

The star tracker mount for the DSLR/Mirrorless Camera.

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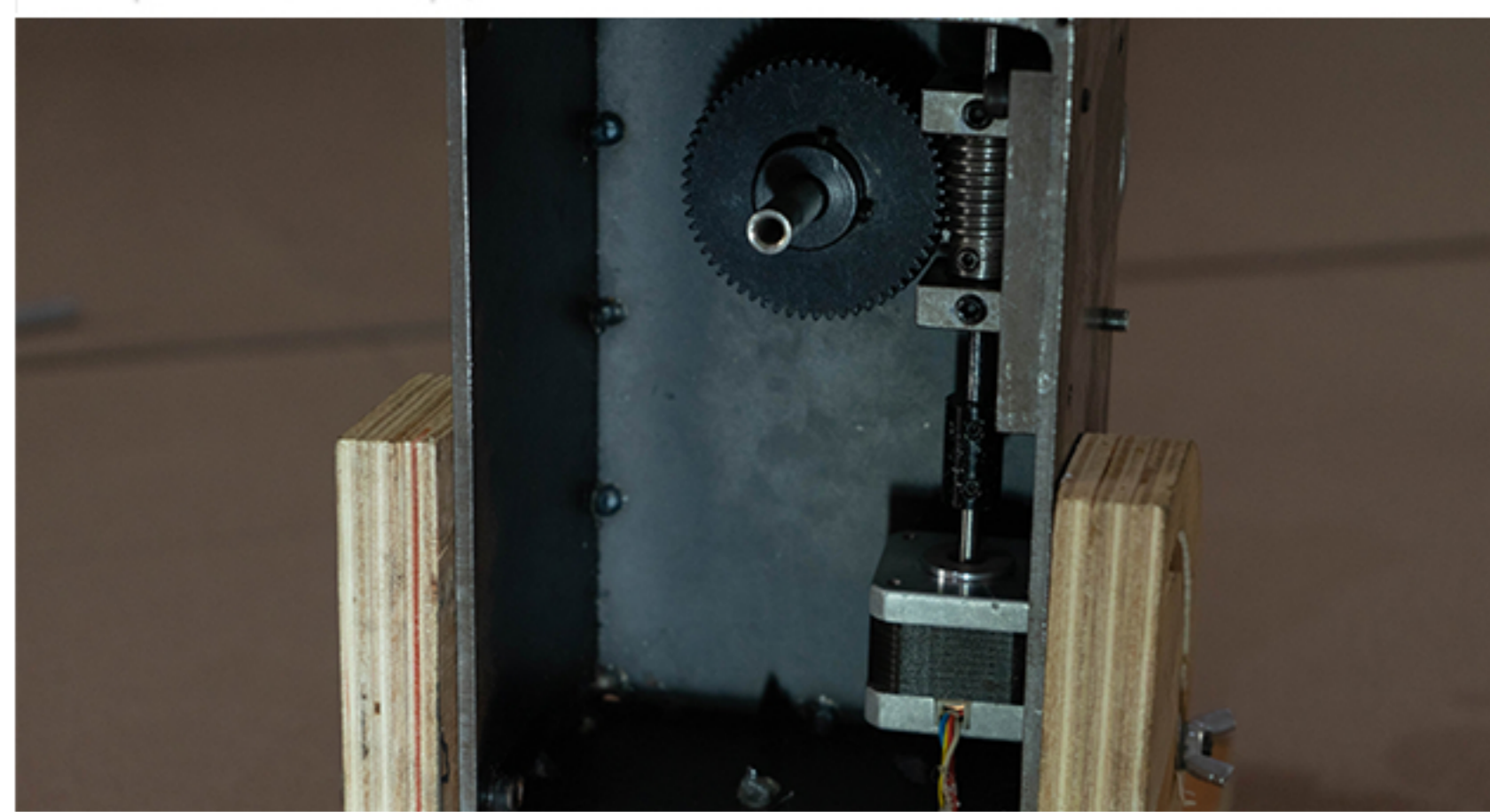
