VISVESVARAYA TECHNOLOGICAL UNIVERSITY

JNANA SANGAMA, BELAGAVI-590018, KARNATAKA

Synopsis of

Mini Project Work entitled

3D Wire Shaping Machine

Submitted by

Akhil A	**1RN18ME010**
Anil R Kashyap	**1RN18ME012**
Anirudh S Betrabet	**1RN18ME013**
K S Kaustubha	**1RN18ME041**

Under the Guidance of

Prof. Madhusudana H C B.E , M.Tech
Asst. Professor

Department of Mechanical Engineering

RNS INSTITUTE OF TECHNOLOGY

(AICTE Approved, VTU Affiliated & NAAC 'A' Grade Accredited)

UG Programs - CSE, ECE, ISE, EIE and EEE have been accredited by NBA for the

Academic years 2018-19, 2019-20 and 2020-2021

Dr. Vishnuvardhan Road, Rajarajeshwari Nagar, Channasandra, Bengaluru-560098

2020-21

3D WIRE SHAPING MACHINE

AIM:

To design and develop a 3D wire shaping machine which helps to shape wires in desired shapes.
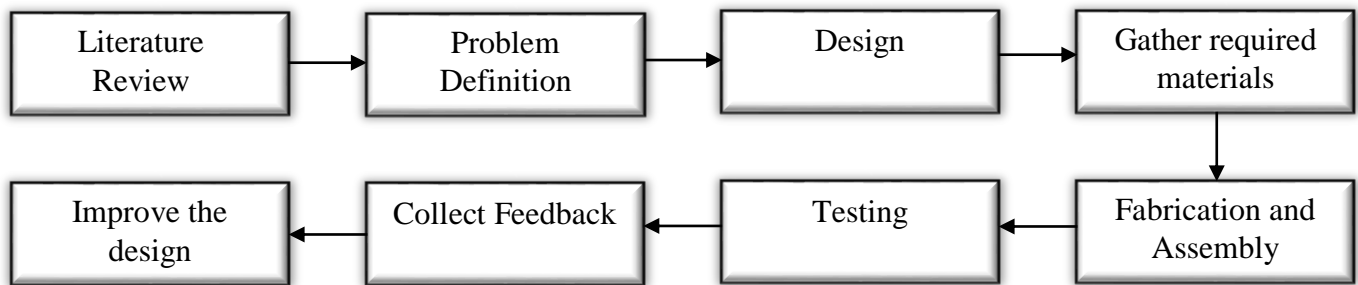
THEORY:

The enormous benefits of a wire-bending machine may not be immediately obvious, but that's because bent wires tend to be so ubiquitous that they're invisible. Shaped wires are used in baskets, chain link fences, shopping carts, fancy light fixtures, ornate gratings, stands, hooks, paperclips, springs, egg-beaters, and earrings. They are useful for creating structures and scaffolding. You can use a mixture of friction and welding to combine wires into incredibly complex shapes, or artistically useful designs like modernist chairs. It's a domain that, until now, has been out of reach for the independent crafter. This type of system has the potential to allow users to design or download a specific wire-based project and precisely create its individual components. And it creates the possibility to create skeletal frameworks for 3-D printers to build on, although this would require additional software and hardware development.

There are a lot of machines that are manufactured for bending wires. Our project involves designing a 3D wire shaping machine using an arduino board that can bend and shape a wire to the desired shape and dimensions.

PROJECT OBJECTIVES:

- To design the various components used in the machine.
- To make it 3D printing friendly.
- To make it user friendly.
- To make it economical.

PROJECT METHODOLOGY:

```
┌──────────────┐     ┌──────────────┐     ┌──────────────┐     ┌──────────────┐
│  Literature  │ ──▶ │   Problem    │ ──▶ │    Design    │ ──▶ │Gather required│
│    Review    │     │  Definition  │     │              │     │   materials  │
└──────────────┘     └──────────────┘     └──────────────┘     └──────────────┘
                                                                       │
                                                                       ▼
┌──────────────┐     ┌──────────────┐     ┌──────────────┐     ┌──────────────┐
│ Improve the  │ ◀── │Collect Feedback│◀─│   Testing    │ ◀── │Fabrication and│
│    design    │     │              │     │              │     │   Assembly   │
└──────────────┘     └──────────────┘     └──────────────┘     └──────────────┘
```

The wire is fed into the machine using a straightening mechanism consisting of grooved rollers and bearings. A stepper motor precisely controls the feed rate and the length of wire fed into the machine. The bending mechanism consists of a 2 stepper motors and a servo motor which are used to bend the wire into the required shape. One stepper motor (z-axis) is used to control the rotation of the central shaft which helps achieve the 3D forms while the other stepper motor (X- axis) is used to control the bending of the wire. The servo motor is used to drive a rack and pinion gear mechanism which is used the reset the stepper motor after the completion of a job. Gears are used to multiply the torque generated by the stepper motors into the torque required to bend the wire.
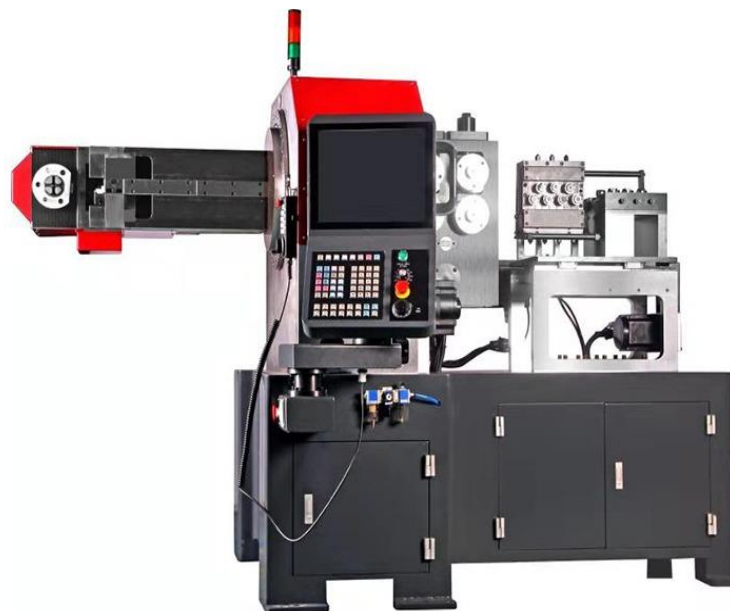
Industrial CNC Wire Bending Machine

COMPONENTS REQUIRED:

- Arduino Nano, DRV8825 Motor drivers, LM 7805 voltage regulator
- Stepper motors, Servo Motors, Ball Bearings.
- Gears, Hollow shaft.
- Nuts and bolts.

APPLICATIONS:

- Can be used in making complex wire objects such as paper clips, hooks.
- Can be used in creating structural framework base for 3D printed objects.
- Stronger and durable versions of the machine can be used in construction works for creating steel foundations.

ADVANTAGES:

- Allows for unique designs
- Reduces human error
- High precision can be achieved
- Reduces cost and time

DISADVANTAGES:

- Requires a skilled operator
- Maintenance might be costly due to use of gears.

RESULTS EXPECTED:

Design and develop a machine which can easily bend and shape wires into the required profile and dimensions.

Signature of Students:

Akhil A   1RN18ME010   ....

Anil R Kashyap   1RN18ME012   ....

Anirudh S Betrabet   1RN18ME013   ....

K S Kaustubha   1RN18ME041   ....

Prof. Madhusudana H C   **Dr. T. Sreenivasan**

Guide   HOD