

# Princess Sumaya University for Technology

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University الأميرة سميرة  
for Technology للتكنولوجيا

## BULLDOZER

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## ***Abstract***

*This project presents the design and implementation of an autonomous two-wheel bulldozer-like robot, programmed using mikroC for PIC microcontrollers. The robot is equipped with two DC motors for locomotion, three infrared (IR) sensors for obstacle detection, and a servo motor to simulate the pulling action of a bulldozer blade. The IR sensors are positioned at the left, middle, and right sections of the robot. The left and right sensors enable the robot to steer away from obstacles by turning in the corresponding direction, while the middle sensor detects obstacles directly ahead, prompting the robot to stop. This configuration allows the robot to navigate complex environments autonomously.*

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# 1 INTRODUCTION

## 1.1 OBJECTIVES

The main objectives of this experiment are:

- To create an autonomous robot that can navigate through an environment using IR sensors.
- To develop a control system in mikroC that integrates sensor inputs to direct motor actions.
- To simulate the functionality of a bulldozer by using a servo motor for lifting and pulling objects.
- To evaluate the robot's performance in terms of obstacle avoidance and material handling efficiency.

## 1.2 THEORY

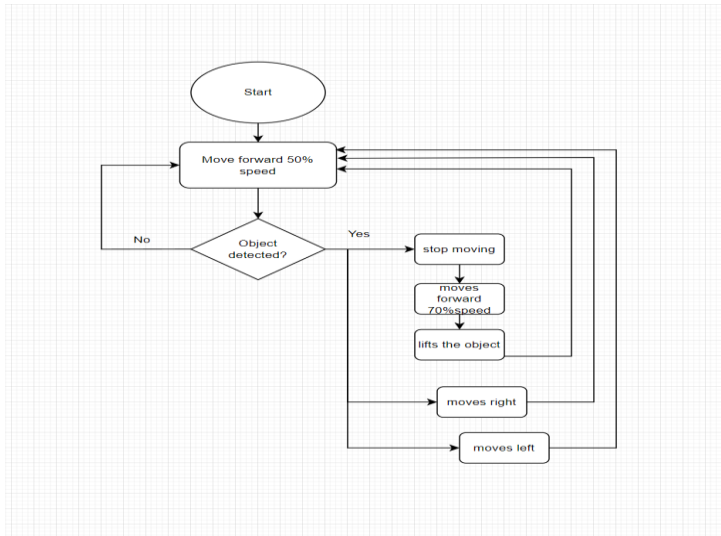
The theory behind the development of the autonomous two-wheel bulldozer-like robot involves several key principles in robotics, sensor integration, motor control, and embedded systems programming. Each of these components plays a crucial role in ensuring the robot's ability to navigate autonomously and perform tasks effectively.

# 2 DESIGN OF THE PROJECT

The Design process is made up of two parts the software design and the hardware design to implement the idea we had.

## SOFTWARE

The project start with a speed of 50% waiting for the sensors to locate object so if our sensors located and object it will do 3 things which is move left, right and the last thing is going in the interrupt which will turn the motors off and then go to 70% speed and pull up the object



## HARDWARE DESIGN

- DC Motors
- Servo Motor
- IR Sensors
- Breadboard
- Wires
- Pic 16F877A
- Lithium battery
- Switch

## 4 CONCLUSIONS

After testing the bulldozer, it performs what is required of it automatically, the wheels move at 50% of its speed at the start by software PWM, and as soon as the IR sensor detects an object, the bulldozer moves 20% faster to make the object enter the blade before lifting occurs. The only human interaction required is lowering the servo motor to collect the object, The use of interrupts instead of regular if-statements when detecting an object removes any sort of delay by the program counter and makes the process faster and more effective.

In terms of the mechanical aspect, two wheels (in addition to the built-in support wheel) were enough to keep the bulldozer balanced and moving in a straight path, as opposed to four wheels which would have added unnecessary cost