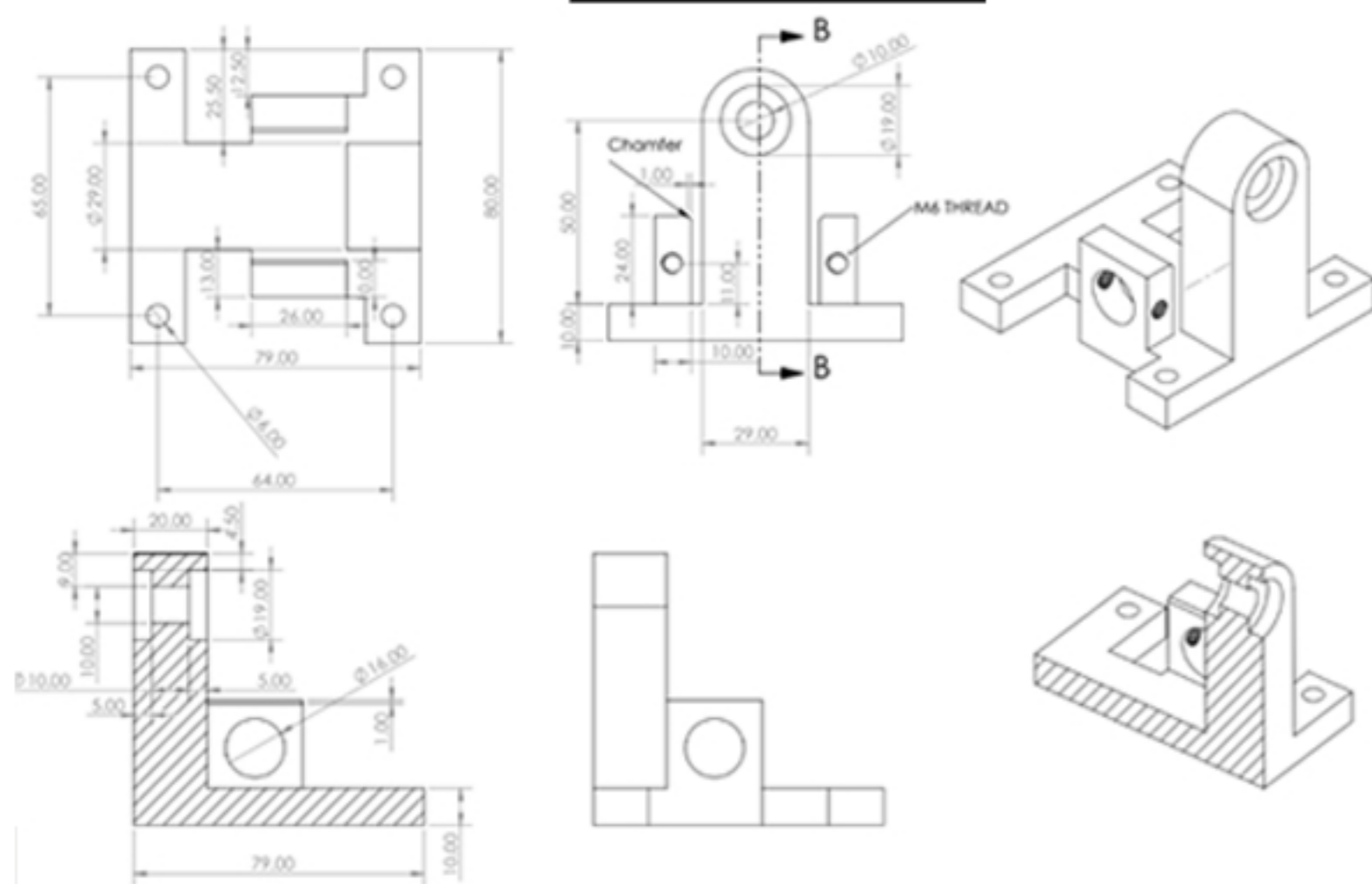
Natkanin Ponpinij (Grade 12)
[Piboonbumpen Demonstration School of Burapha University]
Boonsong Henggam (Adviser)

