FINAL OPERATION AND ASSEMBLY MANUAL

Team 18F27

PORTABLE CARRIER B

ME 486C - 003

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04/26/2019

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1. INTRODUCTION

Manufacturing of the device has performed and presented in this paper with all the steps through which it has passed. In this paper, the assembly process has defined and then the maintenance is going to describe as well. It will also describe the operation of the device though.

2. MANUFACTURING

Figure 1 is showing the structure (top) and showing the side of structure (bottom).

Figure 1: Assembled structure

1. Started the structure by joining the aluminum bars through the pins and make the cut down shape to give the arc on both end sides.
2. Make the connections between the bars using the pins and struck the pins properly to make sure bars have connected strongly without moving.

3. Drill the hole at the bottom bar to place the motors in it. Holes must be made enough that shaft of motor can easily pass through it and then make the holes for the pins to fix the motors in it.

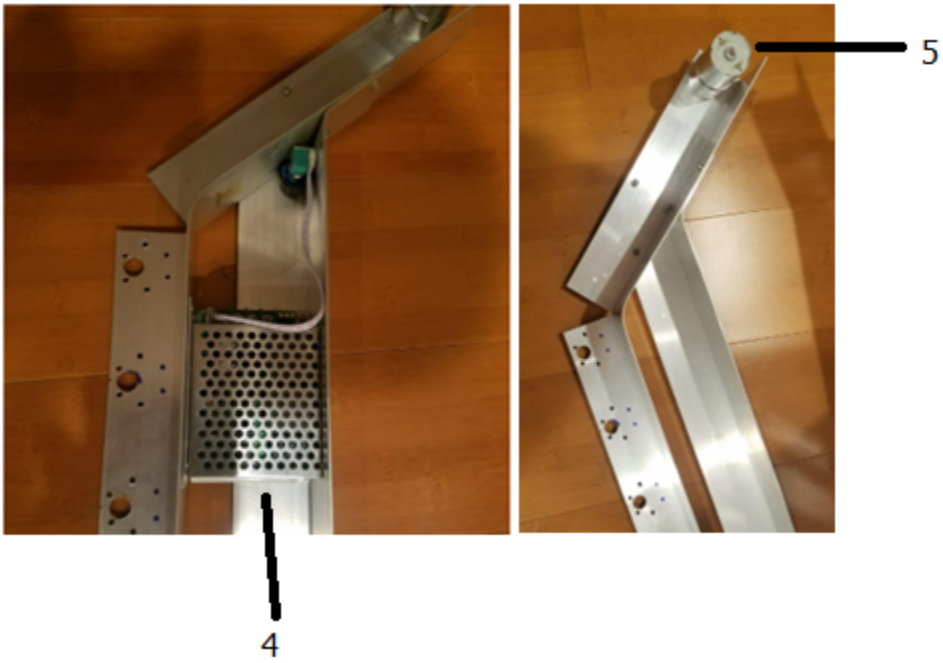

Figure 2: Motor installment

4. Put the speed controllers in between the two motors and hold it with the pin so it will connect through the motor and will control the motion of the motor. Figure 2 (left) is showing the controller fixed in between two bars and the gap between the bars have selected appropriately that the controller will fit between them.
5. Install the motors in the drilled holes like the one showing in figure 2. All the motors will connect in the same format as presented in Figure 2 (right).

