# DEVELOPMENT OF 3D PRINTER BASED ON FDM MODULAR FOR PROTOTYPE DEVELOPMENT OF ROBOT ARM

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### ABSTRACT

3D printing is one of the most important tools of Industry 4.0. The application of Additive Manufacturing has brought progress and transformation in the industrial world. 3D printing technology has an advantage over traditional manufacturing processes, as it has the ability to convert 3D designs/models into ready-to-use products. The world of education needs to continue to adapt to technological developments. Making a mechanical prototype of a robotic arm is one of the main things to do to develop learning media in an educational environment. The mechanical prototype of the robotic arm can be made using 3D printing, so it will provide real implementation for education. The purpose of this study is to develop a custom 3D Printer learning media which is expected to facilitate the installation process and development of a mechanical prototype of a robotic arm as a form of implementation in the Mechatronics Engineering Education Study Program, FT UNY. This research was carried out based on the ADDIE model, namely Analysis, Design, Development, Implementation and Evaluation. The analysis phase is carried out to identify the components needed in a custom 3D printer based on FDM and their implementation as a learning medium. The design stage is carried out by designing a custom 3D Printer based on FDM and its implementation according to the needs at the analysis stage, both in the form of hardware and software. The Development stage is carried out by making the custom 3D Printer, starting from making and assembling the mechanical and electronic components, then installing and connecting the software to the electronic components used. In the implementation stage, in this stage the implementation of a custom 3D Printer based on FDM is carried out by printing on the robot arm design that has been made and testing whether the performance results of the tool match the needs. The evaluation stage is carried out to obtain improvements from the implementation that has been carried out. The output targeted for this research is the creation of a custom 3D Printer based on FDM and its implementation, namely the manufacture of a mechanical prototype of a robotic arm that can be used for learning. The test results show that the 3D Printer has an average measurement error of less than 2% so that it can be used in the learning process and supports the selected learning content.

Kata Kunci: *3D Printer, FDM, Robot Arm Prototype*