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**King Faisal University**

**Wireless traffic light control system using Arduino**

Project Report

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**Abstract:**

This project presents the development of an Arduino based system with traffic light, Bluetooth connectivity, motion sensor and a buzzer. The system works automatically, with the traffic light that stays red until a vehicle is detected by the sensor, then it will turn green for 7 seconds. Also, an alarm alerts when a vehicle is in front of the sensor. Manual control of the traffic light is also enabled via Bluetooth using a smartphone. This report outlines the project objectives, implementation steps and details then showing key results.

**Introduction:**

In the field of mobile and wireless networks, the Internet of Things (IoT) devices are gaining more importance last years. This project shows the importance of creating an intelligent traffic management system that can efficiently deal with different traffic conditions and solve the problems that we face during traffic. And the idea is combining a traffic light system with Bluetooth connectivity and a motion sensor. The project aims to provide two ways of control, that can be automatic or manual control of traffic lights, that will enhance road safety and traffic flow.

**Detailed System Description:**

The system contains four main components, the first important part is an Arduino microcontroller then we use a motion sensor, a traffic light, a buzzer, and a Bluetooth module. The motion sensor detects the vehicles then activating the traffic light sequence accordingly.

The idea of the project is that the traffic light be green if there is a vehicle in front of the sensor, and after the vehicle moves, the green light lights up for 7 seconds, then yellow lights up for 3 seconds. then it goes back to red.

Since the system works automatically, the system can be controlled manually via the phone through a Bluetooth connection between the phone and the system.

The challenges that we faced during the implementation are synchronizing the timing of traffic light sequences, ensuring accurate detection of vehicle presence by the sensor, and creating a Bluetooth connection for remote control. We deal with these challenges by doing some tests, debugging, and improving system functionality.

**Wireless and Mobile Concepts:**

Wireless communication such as Bluetooth connection are the main part of the system's mobile control. Bluetooth technology allows communication between the Arduino system and the user's Device and that allows the traffic lights to be controlled remotely. Mobile integration improves user accessibility and convenience, allowing real-time traffic management.

**Network Design:**

In this project we guarantee the use of Bluetooth technology for remote control capabilities within the framework of wireless network design. In order to use the Bluetooth connection for manual control, also quality of Service (QoS) concerns was implemented in this project successfully.

A circuit board with a remote control

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**Conclusion:**

In conclusion, the idea of developing an Arduino-based traffic management system will enhance road safety and traffic efficiency. By combining automated traffic lights and manual control, the system will provide adaptability to different traffic conditions and it can be controlled easily. The project can solve the traffic lights problems and it will improve the roads safety and it will reduce the traffic on the streets. Finally, the project demonstrates the effectiveness of the wireless and mobile technologies for intelligent systems.

**References:**

Arduino - <https://www.arduino.cc>/

Bluetooth SIG - <https://www.bluetooth.com>/

IEEE Xplore - <https://ieeexplore.ieee.org/>

**Project Marking Guide**

1. **Project Title:** **Wireless traffic light control system using Arduino.**

**Team Members:** *Abdullah Albarrak , Saad Almoosa*

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|  | **Assignment Component** | **Max. Marks** | **Marks Obtained** |
| **Report** | Format (Table of Contents, References, formatting, font, etc....) | 10 |  |
| English language (grammar and spelling) | 10 |  |
| Introduction | 15 |  |
| References | 10 |  |
| Contents  Design, and Discussions | 55 |  |
| **Report mark** | 100 \* 0.15 |  |
| **Presentation** | Questions and answers | 15 |  |
| Design & Usability | 25 |  |
| Testing (Various Input Conditions) | 15 |  |
| Presentation skills | 15 |  |
| Understanding / Explanation of the Design | 30 |  |
| **Presentation Mark** | 100 \* 0.05 |  |
|  | **Total Mark** | 20 |  |
|  | Plagiarism report more than 30% to 35%  Plagiarism report more than 36% to 40%  Plagiarism report more than 41% to 45%  Plagiarism report more than 45% | - 10  - 30  - 60  - 100 |  |
|  | USING AI | -100 |  |