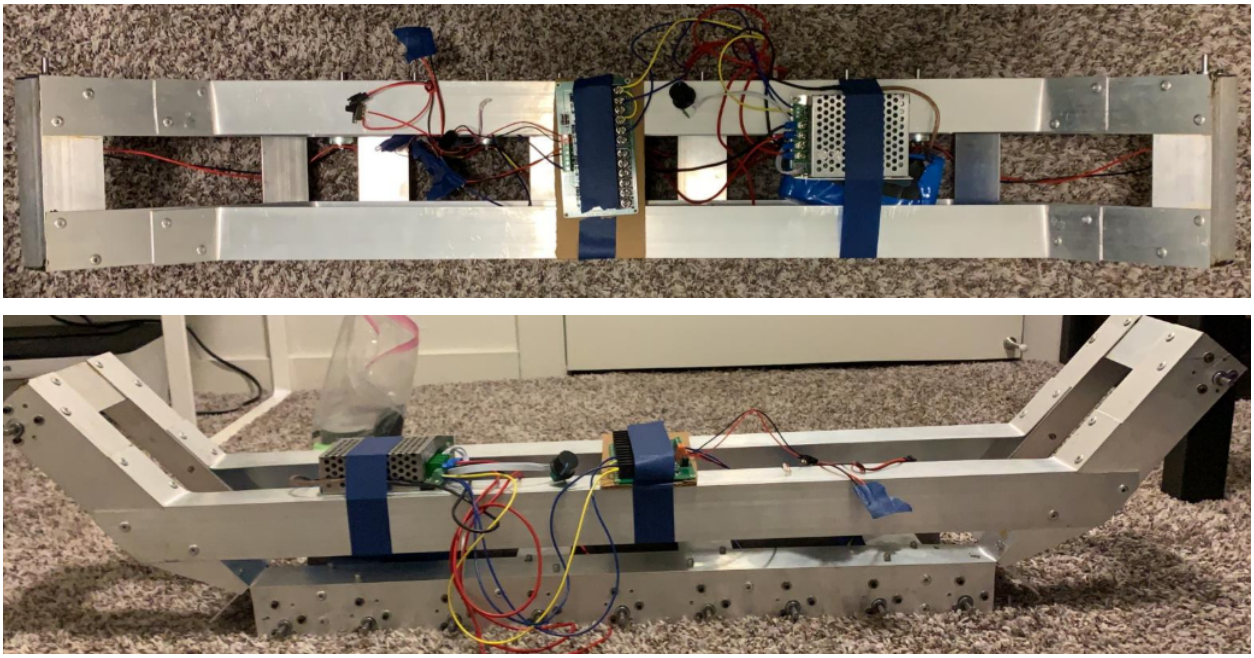

Figure 3: Controllers on tank

6. Install the RC receivers and all controllers over the device and fix them with the help of tape and grip them tightly as shown in figure 3.

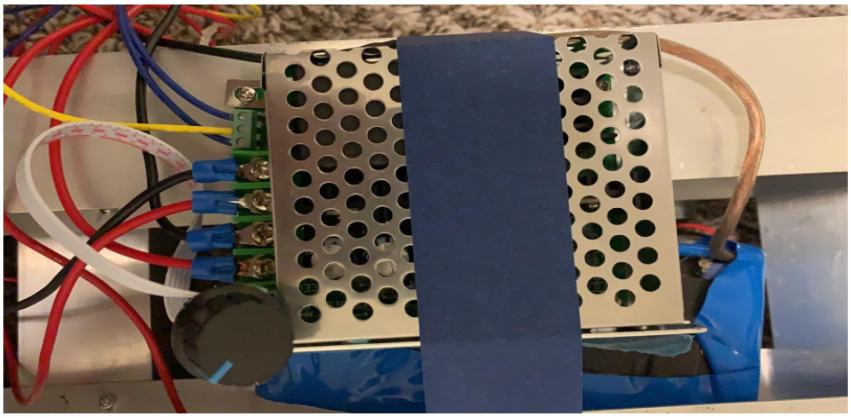

Figure 4: connections between the controllers

7. Connect the jumper wires to make the connection between the controllers and the motors. There is a knob on the controller to control the speed of the motor.

Figure 5: Batteries

8. Install the batteries as shown in figure 5, in which the USB power is going to use for connecting the controllers with the batteries.

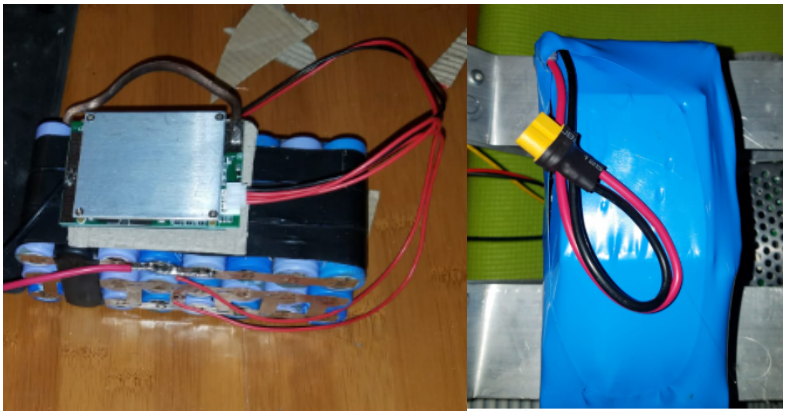

Figure 6: Battery pack opened (left) and battery packed with shrink wrapped (right).

