

ABSTRAK

Wahyudin. 2026. Skripsi. Pengembangan Trainer Arduino Uno Berbasis Multi Sensor Dan Aktuator Sebagai Media Pembelajaran Praktik Mikrokontroler Untuk Siswa Smk. Pembimbing (I) Ihtiari Prastyaningrum, M.Si. Pembimbing (II) Pramudya Ardi, S.Pd., M.Pd.

Penelitian ini dilatarbelakangi oleh keterbatasan media pembelajaran praktik mikrokontroler di SMK yang umumnya hanya menggunakan satu jenis sensor sehingga belum mampu memberikan pengalaman belajar yang terintegrasi. Penelitian ini bertujuan mengembangkan Trainer Arduino Uno berbasis multi sensor dan aktuator sebagai media pembelajaran praktik mikrokontroler, mengetahui tingkat kelayakan trainer, serta mengetahui respons siswa terhadap penggunaannya.

Metode penelitian yang digunakan adalah Research and Development (R&D) dengan model ADDIE yang meliputi tahap *Analysis*, *Design*, *Development*, *Implementation*, dan *Evaluation*. Produk yang dikembangkan terdiri atas Arduino Uno yang dipadukan dengan sensor ultrasonik, PIR, DHT11, soil moisture, infrared, RFID RC522, serta aktuator berupa LCD I2C, servo, buzzer, LED, dan push button. Data diperoleh melalui lembar validasi ahli dan angket respons siswa. Hasil validasi oleh lima validator memperoleh persentase 94,10% dengan kategori Sangat Layak, sedangkan hasil respons sepuluh siswa memperoleh persentase 89,46% dengan kategori Sangat Baik. Hasil tersebut menunjukkan bahwa trainer mudah digunakan, menarik, dan membantu siswa memahami konsep penggunaan sensor dan aktuator dalam pembelajaran praktik. Berdasarkan hasil penelitian dapat disimpulkan bahwa Trainer Arduino Uno berbasis multi sensor dan aktuator layak digunakan sebagai media pembelajaran praktik mikrokontroler di SMK.

Kata Kunci: Arduino Uno, trainer, multi sensor, media pembelajaran, mikrokontroler

ABSTRACT

Wahyudin. 2026. Thesis. Development of a Multi-Sensor and Actuator-Based Arduino Uno Trainer as a Practical Learning Tool for Microcontrollers for Vocational High School Students. Advisor (I) Ihtiari Prastyaningrum, M.Si. Advisor (II) Pramudya Ardi, S.Pd., M.Pd.

This study was motivated by the limitations of practical microcontroller learning materials in vocational high schools, which generally use only one type of sensor and thus fail to provide an integrated learning experience. The objectives of this study are to develop a multi-sensor and actuator-based Arduino Uno trainer as a practical microcontroller learning tool, to assess the trainer's feasibility, and to determine students' responses to its use.

The research method used was Research and Development (R&D) based on the ADDIE model, which includes the stages of Analysis, Design, Development, Implementation, and Evaluation. The developed product consists of an Arduino Uno integrated with ultrasonic, PIR, DHT11, soil moisture, and infrared sensors, as well as an RC522 RFID module and actuators such as an I2C LCD, servos, a buzzer, LEDs, and push buttons. Data were collected through expert validation sheets and student response questionnaires. The validation results from five validators yielded a percentage of 94.10%, categorized as "Highly Acceptable," while the results from ten students yielded a percentage of 89.46%, categorized as "Very Good." These results indicate that the trainer is easy to use, engaging, and helps students understand the concepts of using sensors and actuators in hands-on learning. Based on the research results, it can be concluded that the multi-sensor and actuator-based Arduino Uno trainer is suitable for use as a practical learning medium for microcontrollers in vocational high schools.

Keywords: Arduino Uno, trainer, multi-sensor, learning medium, microcontroller