



Project title: Indoor Localization

Academic Year: 2023

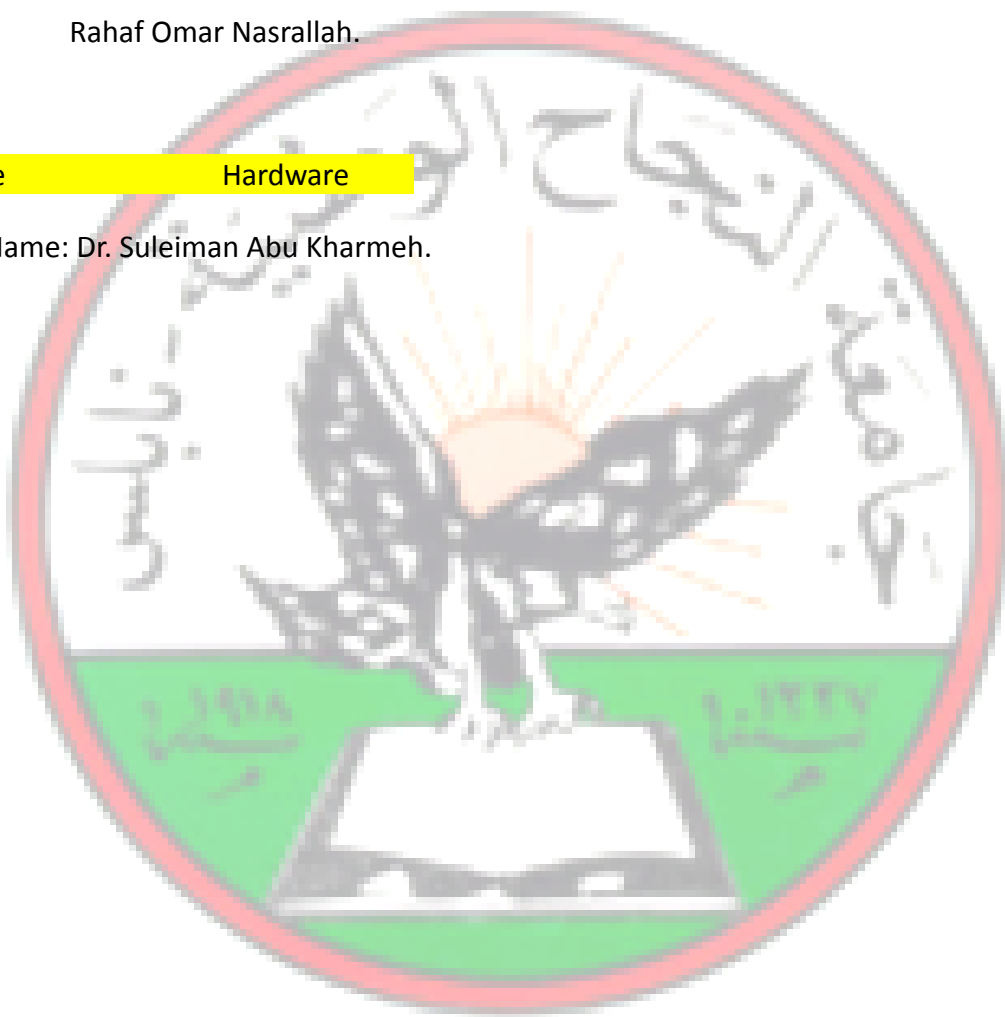
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Project Type **Hardware**

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## Project's Abstract:

Indoor localization also known as indoor positioning is crucial because it has many applications in environments like supermarkets, hospitals, libraries, train stations, and airports especially for blind people or people suffering from mental diseases like Alzheimer.

For the outdoor scenario GPS is applied but it's inefficient indoors due to building external walls, because it requires line-of-sight (LOS) between the handset and the satellites.

There are multiple topologies for indoor localization including angle of arrival (AOA), time of arrival (TOA) and received signal strength (RSS) which is based on technologies such as WiFi, radio frequency identification device (RFID), ultra wideband (UWB), Bluetooth and Zigbee.

For our project we will make a **navigation robot** based on Wi-Fi received signal strength indication (RSSI) which is applied at a supermarket that helps customers to find the location of needed sections. The robot also assists in monitoring supermarket conditions like smoke or detecting spilled water by scanning the floor, and provides streaming of the robot route to afford a real time tracking of the robot.

The robot has autonomous mode which allows it to move from a specific location to another. Inputs can be given through either the mobile application or a keypad and LCD.

The keypad is used to afford choices for controlling the robot so the user can choose to make a scan for spilled liquid, smoke, or by the customer to send a notification if the product he came for wasn't available in the spot the robot navigated to. The mobile app also can handle these inputs in addition to streaming the route.

We will be using multiple WIFI transceivers to equip the robot with increased accuracy, after reading the recent paper (Abu Kharmeh et al., 2023) we wanted our robot to include a 2D matrix of transceivers (4 corners), it will be high power so we will be employing high power DC motors, H-bridge and batteries, and for better navigation we will utilize the help of ultrasonic sensors.

Also we will be using esp32 cam, LCD, keypad ,liquid sensor, smoke detector.