9. The main battery has used BMS to connect with each other. It has then packed in shrink wrap. This is 12-V lithium ion and it has made with 18650 cells and this battery output is 12 volts so it will run the motors of 12 volts, and other controllers as well. And the nominal value obtained from the battery is around 10.8 volts in a fully charged 12.6 volts. Figure 2 on right is showing the battery packed with the shrink wrapper and it has an output wire which connects through the charger directly by plug and unplugs the battery. The naked battery has shown in the left with the BMS battery management system to protect the battery from overcharging and over discharging. When the battery will completely charge, it will disconnect the connection between the charger and the battery and when the battery will completely discharge then it will disconnect the battery with

controllers and all other things. There is a charger light on the device to show the device is in the charging phase when connecting through the charger and when the battery will fully charge it will turn the LED light to the green from red. There is a green battery also attached to the device that needs to charge frequently because of small size, whereas the main battery will keep working for a long time.

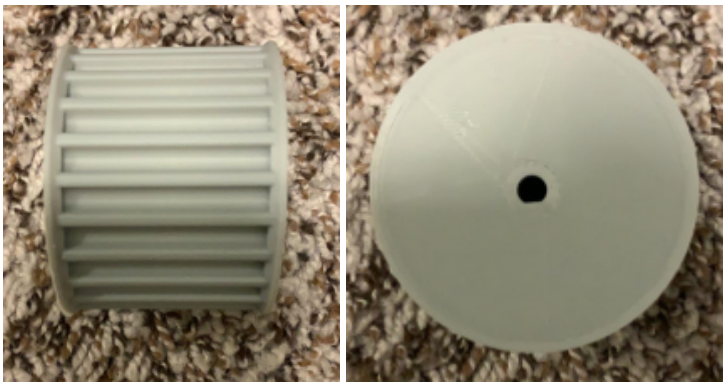

Figure 7: Wheels

10. Install the wheels over the motor shafts with the help of hole present in the wheels as shown in figure 7.
11. Install the lower plate to keep the modules save and provide the option to do the maintenance at any time.

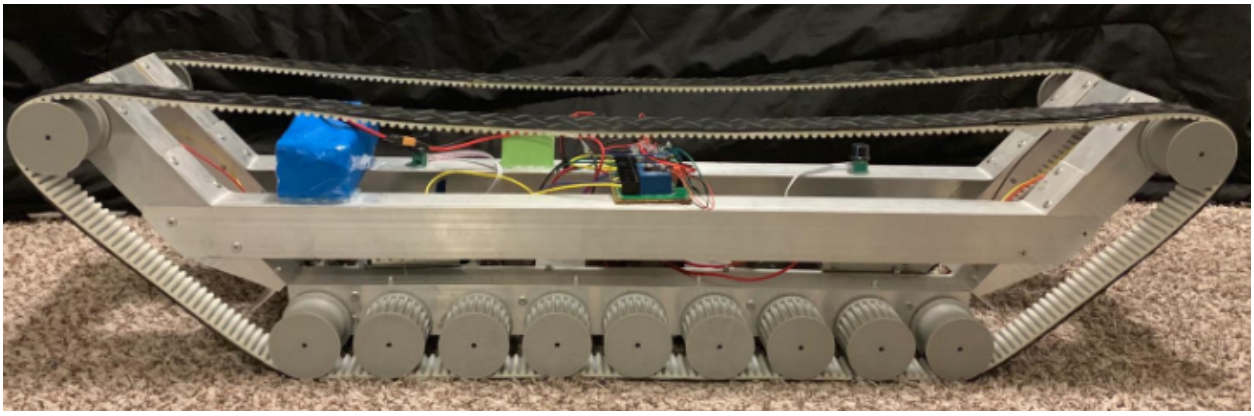

Figure 8: tread on wheels

12. Install the tread on the wheels to make it moveable and insert the wheels properly into the tread because wheels will manage to move the tread.

Figure 9: RC Controller

13. Connect the RC controller with the RC receiver to make the connections and working. On the controller there is a button to turn on and off, so turning the button on will connect the controller to the device. There is a sound check to make sure the controller has connected with the device.
14. Two handles are available on the controller to move the tank, forward, backward, left right.
15. The tank can move in these directions move forward, backward, left forward, left reverse, right forward, and right reverse.
16. For safety purpose a think aluminum foil has placed in lower sider of the device so that all the electronics parts will keep safe inside it and it will be easy to do maintenance as it has shown in figure 10.

