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*Ushering in the Age of Endemic*

# THE 11TH INTERNATIONAL INNOVATION, INVENTION & DESIGN COMPETITION INDES 2022

# EXTENDED ABSTRACTS BOOK

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# *The 11th International Innovation, Invention and Design Competition 2022*

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# URBAN TREE PROFILER FOR URBAN PARK AREA

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## ABSTRACT

Tree management in urban park areas is based on in-site observations to obtain the urban tree information and has thus become challenging because it is time consuming, laborious, and costly at the high density developed area. Urban tree information has been stored in conventional methods like in a thick report and is difficult to retrieve. Furthermore, this tree inventory system is currently in tabular form and can only be visualised for internal use. Therefore, the need to have an urban tree profiler is essential in order to expedite the process of updating the urban tree information for conservation and maintenance purposes in the future. The objective of this project is to visualise the urban tree inventory in a two-dimensional (2D) map and develop the tree editor to be used to update the tree information on the site. The output of this project features two dimensional (2D) interactive maps with detailed information of the urban trees. The methodology for this project involved project planning, collection of secondary data, database and interactive map development using geographical information system (GIS), and the smart interface for urban tree visualisations using Google Map. This project enables users to retrieve the details of urban trees and update the tree information from time to time and this tree profiler can be used while on site observation. This project will assist the local authorities and decision makers by providing an efficient solution to the maintenance problem of trees in urban park areas.

***Keyword:*** *Geographical Information System; interactive map; urban tree; smart interface and visualisation.*

## 1. INTRODUCTION

Private, communal, or publicly accessible natural vegetated areas within urban landscapes that are commonly used for recreation and other leisure activities are referred to as urban green spaces (Zupancic et al., 2015). These urban green spaces are increasingly viewed as important for residents to balance their city life by providing areas for restoration and addressing mental fatigue and stress, thereby helping to compensate for the negative psycho-psychological effects of living and working in densely built urban environments (Lee et al., 2015; Zhang et al., 2015; Nath et al., 2018). “Green space” refers to any vegetated surface found in the urban environment, including parks, residential and cemetery gardens, street trees, and urban forest trees. (Kabisch & Haase, 2013; Brown et al., 2018). Urban trees typically have their own space relatively in gardens and parks, a luxury that is becoming increasingly difficult to justify in the sub-division mentality of the modern planning environment (Fazamimah Mohd Arrifin et al., 2019). Urban trees provide a valuable service to urban populations by providing a variety of proven settings, as well as social and economic benefits. Furthermore, urban trees have

promoted many valuable functions from shadowing, food source and economic benefits in our lives. Although urban trees provide numerous benefits, primarily to the environment, community, and economy, they can also be hazardous to property and human lives (Kanniah et. Al., 2018). Therefore, it is important to have a systematic inventory system to manage information about urban trees in order to ensure that this valuable resource is well maintained. The use of geospatial technology gives several advantages to enhance the skills to efficiently manage urban tree data (Adam et al., 2017; Fargher, M., 2018; Kanniah et al., 2018). Currently the tree inventory system is in a tabular form and can be visualized using specific software for internal use only. With the development of technology, GIS technology brought about intelligent digital maps. Many of the greatest discoveries in human history have been made possible because of maps due to geographic correlations, variances, and patterns. With its high-quality cartographic output, GIS can help users with no cartographic skills to advance from traditional descriptive mapping to prescriptive mapping. Therefore, the need to have a smart 2D map for urban tree profilers is essential in order to expedite the process of updating the urban tree information for maintenance planning. The objective of this project is to visualize the urban tree inventory in a two-dimensional (2D) map and develop the tree editor for updating the tree information in the site. The output of this project features 2D interactive maps with the detailed information of the urban trees and users can easily update the latest data while performing site data collection and verification. This project will integrate the urban tree inventory database in ArcGIS software with google map interface for tree editing features. Users can visualize the 2D map and explore the tree information from time to time.

## 2. METHODOLOGY

The study area selected for this project was the small part or urban forest area in National Monument Park, Kuala Lumpur. This area was surrounded by various urban tree species. The tree was categorized as a street tree and urban forest tree. The selection of this study area because of the location in the city center and was one of the locations for tourism purposes. Tree maintenance for this area was needed to ensure all the trees were healthy, safe, robust and well maintained. ArcGIS software was used to develop the urban tree inventory database and the 2D map shows the tree distribution. Google map application would be used as the interface for users to easily visualize, explore and edit the urban tree information.

### 2.1 Stage 1: Project Planning and Data Collection

Project planning involved the discussion on how to execute the project. Several meeting discussions were conducted to get the idea to complete this task. Data collection for this project was the secondary data of urban tree inventory obtained from, Landscape Department, Planning Division, City Hall, Kuala Lumpur. The data provided in tabular form shows the detailed information of urban trees in the study area.

2.2 Stage 2: Development of Urban Tree Database with ArcGIS

Secondary data was used to create the urban tree inventory database using GIS software (ArcGIS). This data was inserted into the data attribute database. The attribute shows the detailed information of the urban tree such as Tree ID, name, type, coordinate, family name, tree height, diameter breast height (DBH), crown size, plant date, inventory date, age, and health status. Once this database was developed, a two-dimensional (2D) map was created, and each tree information is displayed in point form. The 2D map shows the location of trees, while the details of the trees can be extracted from the trees points on map.

