AND DELIVERY

It is the core of the business logic. The captured image from the wearable device along with the user id and BLE ID will be transferred to Cloud. Based on the BLE ID the search will be narrow down to a particular room to get result from artwork. By comparing all the artwork placed in that room the result will be fetched, that is the corresponding content of the art is fetched. Here image comparison techniques are used to compare between different arts. Finally documents like audio, video, and textual information related to that artwork will be transferred to the user mobile app. By just touching into the contents he information about the artwork can be fetched by the user. In addition to this all the arts viewed by the user will along with its contents will be available in the art history option. And once leaving the museum these information cannot be get by the user there by the privacy of the museum is also achieved. There is an another option called feedback option through which the feedback about the museum can be given by the user.

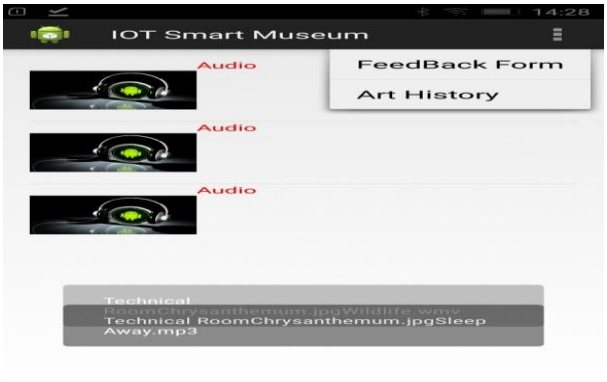


**Chart-6:**feedback form

## 5. FUTURE ENHANCEMENT

Here, the content provided to the user only in limited languages like universal language and in one local language. In future work it can be extended and the contents can be made available in many languages. The interaction between the user and the processing center through the smart phone can be enhanced. The whole architectural system can be implemented in cost effective manner. The same system can be extended and used in other fields like location identification of a person or a room (like providing route), identification of route to the rides in the theme parks etc.

## 6. CONCLUSION

In this manner in the proposed framework, an indoor area mindful engineering ready to upgrade the client involvement in a historical center. The framework depends on a wearable gadget that joins picture acknowledgment and restriction abilities to consequently furnish the clients with social substance identified with the watched fine arts. Along these lines successful substance can be conveyed to the clients of the historical center.

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