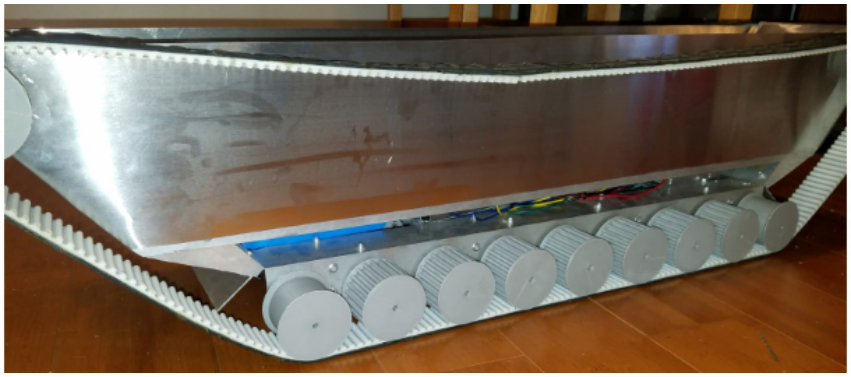

Figure 10: Aluminum Foil sheet

17. And for placing the electronic devices safely a partion has made inside the tank with the help of aluminum as well.

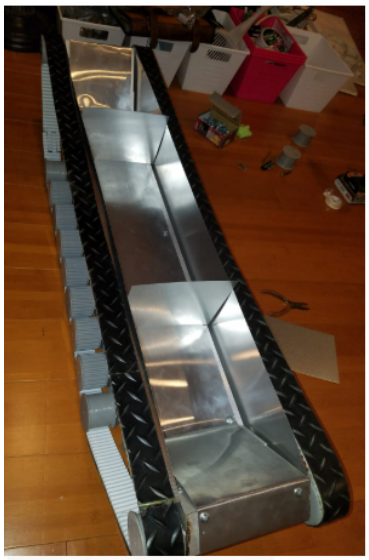

Figure 11: Inside Aluminum sheet with partition

Figure 11 has shown the partition as well to put the devices inside the tanker.

3. Maintenance

To do the maintenance of device following operation will need to perform.

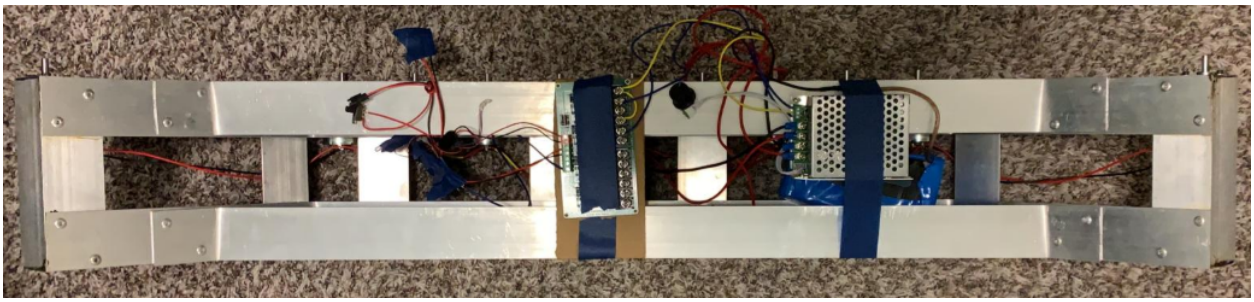

Figure 12: Maintenance

1. Firstly, remove the underneath plate to get access to the batteries, motor controllers, motors and the wires.
2. Check each connection and disconnect the controllers with the batteries
3. Clean the structure and check the joints and check the battery levels to see if they need to replace or not.
4. Check the batteries of the RC controller and replace it if it is dead.
5. Check the motors and replace the motors in case any need.

4. Troubleshooting

In case of troubleshooting following things need to perform

1. Disconnect the batteries
2. Turn the power on for the RC controller and device
3. Reset the connection between the receiver
4. Check with the sound, if not then remove the batteries and insert them again
5. In case of any motor issue, check each motor movement and the one which is not working replace it.
6. In case of any programming controller issue, disconnect the battery and then replace the controller.

