MYANMAR INSTITUTE OF INFORMATION TECHNOLOGY

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ECE 3011 (Microprocessors & Interfacing Lab)

Final Project Proposal

Project Title:	**Car Parking System**
Presented by:	**Group II**
Instructor-in-Charge:	**Dr. Nu War**
Course:	**Microprocessors & Interfacing Lab**

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Project Title:	**Arduino Based Car Parking System**
Project Leader:	**Kyaw Bon Thar**
Instructor in Charge:	**Dr. Nu War**
Course:	**ECE 3011 (Microprocessors & Interfacing Lab)**

Group Members:

No.	Name	Roll No
1.	Min Htet Mon	2016-MIIT-CSE-017
2.	Saung Wut Yee	2018-MIIT-CSE-043
3.	Swan Yee Htet	2018-MIIT-CSE-048
4.	William Aye Tun Oo	2018-MIIT-CSE-055
5.	Kaung Khant Hein	2019-MIIT-CSE-009
6.	Khant Zaw Phyo	2019-MIIT-CSE-018
7.	Zwe Shein Lin	2019-MIIT-CSE-060
8.	Khaing Thinzar Tun	2019-MIIT-ECE-014
9.	Kyaw Bon Thar	2019-MIIT-ECE-016
10.	Min Ko Khant	2019-MIIT-ECE-028
11.	Zay Yar Paing Min	2019-MIIT-ECE-051
12.	Zwe Wai Yan Aung	2019-MIIT-ECE-055

INTRODUCTION

Parking in metropolitan areas is increasingly becoming a significant issue. Conventional parking systems are struggling to keep pace, leading to traffic congestion and wasted time for drivers. However, technology offers a solution to these challenges, and Arduino, a versatile technological platform, is perfectly suited for this task.

An arduino based car parking system changes the way we utilize parking spaces. It employs sensors and microcontrollers to enhance the parking experience for both drivers and parking lot operators. The days of aimlessly driving around in search of a spot are over - the system directs drivers directly to an available space. The system leverages sensors such as ultrasonic or infrared to determine whether a parking space is occupied or not. This real-time monitoring ensures that the system is always aware of the locations of available spaces. The Arduino microcontroller is the system’s brain. It takes the data from the sensors and uses smart algorithms to find the best parking space for each car. It considers things like how close the space is, if it’s free, and how convenient it is. This automated process makes parking easier for drivers and helps use all available spaces efficiently.

The Arduino-based car parking system also contributes positively to environmental conservation. By facilitating faster parking for drivers, it minimizes fuel consumption and cuts down greenhouse gas emissions. As urban areas continue to expand and parking issues become more of a problem, such systems will increasingly become crucial in shaping intelligent, eco-friendly cities.

In short, the Arduino-based car parking system is a big improvement in how we manage parking in cities. It uses technology to make parking easier and more efficient for drivers and parking lot managers. As cities face the challenges of growing bigger, innovative solutions like this will play a key role in making cities more efficient, livable, and sustainable.

TARGETS, METHODS, AND IMPLEMENTATION

Targets

The project aims to create a flexible and scalable parking system that can be used in different urban settings, from busy city centers to suburban areas. It uses advanced technologies like Arduino microcontrollers, sensors, and actuators, showing how these can be used in parking management and encouraging more innovation in this area.

Methods and Implementation

We are going to build a two-storied car parking which includes 6 parking slots(3 slots on ground floor and 3 slots on 1st floor) , 1 entrance and 1 exit. At the entrance and exit gates, we have deployed two ultrasonic sensors to detect whether a car is present or not. When a car is detected, the lever which is connected with the servo motor is activated and rotates to an angle of 90. That's when the car can get into our parking system. But there's also a condition when all slots are taken. To know that, we also placed a LCD display to inform the customers who are going to use our parking. As the customers are done with shopping or something they will just leave the parking, so we made a lane for exit and a gate with the servo connected lever and an ultrasonic sensor which detects and activates the lever to rotate an angle of 90 again. As we have two-storied parking, customers can park anywhere they want to until the slots are taken.For the main part of the system, we used Infrared sensors for each slot to detect if the slot is taken or not. We use two arduino boards as we will encounter insufficient pins as the LCD takes too many. So, we are using the “Master” “Slave” method to control the system. We use AC power supply and a 9V battery to power the system.

