The Lunar Terrain Vehicle Project

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Abstract

A team of electrical and mechanical engineering students at the University of Arkansas Fort Smith (UAFS) has responded to a NASA Request For Information (RFI) [1] concerning a Lunar Terrain Vehicle (LTV) for the upcoming Artemis mission. The team has focused their attention on two design criteria, stowage footprint and suspension/steering. Our design features a folding frame and canopy which reduces the stowage footprint by 50%. The LTV will also feature independent suspension using an encapsulated spring and all-wheel driving using hub motors. During the design and construction of the LTV, this team will present their work to a group of NASA engineers for consideration and feature adoption. This poster will explain the uniqueness of this LTV design. A rendering of our LTV is shown in Figure 1.

Keywords
Student Poster, Lunar Terrain Vehicle, NASA RFI

LTV Stowage Footprint Reduction

The first criteria listed on the NASA RFI was stowage footprint reduction due to limited spacecraft transportation capacity. The UAFS design team determined the LTV needed to fold at the midsection to reduce the stowage footprint by 50%. There are two things that make this design unique, the hub motors already in place are used to fold the LTV (see Figure 2 below). The second advantage to this design is the folding canopy. As the LTV folds, the canopy will collapse thus reducing the stowage volume. As an added benefit to this design, the LTV can be folded on the moon's surface increasing the protection to onboard electronics.

Figure 1: Artist rendering of the designed LTV. This LTV can transport two astronauts and folds at the midsection.

Figure 2: The LTV in the folded position. The four hub motors are used to fold the LTV reducing needed hardware.

LTV Suspension and Steering

Our LTV features independent suspension and all-wheel drive/steering. Figure 3 below shows the placement of the hub motor, steering motor, and encapulated spring for suspension. All-wheel drive/steering will allow the astronauts to manuver across difficult terrain such as deep regolith using a swimming motion. As noted, the use of hub motors will allow propulsion on the lunar surface and folding of the LTV. A shaft extends from the steering motor to the lower section allowing steering; this is possible by using a slipring to supply power to the hub motor.

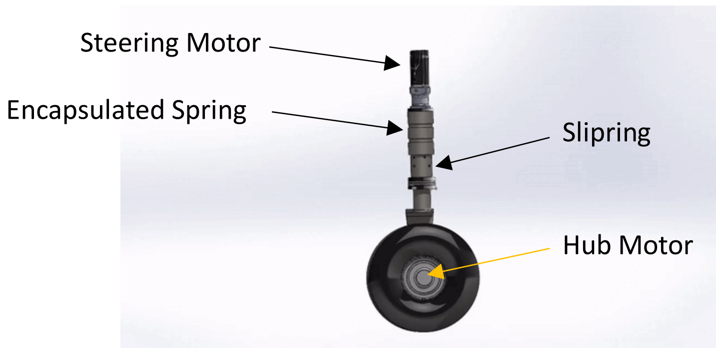

Figure 3: This Figure illustrates the LTV's suspension and drive/steering mechanism. A shaft extends from the steering motor to the lower section which allows the LTV to turn.

References

[1] NASA RFI https://sam.gov/opp/9e777623a1f3478296f21f2f0d787113/view

Biographical Information

Shea Brown is a junior electrical engineering student at the University of Arkansas Fort Smith. He is interested in controls and programing in an industrial setting.

Kasey Baker is a senior mechanical engineering student at the University of Arkansas Fort Smith. He is interested in space related projects.