

Bachelor's Thesis, Term Project

Digital Twin for the Simple 3D Wire Bending Machine: Fabrication and Control

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A digital twin is a virtual representation that serves as the real-time digital counterpart of a physical object or process. Though the concept originated earlier the first practical definition of digital twin originated from NASA in an attempt to improve physical model simulation of spacecraft in 2010. In this project, we will start to build a simple 3D wire Bending Machine as an Example for one of the Mechatronics System that we need to build a digital twin for it and also we are looking to build an Augmented Reality for the Machine (AR) to help in the maintenance and assembly process. **The project will be in collaboration with the MET department and there is other students in the MET Department will be working with you to create the VR for the Wire Bending Machine.**

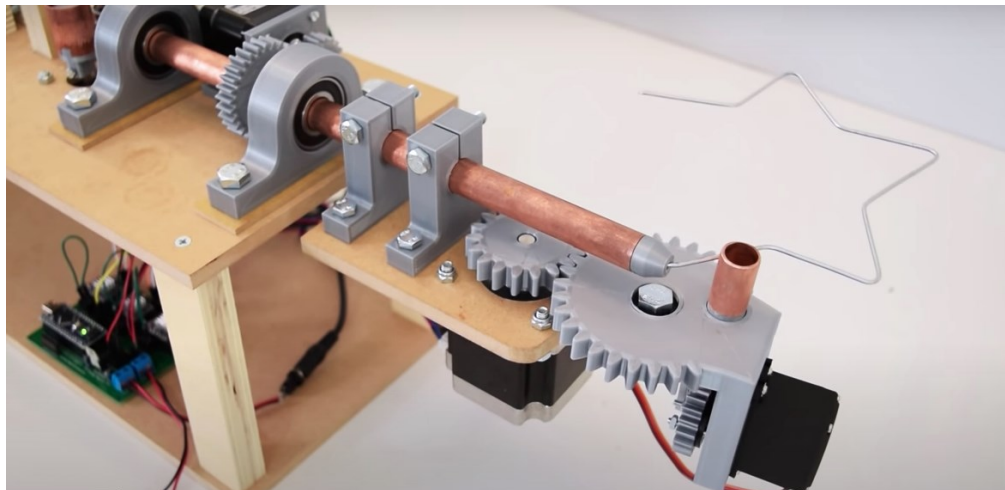
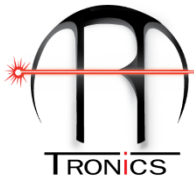


Fig.: 3D Wire Bending Machine

Project description and objective:

working principle of this 3D wire bending machine. So first, the wire goes through some series rollers, or straighteners. Using a stepper motor the wire is precisely fed to the wire bending mechanism which also uses a stepper motor as well as a small servo for the bending process.



Research focus of this project:

- Literature review on the project should be studied properly.
- Not only, creating a software control system for the project but also the hardware.
- Experiments using the gadget and control system should be built properly.
- The outcomes must be documented.

Requirements:

- Passionate to learn more about, VR, 3D Printing design, Robotics and control.
- Prior mechatronic design expertise is desired like "SolidWork and Arduino".
- Enthusiasm for completing actual practical work with 3D printing staff (design fabrication and construction).
- A method of working that is both structured and self-contained.

General tasks of the project:

- The complete methodology is already available in the ARATRONICS Lab, so we will discuss it from the first day to start the automation process for it
- Fabricate the robot/system using 3D printer/CNC machine (small parts).
- Assembly all parts of the proposed Machine.
- Changing the working variables and see the effect on the Machine

Other notes:

- A weekly meeting with the advisors will be required for this project, as well as weekly progress updates (*The meeting could be more than once during the week based on your progress and based on your achievements*).
- You should to be in the Lab two days per week (*It could be more than two days based on your progress and based on your achievements*).
- All reports must be prepared in the style of a research paper.
- The outcome of this research will be published in one of the coming international Conferences and , or Journal