2.3 Stage 3: Development of Urban Tree Profiler

The final stage was to create the google map interface for urban tree profilers. Google Maps can create a 2D map by integration of the urban tree inventory database from ArcGIS into Google Maps application. This 2D map can be used for further exploration and visualization of the urban tree information. Users also can update the tree information easily with this interface while conducting field measurement and verification of trees on site.

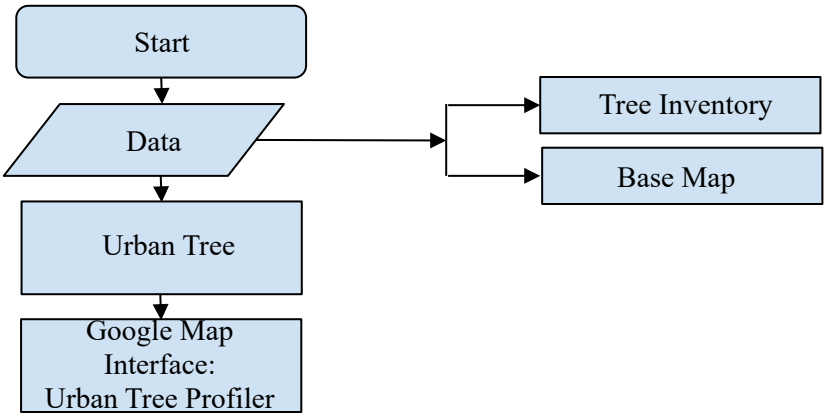


**Figure 1** Methodology Flow Chart

## 3. FINDINGS

The output of this project was a two-dimensional interactive map for urban trees using Google Maps interface. This map enables the user to visualize the tree location with its detailed information. Users also can easily update the tree information from site verification. Having accurate information of these resources will assist the decision maker to enhance the current maintenance system to manage the urban tree.

The advanced technology of geospatial enables this valuable information to be benefited for local authorities to efficiently manage their urban tree information. Therefore, this project fully utilized the application of GIS and Google Maps for dissemination of urban tree information through 2D interactive map. This interactive map not only displays the urban tree information,

but it also enables users to perform the editing process to update the latest information about the urban tree inventory. This system enables users to update and store new information. To execute the maintenance of urban trees, accurate information is needed to ensure the work runs smoothly. This system is suitable for government agencies such as the Landscape department to manage the urban tree inventory data digitally.

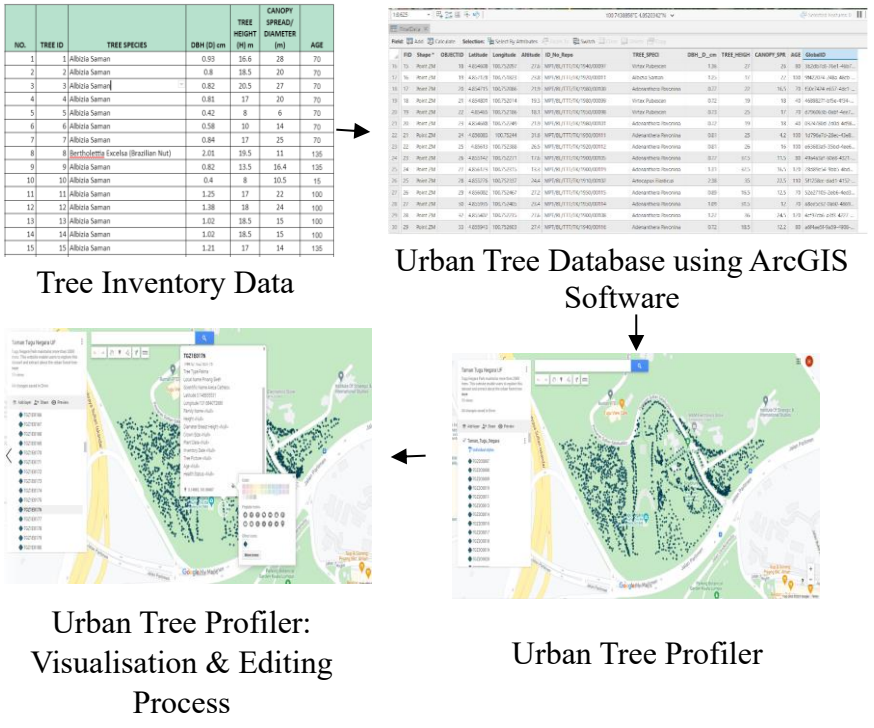


**Figure 2** Flow Diagram of Urban Tree Profiler

The flow diagram shows the diagram for developing the urban tree database from tabular data using ArcGIS software. The next step is to integrate the database with Google Maps interface to create a two-dimensional map that can be used for visualization and editing process for maintenance purpose.

## 4. CONCLUSION

The advanced technology of geospatial enables various types of valuable information to be accessed visually and easily using GIS. This project will enable better management of urban tree information. Moreover, this innovative project will help state leaders and decision-makers not only to organize massive amounts of data for urban trees, but it also makes it simple to access and update any information as needed.

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Sekian, terima kasih.

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Saya yang menjalankan amanah,

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