LEVERAGED RESOURCES AND PARTICIPANTS

➔ Hardware requirements:

- Arduino Uno x2
- Male header x2
- 20x4 LCD Display x1
- Wire Soldering Kit x1
- Resistors
- Multimeter x1
- Servo Motor x2
- PVC 5mm x 2
- Ultrasonic Sensor x 8

➔ Software requirements:

- Arduino IDE
- Tinkercad Simulator
- Proteus 8 Professional

➔ Participants duty:

● Min Htet Mon	- **System flow chart**
● Swan Yee Htet	- **Hardware implementation, Coding**
● Saung Wut Yee	- **Coding, Hardware Software Integration**
● Willam Aye Tun Oo	- **Powerpoint**
● Kaung Khant Hein	- **Project report**
● Khant Zaw Phyo	- **Project report, Powerpoint**
● Zwe Shein Lin	- **Hardware implementation**
● Khaing Thinzar Tun	- **Hardware implementation**
● Kyaw Bon Thar	- **Hardware Software Integration**
● Min Ko Khant	- **Project report**
● Zay Yar Paing Min	- **Hardware implementation**
● Zwe Wai Yan Aung	- **Hardware implementation**

* **Leader:** **Kyaw Bon Thar**
* **Presenter:** **Swan Yee Htet, Zay Yar Paing Min**

BROADER IMPACT

The Arduino-based car parking system project has the potential to change the way parking lots operate, leading to significant societal and economic impacts.

Societal Impact: The system can greatly enhance the user experience by reducing the time and stress associated with finding a parking space. This could lead to less traffic congestion in and around parking lots, contributing to smoother traffic flow and potentially reducing carbon emissions from idling vehicles. Furthermore, the system's potential integration with security features could enhance the safety and security of parking lots, providing peace of mind for vehicle owners.

Economic Impact: For parking lot operators, the system could lead to more efficient use of available parking spaces, potentially increasing revenue. The real-time data provided by the system could also be used to optimize pricing strategies based on demand patterns. Additionally, the cost savings from reduced manpower requirements and the potential increase in customer satisfaction could further enhance profitability.

Educational Impact: This project serves as a practical application of microcontroller technology and can be used as a teaching tool in engineering and computer science curriculums. It provides a hands-on opportunity for students to apply theoretical concepts in a real-world context, enhancing their learning experience.

Policy Impact: The successful implementation of this system could influence urban planning policies, encouraging the adoption of smart parking solutions in city infrastructure. It could also inform regulations related to parking lot operations, security, and data privacy.

In conclusion, the Arduino-based car parking system project has the potential to create broad impacts that extend beyond its immediate application, influencing society, economy, education, and policy in meaningful ways. It underscores the transformative potential of technology in addressing everyday challenges and enhancing the quality of life.

Budget Explanation

The estimated budget for our project, which utilizes an Arduino Uno and various other components, is approximately 150,000 kyats. The bulk of the cost, around 60,000 kyats, is allocated for the Ultrasonic sensor and other components required to set up the testing environment. Additionally, we will need to purchase PVC foam Slabs and a jumper wire kit, which includes both male-to-male and female-to-female jumpers, essential for our project setup. While the 9V battery and other components represent minor expenses. We plan to self-fund all these expenses to bring our project to fruition.

Detailed Expenses:

No.	Description	Price	Quantity	Amount
1.	InfraRed Sensor (not utilized)	6200	10	62,000
2.	Servo Motor	8500	2	17,000
3.	Ultrasonic Sensor	6000	8	48,000
4.	Jumper Wires	9000	1	9000
5.	PVC 5mm 4’ x 2’	8504	2	17,008
6.	20x4 LCD	20,000	1	20,000
7.	Male Header	500	1	500
8.	Extra Components	-	-	10,000
			Total:	183,508

References

1. *"Arduino Documentation." Arduino. Available at: https://docs.arduino.cc/*
2. *"Servo Motor Documentation." Arduino. Available at: https://www.arduino.cc/reference/en/libraries/servo/*
3. *"Liquid Crystal Displays (LCD) with Arduino." Arduino. Available at: https://docs.arduino.cc/learn/electronics/lcd-displays/*
4. *"Ultrasonic Sensor HC-SR04 and Arduino – Complete Guide." Dejan. Available at: https://howtomechatronics.com/tutorials/arduino/ultrasonic-sensor-hc-sr04/*

Facilities, Equipment and other Resources

The project will be developed using readily available and other store-bought resources. The primary equipment includes an Arduino microcontroller and six ultrasonic sensors. These sensors, which are more accurate and reliable than infrared sensors, will be used for parking lot detection. The software resources include the Arduino Integrated Development Environment (IDE) for programming the microcontroller and processing the sensor data. Various open-source libraries will also be utilized to facilitate the development process.The project will be carried out by a team of dedicated individuals with separate tasks and will leverage their collective expertise to ensure the completion of the project.

To conclude, despite the limited resources, we are confident that we can successfully implement as planned. This project is a testament to the fact that with creativity and resourcefulness, it is possible to develop effective solutions even with limited resources.