APPENDIX

Figure 13: Top view of device

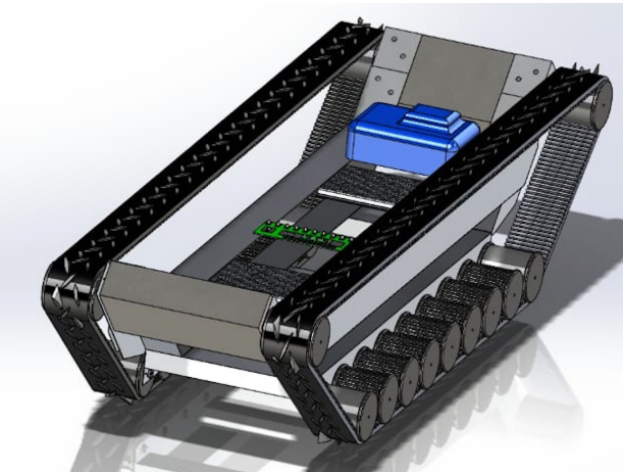

Figure 13: CAD model of device

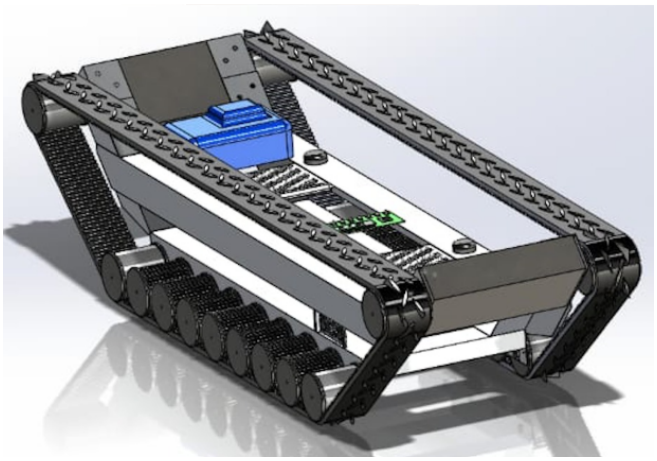

Figure 14: CAD model other side view

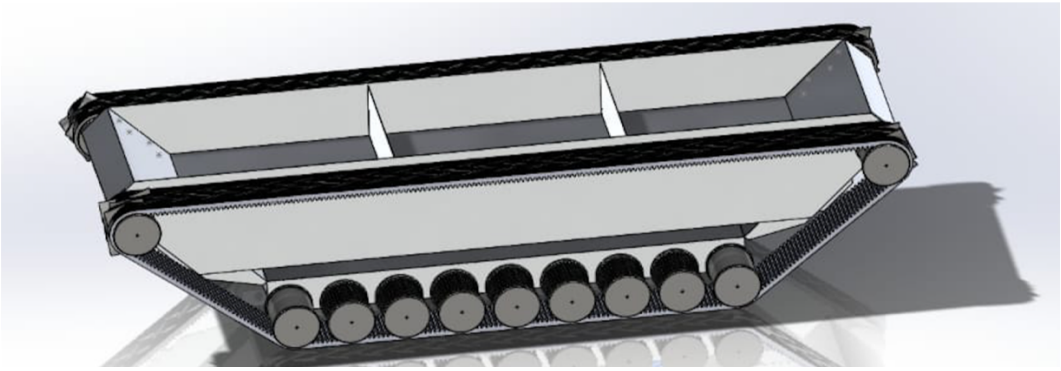

Figure 15: CAD model side view

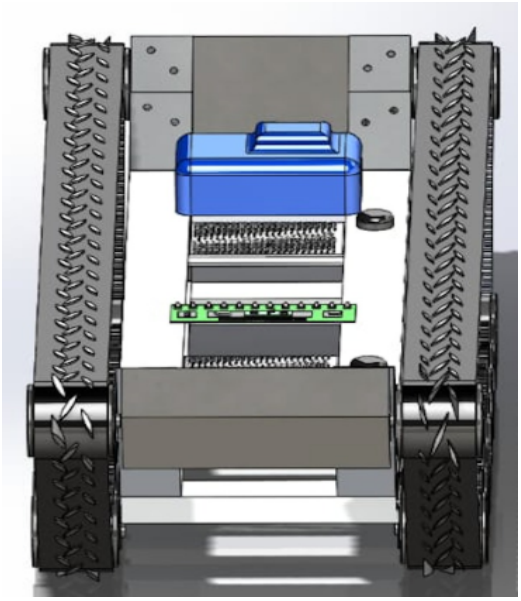

Figure 16: CAD Model top view