



Sustainable Campus Transit Solution



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02. Constrains

The project aims to improve public health, safety, welfare, global development, social opportunities, environmental sustainability, and economic feasibility.

- Safety
- Environment
- Sustainability
- Economic
- All buildings are covered

03. Design Prototype

The prototype consists of a short video showcasing the tram network and a mobile app, providing an immersive virtual tour of the campus tram system.

Our prototype:

- Using Unreal Engine, we did a realistic simulation of the tram trips.
- Demo mobile application to support the user experience.

04. Testing / Validation

Decision Variables

·xbs: Binary variable, where xbs=1 if building b is covered by station s, and 0 otherwise.

·ys: Binary variable, where ys=1 if station s is open, and 0 otherwise.

Parameters

- Dbs: Distance between building b and station s.
- R: Coverage radius, buildings further than this distance from a station cannot be covered.
- C: Cost per station to open.
- B: Total additional budget available for opening new stations.
- N: Number of stations already open.

Objective Function

Maximize the total number of buildings covered:

$$\text{Maximize } \sum_{b \in \text{Buildings}} \sum_{s \in \text{Stations}} X_{bs}$$

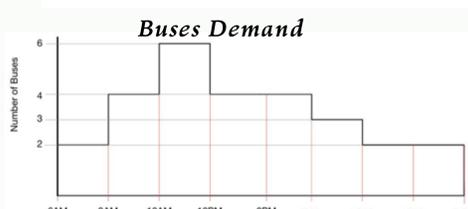
Constraints

Coverage Requirement: Each building must be covered by at least one station.

Coverage Feasibility: A building can be covered by a station only if the station is open and the building is within the coverage radius of the station.

Budget Constraint: The total number of stations that can be opened is limited by the available budget and the number of stations already open. **Result**

station	Building covered
1	1,2,63,75
2	-
3	4, 59, 6, 68,7
4	-
5	14,17,19, 59,6,7,8,9
6	11,22,23,24,76,78



Bus Schedule	
buses starting at 6:01 AM	5
bus starting at 8:01 AM	1
buses starting at 10:01 AM	0
buses starting at 12:01 PM	0
buses starting at 2:01 PM	3

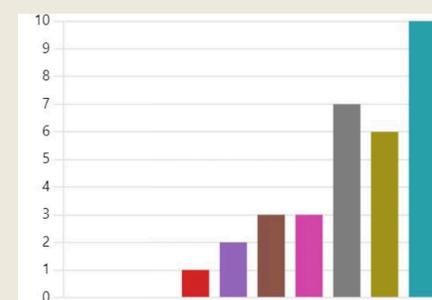
01. Introduction

The project is implementing an automated tram network and electric buses to improve student commuting experiences, utilizing less energy sources and minimizing fossil fuel usage. The mobile application supports this greener, safer, less labor-intensive transportation system.

Problem Statement

KFUPM faces disruptions due to inefficient transportation systems, causing environmental harm and increasing costs. Hybrid systems combining electric buses and trams can improve efficiency and reduce environmental impact.

On a scale of one to ten, how much do you need a new transportation system?



Project Impact

Economic Impact

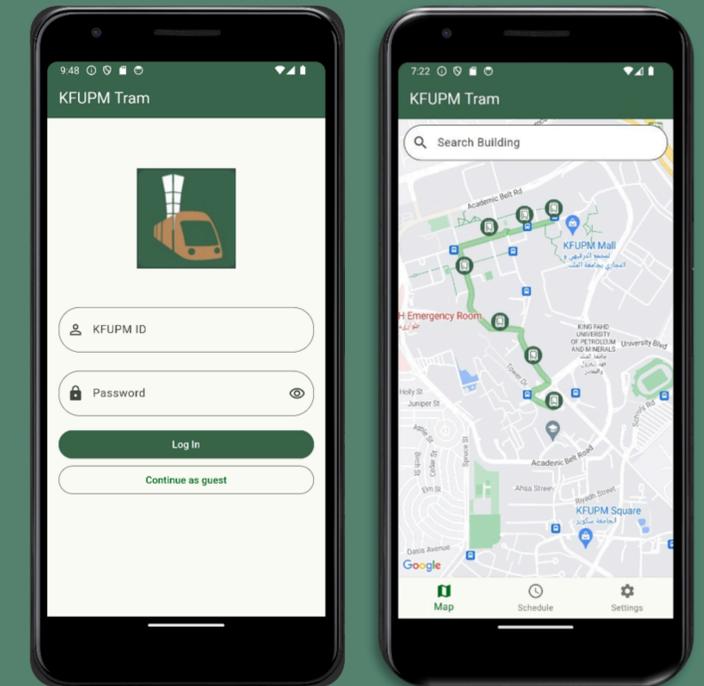
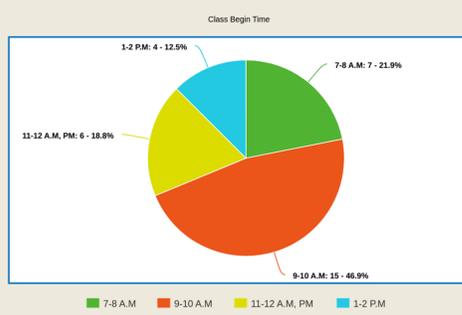
It is expected to create new jobs, boosting local employment and economic activity.

Social Impact

Providing a convenient and sustainable transportation option for students

Environmental Impact

The project leads to more sustainable production and consumption of natural ecological resources



05. Conclusion

The proposed transformation of King Fahd University's student transportation system aims to achieve Saudi Arabia's 2030 greener vision by introducing an automated tram network, and electric buses, supported by a mobile application.

Power Supply Design

APS Technology

