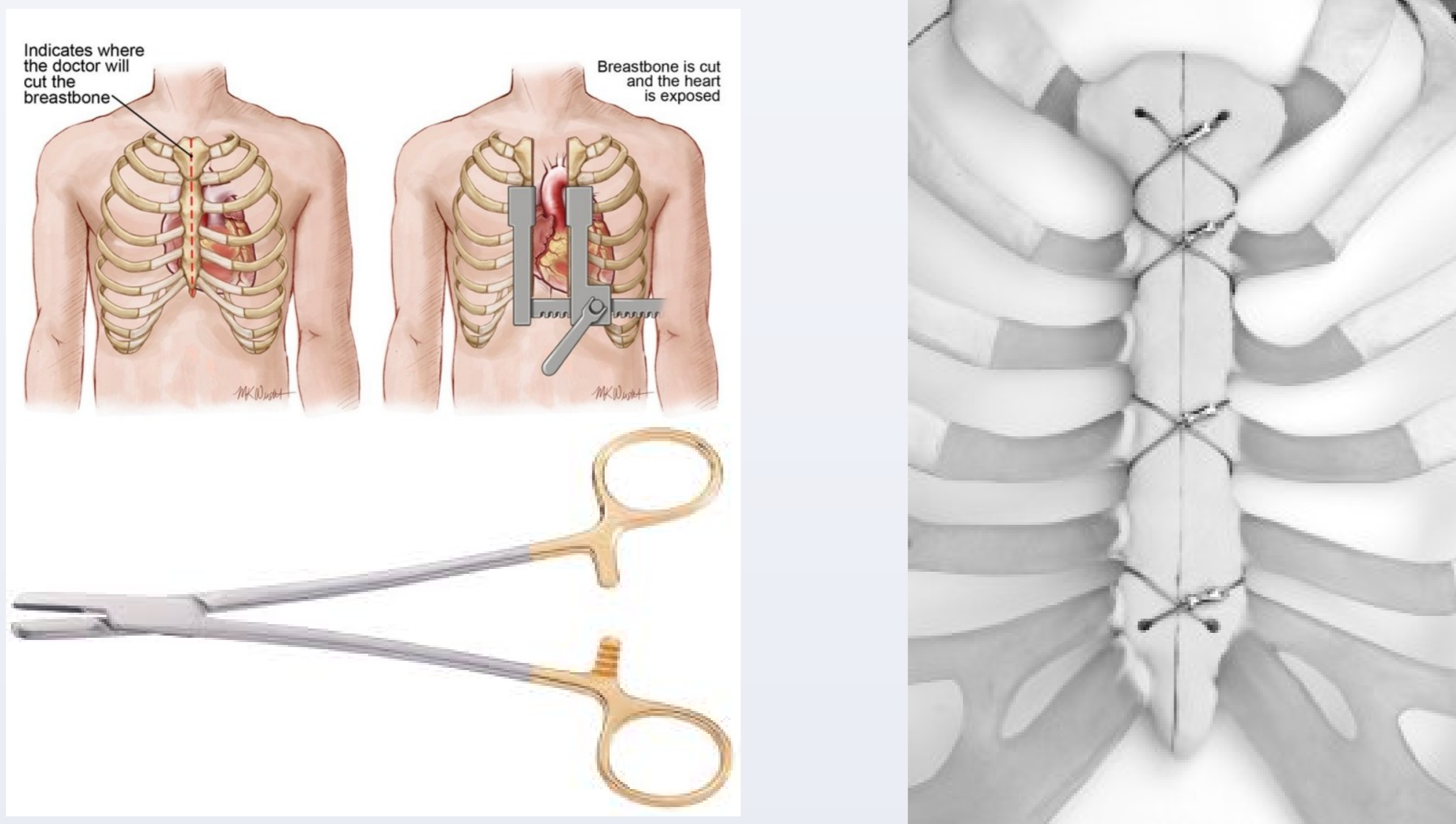


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PROJECT INTRODUCTION



This study was conducted to design a novel device that could replace the portegue tool in some operations and improve the overall effectiveness of the procedure. During surgical interventions the portegue tool is used frequently, from suturing to bone fixation. The project focuses on the specific task of twisting wires for alignment and fixation of the bones in operations like sternal fixation or jaw fracture fixations. Uncomfortable and tiring turning motion of the wrist is eliminated and one handed, simple and effective approach is introduced.

