

ABSTRAK

PERANCANGAN PROTOTIPE SISTEM OTOMASI SORTING BUAH TERINTEGRASI ARTIFICIAL INTELLIGENCE BERBASIS ALGORITMA YOLO MENGGUNAKAN PROGRAMMABLE LOGIC CONTROLLER

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DEA RAMADHANIA

062230330725

JURUSAN TEKNIK ELEKTRO

PROGRAM STUDI TEKNIK TELEKOMUNIKASI

POLITEKNIK NEGERI SRIWIJAYA

Di era modern ini, perkembangan sistem otomasi terus mengalami kemajuan pesat di berbagai bidang, termasuk dalam proses penyortiran hasil pertanian. Laporan akhir ini membahas tentang perancangan prototipe sistem otomasi penyortiran buah yang terintegrasi Artificial Intelligence (AI) berbasis YOLO menggunakan Programmable Logic Controller (PLC). Sistem ini terdiri atas beberapa komponen antara lain, yaitu kamera, Raspberry Pi, dua motor arus searah (DC), dua sensor kedekatan induktif, dan PLC OMRON CP1L sebagai pengendali utama. Buah dimasukkan ke dalam sistem secara bersamaan, kemudian dikenali satu per satu oleh kamera untuk mengidentifikasi warna menggunakan algoritma AI. Hasil klasifikasi dikirim ke PLC untuk mengatur pergerakan motor agar buah masuk ke wadah sortir yang sesuai. Proses penyortiran dilakukan secara vertikal dengan sudut 90 derajat menggunakan gaya gravitasi tanpa konveyor. Hasil pengujian menunjukkan bahwa buah apel membutuhkan waktu lebih lama untuk disortir dibandingkan pir dan jeruk karena posisi wadahnya paling jauh. Sensor proximity memberikan respons optimal pada jarak 4 mm, dan motor DC berputar stabil, meskipun kinerja sedikit dipengaruhi oleh berat buah. Sistem ini terbukti mampu menyortir buah apel, pir, dan jeruk secara cepat, tepat, dan efisien sesuai tujuan perancangan.

Kata Kunci : Kecerdasan Buatan, Pengontrol Logika Terprogram, Sensor Proximity, Motor DC, Sistem Otomasi, Penyortiran Buah

ABSTRACT

DESIGN OF A PROTOTYPE INTEGRATED FRUIT SORTING AUTOMATION SYSTEM USING ARTIFICIAL INTELLIGENCE BASED ON THE YOLO ALGORITHM USING A PROGRAMMABLE LOGIC CONTROLLER

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DEA RAMADHANIA

062230330725

DEPARTMENT OF ELECTRICAL ENGINEERING

TELECOMMUNICATION ENGINEERING STUDY PROGRAM D-III

SRIWIJAYA STATE POLYTECHNIC

In this modern era, the development of automation systems continues to progress rapidly in various fields, including in the process of sorting agricultural products. This final report discusses the design of a prototype fruit sorting automation system integrated with Artificial Intelligence (AI) based on YOLO using a Programmable Logic Controller (PLC). This system consists of several components including a camera, Raspberry Pi, two direct current (DC) motors, two inductive proximity sensors, and an OMRON CP1L PLC as the main controller. The fruits are put into the system simultaneously, then recognized one by one by the camera to identify the color using an AI algorithm. The classification results are sent to the PLC to regulate the movement of the motor so that the fruits enter the appropriate sorting container. The sorting process is carried out vertically at an angle of 90 degrees using gravity without a conveyor. The test results show that apples take longer to sort than pears and oranges due to the farthest position of the container. The proximity sensor gave an optimal response at a distance of 4 mm, and the DC motor rotated stably, although performance was slightly affected by the weight of the fruit. The system proved capable of sorting apples, pears, and oranges quickly, precisely, and efficiently according to the design objectives.

Keywords: *Artificial Intelligence, Programmable Logic Controller, Proximity Sensor, DC Motor, Automation System, Fruit Sorting*