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**Article title**

*Mechanized Robot Detecting and Recognizing Fruit.*

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**Abstract**

*Today, studies are carried out in the field of robotics, such as the discovery of old or unknown places, their targeting, and object recognition. The designed robots can be dressed as cars, drones, people or arms for use. This common goal reduces humans work and provides robots can do everything what humans can do. These processes include hardware and software jobs. Artificial intelligence offers us the ability to teach and apply what it has learned to machines with the help of software. The aim of this study is to design a prototype mobile robot that can detect and recognize fruits that are far from the current location and within the reach of the robot, and can collect the fruits and transport them from one place to another. The results obtained by the study, when sufficient light and angle were provided, an average of 95% success rate in the correct recognition of objects and an average of 90% in detection achieved by the prototype robot. It has been realized that the motor power and the arm handle area are very important in the processes of the robot's hardware grasping and carrying the fruits.*

**Keywords**

*arduino, mobile robot, artificial intelligence, rasbperry pi, image processing.*

**Specifications table**

*Please replace the italicized instructions in the right column of the table with the relevant information about your hardware.*

|  |  |
| --- | --- |
| Hardware name | *The name of the hardware that you have invented/customized* |
| Subject area | * Engineering and materials science |
| Hardware type | * Electrical engineering and computer science |
| Closest commercial analog | *No commercial analog is available.* |
| Open source license | *GNU General Public License (GPL).* |
| Cost of hardware | *64,95$.* |
| Source file repository | *https://data.mendeley.com/datasets/88xwnn92tp/1* |

1. **Hardware in context**

*A robotic vehicle that can detect and transport objects through a system installed on a wheeled platform.*

1. **Hardware description**

*In most studies, an arm mechanism that can move on a fixed mechanism or limited to a certain area is used. In addition, the costs of materials such as motors and arm equipment used depending on the targets are also in question in terms of wages. The work done is at a cost that everyone can access, and since there is no area limit, it can be used in areas that are suitable for the design and engine power.*

*Working with a few steps can become more effective and useful. These;*

* *By increasing the engine power, heavier objects can be transported.*
* *Improvements can be made in terms of grip by developing the arm mechanism.*
* *The power supply can be increased for longer life use.*
* *By developing the body, a more stable and more resistant structure can be established.*
* *A better camera can be used to improve day and night vision.*

***Design files***

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1. **Design files summary**

*Complete a separate row for each design file associated with your hardware (including the primary design files). Any empty rows should be deleted.*

|  |  |  |  |
| --- | --- | --- | --- |
| **Design file name** | **File type** | **Open source license** | **Location of the file** |
| *For example: Design file 1* | *e.g., CAD files, figures, videos* | *All designs must be submitted under an open hardware license. Enter the corresponding open source license for the file.* | *Either enter the URL for the repository or the sentence: "Available with the article".* |

*For each design file listed in the summary table above, include a short description of the file below (just one or two sentences per design file).*

***Bill of materials***

*If your bill of materials is long or complex, you can upload the details in an editable spreadsheet, e.g., ODS file type, Excel spreadsheet or PDF file, to an open access online location, such as the* [*Open Science Framework*](https://osf.io/)*repository. Include the link here. Alternatively, the bill of materials can be submitted alongside your manuscript as supplementary material.*

1. **Bill of materials summary**

*Complete a separate row for each component of your hardware – all components associated with a cost should be listed and any empty rows should be deleted.*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Designator** | **Component** | **Number** | **Cost per unit -currency** | **Total cost -**  **currency** | **Source of materials** | **Material type** |
| 1, 2, 3, 4 | Parts of robotic arm, wheels, motors and robot body | 1 | 12,34$ | 12,34$ | https://www.robotistan.com/arduino-4wd-robot-kollu-pro-platforma | -Other |
| 5 | Servo motors | 4 | 1,83$ | 7,31$ | https://www.robotistan.com/mg90s-servo-motor | -Other |
| 6 | Arduino uno board | 1 | 4,35$ | 4,35$ | https://www.robotistan.com/arduino-uno-r3-klon-usb-kablo-hediyeli-usb-chip-ch340 | -Other |
| 7 | L298N dual motor driver board with voltage regulator | 1 | 1,12$ | 1,12$ | https://www.robotistan.com/l298n-voltaj-regulatorlu-cift-motor-surucu-karti | -Other |
| 8 | Servo driver shield | 1 | 3,32$ | 3,32$ | https://www.robotistan.com/pca9685-16-kanal-i2c-pwmservo-surucu-shield | -Other |
| 9 | Jumper Cables F-F, M-F and M-M | 3 | 0,56$ | 1,68$ | https://www.robotistan.com/40-pin-ayrilabilen-disi-disi-f-f-jumper-kablo-200-mm | -Other |
| 10 | Raspberry Pi 3 Model B+ Combo Kit | 1 | 58,59$ | 58,59$ | https://www.robotistan.com/raspberry-pi-3-kombo-kit | -Other |
| 11 | 7.4 V 2S Lipo Battery 2800 mAh 35C | 1 | 18,01$ | 18,01$ | https://www.robotistan.com/74v-lipo-batarya-2800mah-35c | -Other |
| 12 | Ultrasonic Sensor Mounting Apparatus Type C | 1 | 0,32$ | 0,32$ | https://www.robotistan.com/ultrasonic-sensor-montaj-aparati-tip-c | -Other |
| 13 | HC-SR04 Ultrasonic Distance Sensor | 1 | 0,6$ | 0,6$ | https://www.robotistan.com/hc-sr04-ultrasonik-mesafe-sensoru | -Other |
| 14 | HC06 Bluetooth-Serial Module Board | 1 | 2,28$ | 2,28$ | https://www.robotistan.com/kablolu-hc06-bluetooth-serial-modul-karti-hc06-bluetooth-to-serial-port-m | -Other |
| 15 | A3 Compact Lipo (2-3S) Charger - Balancer | 1 | 7,48$ | 7,48$ | https://www.robotistan.com/a3-compact-lipo-2-3s-sarj-aleti | -Other |

**Ethics statements**

*HardwareX has ethical guidelines that all authors must comply with. In addition, we ask you to complete the relevant statement(s) below. Please delete those which are not relevant for your work.*

**CRediT author statement**

*CRediT is in initiative that enables authors to share an accurate and detailed description of their diverse contributions to a published work.*

**Acknowledgments**

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**References:**

*If relevant, you should**include a reference to the original publication of the hardware you customized and a reference to the repository in which your design files are published. Other references can be included, as required; for example, references that put your device in context in the literature. For more information on the reference format in HardwareX please see the* [*Guide for Authors*](https://www.elsevier.com/journals/hardwarex/2468-0672/guide-for-authors)*.*