METHODS AND MATERIALS

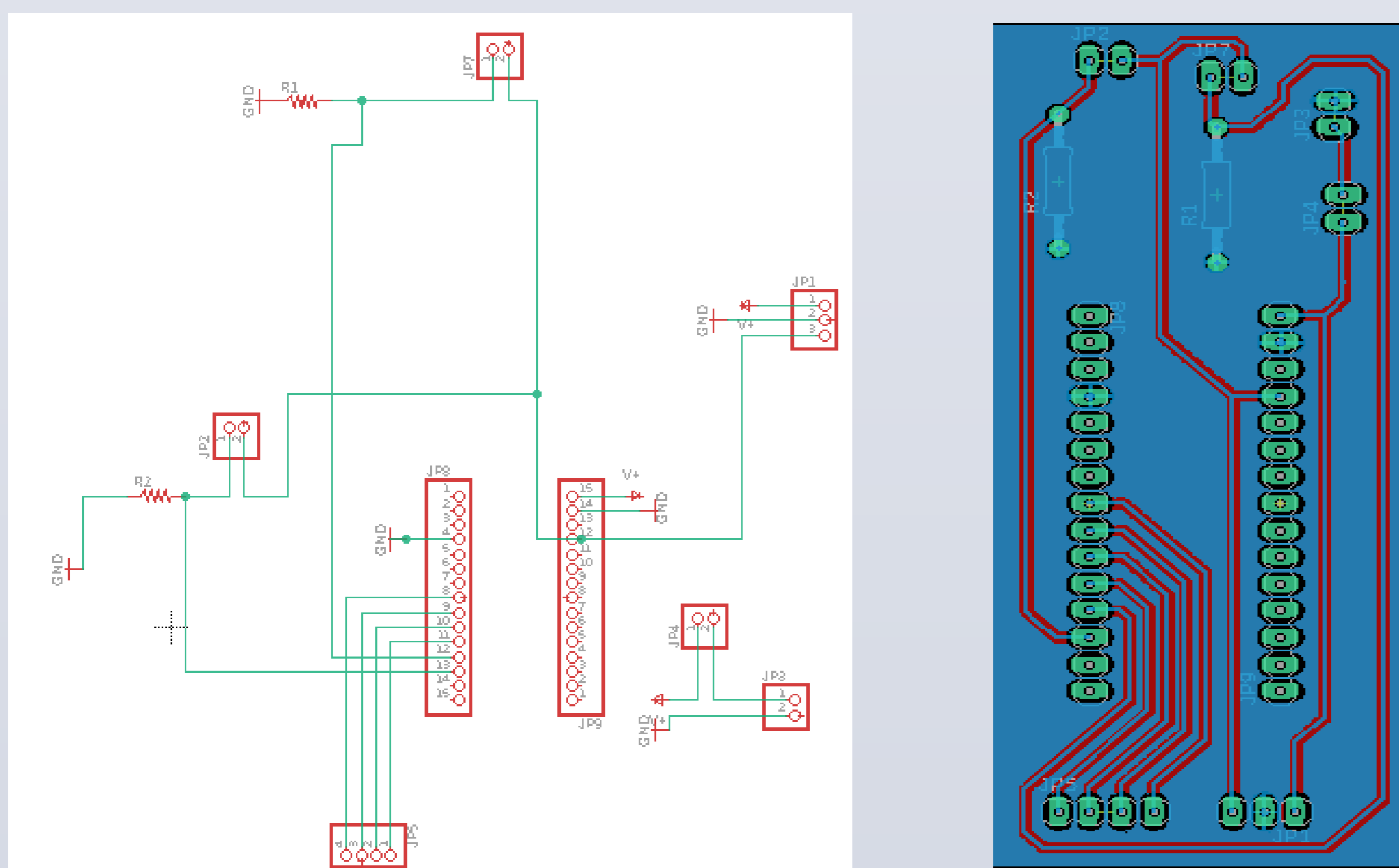


Figure1: Eagle schematic for the PCB

Figure 2: Eagle layout for the PCB

The design consists of three parts. The 9V battery is for the PCB and the motor driver. When the first button is pushed the first motor rotates a certain degrees and locks the jaw of the tool. The second button controls the second reducer motor and rotates the entire lower end of the tool, therefore mimicking the twisting motion.