Abstract

This project is the design and process of creating a star tracker mount for the DSLR/Mirrorless camera. The design of the structure is made through SOLIDWORKS Student Design Kit, electrical and circuitry through EasyEDA and programming by Arduino IDE. Then tested with Sony A7II camera. By increasing the exposure time 30 seconds each time until the star trail appear. In conclusion this tracking mount has maximum tracking time within 180 seconds. And the flaw in the system has been caused by misalignment of the mount and defect in the gear assembly.

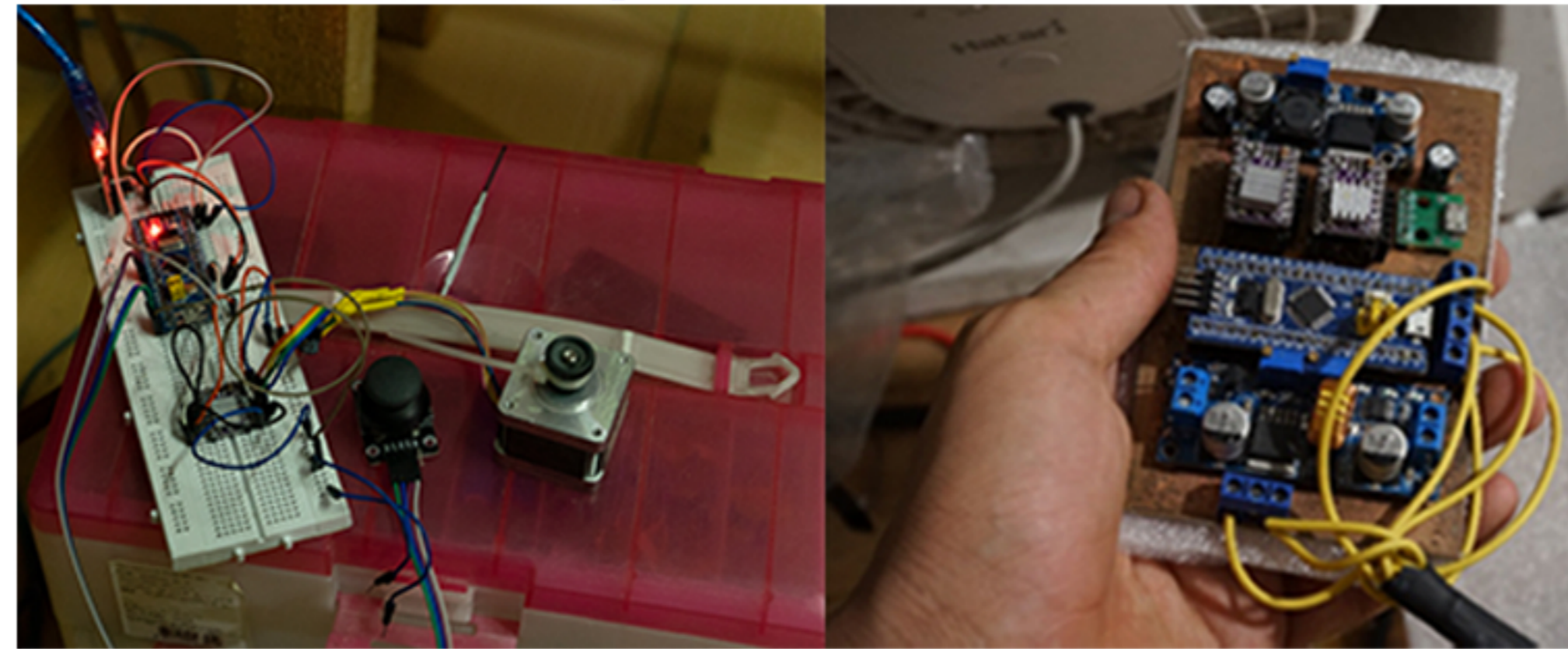
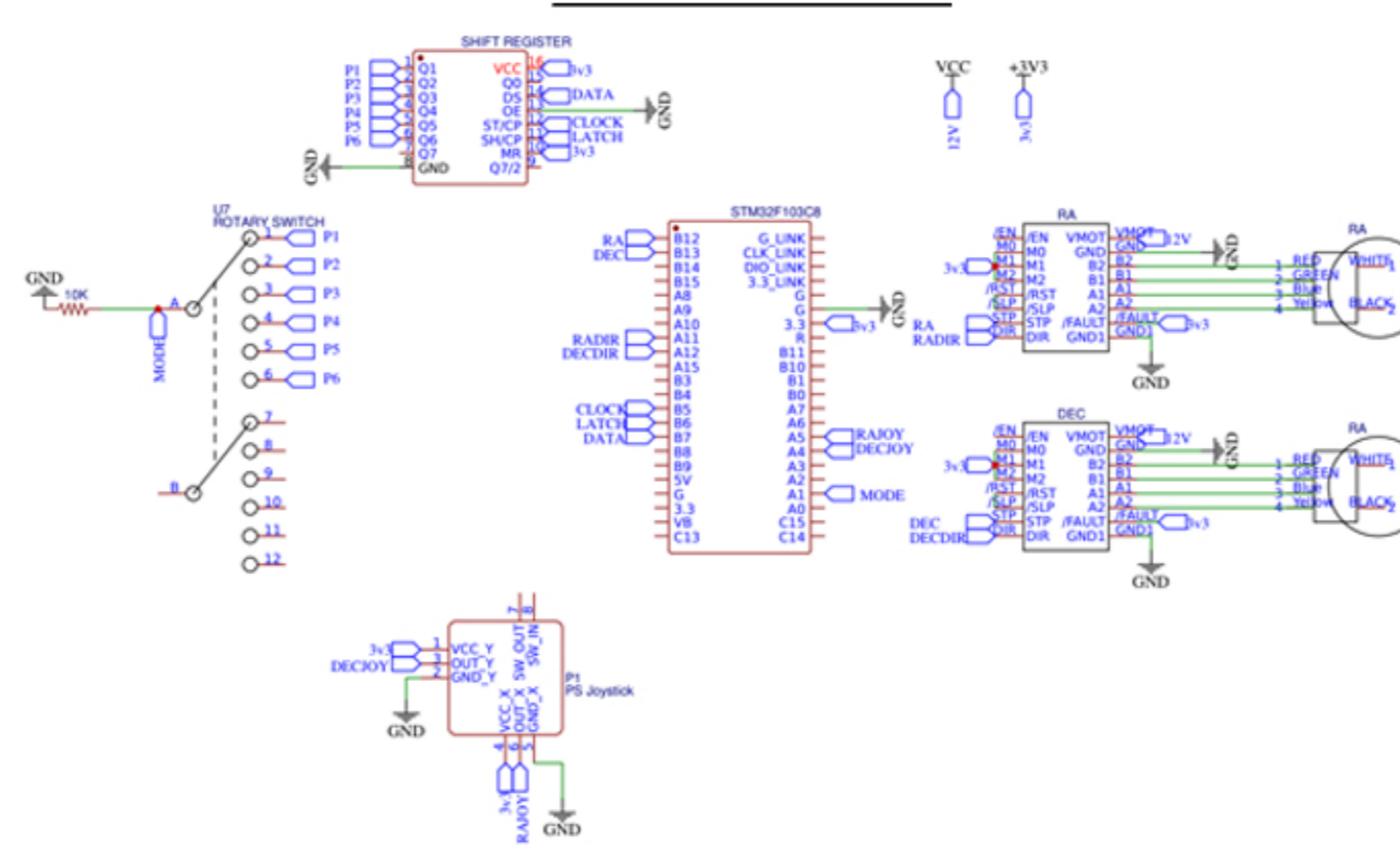
Methodology

