



## Cover page

Project title: .....Ball - E..... Academic Year: ...2024/2025 first semester

Group Members: .....Osama Dweikat..... Department Name: ...Computer Engineering

...Sohaib Arafat.....

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Project Type      Software      or      Hardware      (Choose one)

Supervisor Name: .....Dr.Samer Arandi.....

### Format:

- Single space, Times New Roman.
- 12 pt,
- Maximum 1 page.

### Abstract Body:

#### Items must be provided in the Abstract:

- Why do you think this project is important? Please explain the significance of this Project in brief.
- In your point of view what are the important aspects that should be covered in the project?
- Objective(s): In your view, please explain the main objectives of the project.
- Methodology: Give a brief outline of the application development process.
- Had this project been done before? Are there any similar applications available today?
- **Note:** Please deliver this abstract early to ensure that your Project has been approved by the department's projects committee. **Registration will not be done without this approval.**



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## Project's Abstract:

The project involves a robotic system for ball collection and sorting according to specified characteristics, such as color, size, or type. For example, tennis balls, ping pong balls, and beach balls. This robotic mobile arm will be able to move around the playing area, picking up the balls and sorting them without human interference.

The thing that differentiates our project from the others is the approach. We are trying to develop a custom ODM, for the detection and classification of the balls, which was trained on almost 10,000 images, supported with an OpenMV H7 or Luxonis OAK-D camera for the best outcome of the job. The arm will be equipped with various sensors-still to be defined-ensuring retrieval and sorting in an easy way, even for those balls whose size or type is different. It will be able to move in all directions with great efficiency due to the use of a stepper and servo motor.

The biggest challenge in this project will be the design of a gripping mechanism that will be able grasp different kinds of balls without damaging them or the robot rollover. The gripping arm should be adjusted to variations in ball size and material to ensure a secure but light grip.

The system will also contain sensors for obstacle detection, such as ultrasonic or infrared sensors, with no interference from movement with the camera. A control panel gives the user commands for the robot. It will have a Raspberry Pi main microcontroller for the ODM and camera, while another secondary microcontroller is used to control the motors and manage sensors for the robotic arm. This ensures a fully automated process in the sorting and retrieval of the balls.