RESULTS

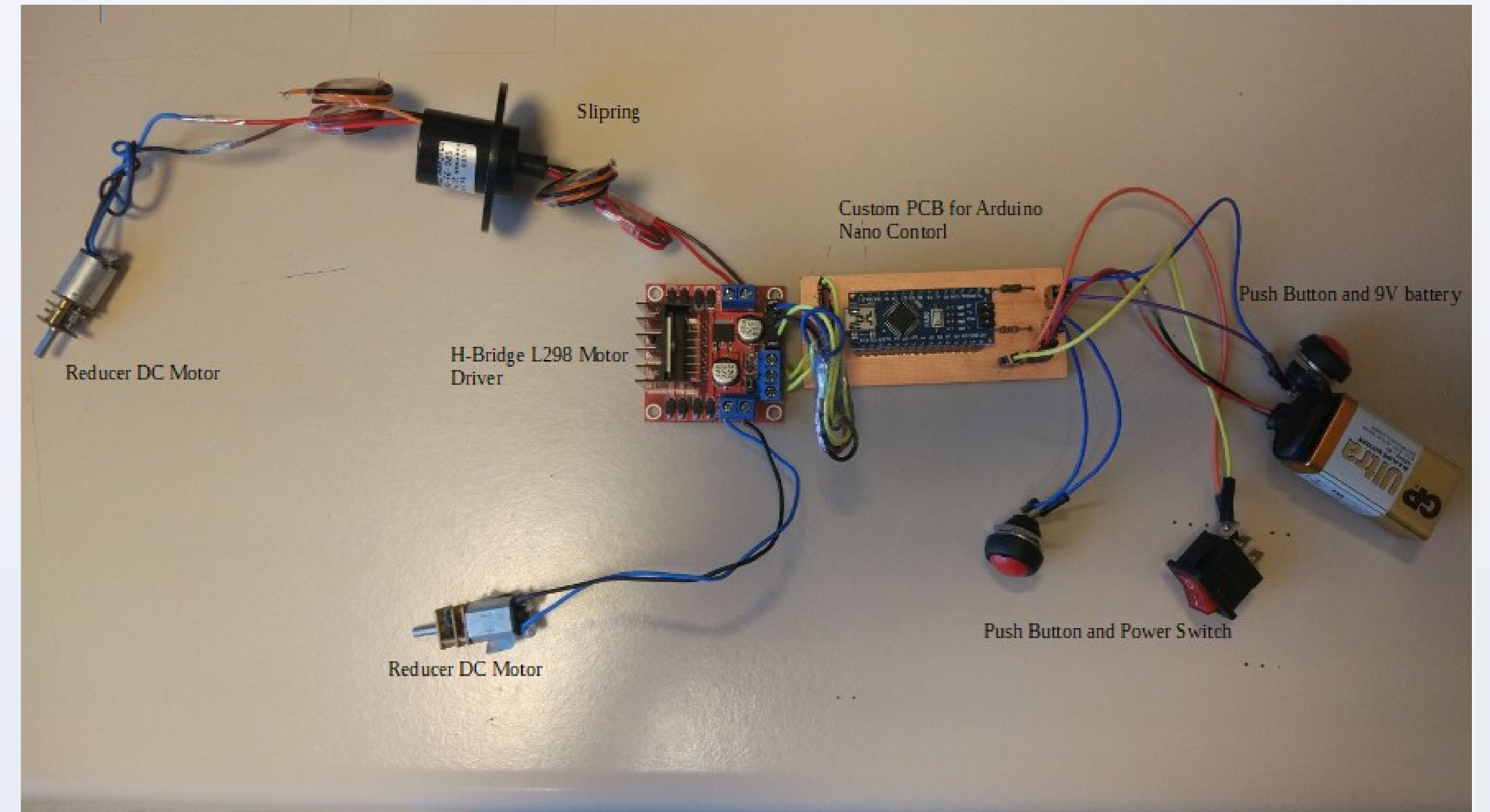


Figure 3: Electronics part of the device

With this device, we offer a practical and easy solution for twisting operations in different areas. In figure 3, device includes one arduino nano, two dc motors, one motor driver, two buttons, one switch and one battery. Thus, automatic version of portegu device can be used various sectors due to its effortless and simple usage.

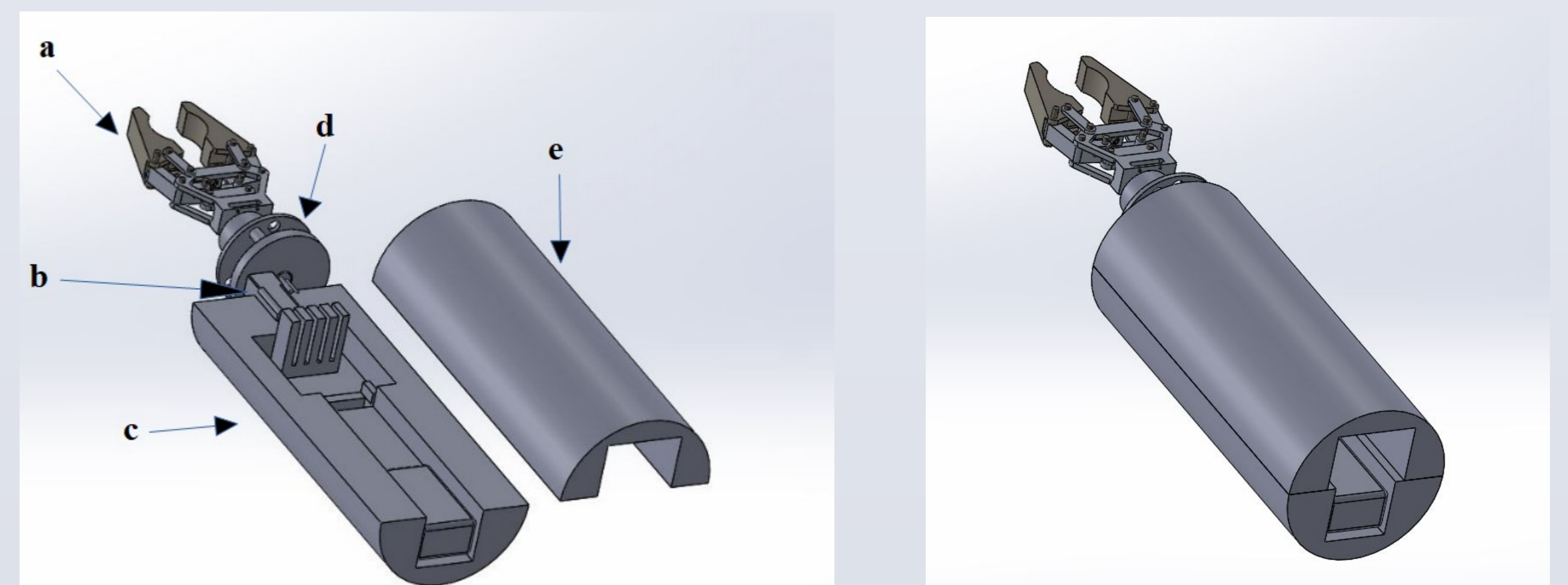


Figure 4,5: Solidworks(2016) drawings; gripper(a), reducer motor(b), lower casing(c), slipring(d), upper casing(e)

CONCLUSION

Compared to traditional methods, the new tool provides:

- Simple one handed usage
- More stable work environment
- Reduction in time and effort
- High torque
- Usage in every single area
- Detachable tip for other suitable operations
- This device keeps surgeon's concentration high while doing the operation easier.

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