Structure



"Worm gear mount's drawing and the completed gear assembly"

Electrical

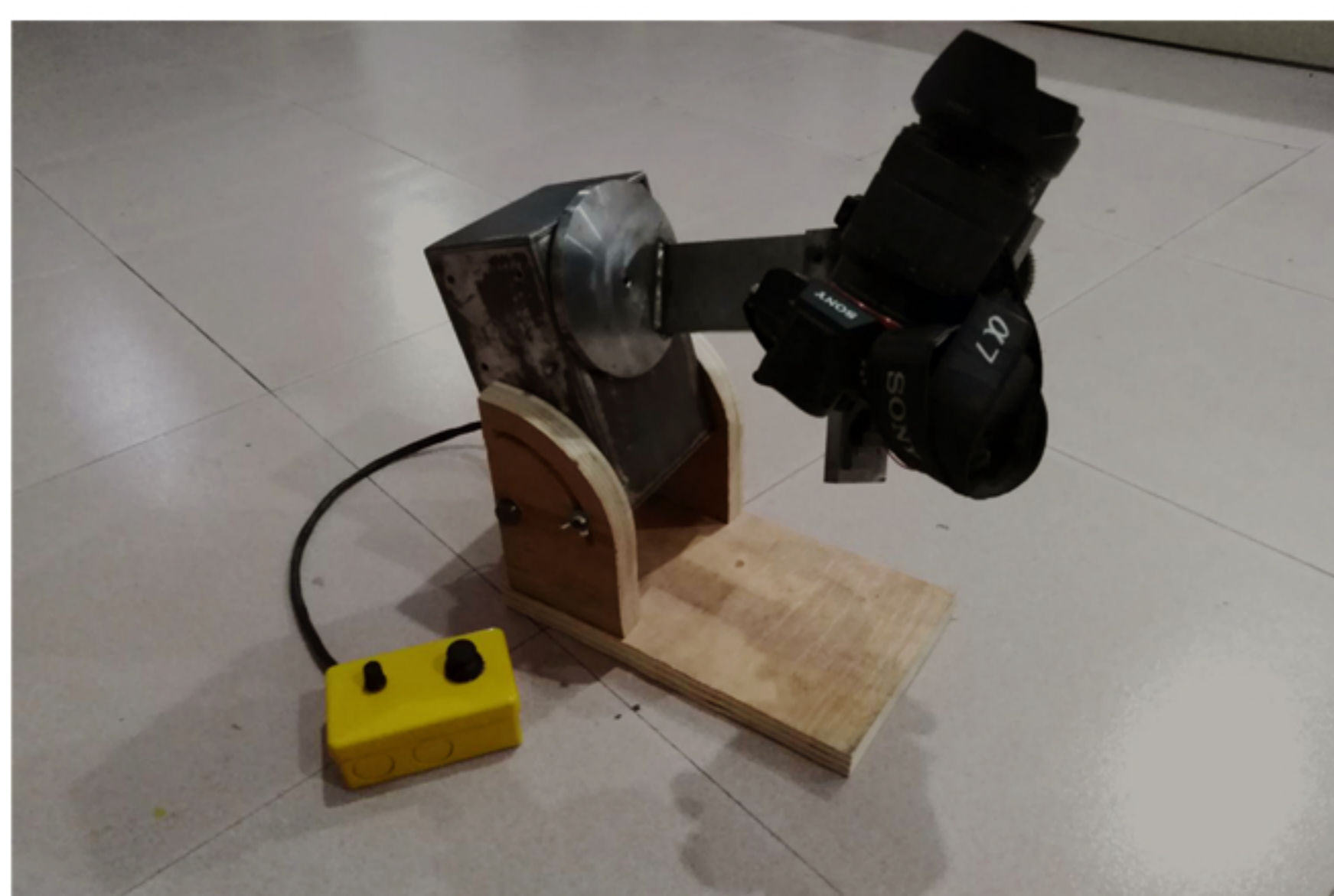


"Circuit Schematic, Early circuit testing stage and complete PCB"

Design and Testing Process

- 1) Calculate the stepping speed of the stepper motor with the gear ratio of 60 : 1 (4.4566 Step/Second), design the algorithm of the system, then design and etch electrical PCB.
- 2) Design the structure and gear supporter. Then fabricate parts at local workshop.
- 3) Assemble all part and circuitry together, test the system and troubleshoot the problem.
- 4) Test the mount by taking image of Spica with Sony A7II. The first image has been taken without tracking for control. Then engage tracking and increase the exposure time until star trail appear.

Result and Analysis



"The finished tracking Mount with Sony A7II camera attached."



"The result image of Spica from 7 different exposure period"

The image from the exposure of 180 seconds and 300 seconds has a strange star trail that indicate the unevenness motion of the tracker. Software and stepper analysis have been conducted and the stepper works flawlessly. With further analysis of the gear assembly conclude that the problem has been caused by a defect in the worm gear due to quality issues. Which could be correct via software programming and redesign to be mechanically adjustable.

Conclusion

Based on the result. This star tracker has 180 seconds exposure time capability. But could be further improve with better worm gear assembly or the correction via software programming in the future. With better material and design of the structure the mount could be made lighter and more portable

Acknowledgement

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Reference

HowToMechatronics : How To Control a Stepper Motor with A4988 Driver. [online]
<https://howtomechatronics.com/tutorials/arduino/how-to-control-stepper-motor-with-a4988-driver/>.

Electrical Schematic,
Drawing
Fabrication Process,
Result, etc.

