

APPLICATION NOTES

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This application note is a document showing the uses and applications of the robot base built for the agBOT. It will also showcase how the base was built, using what software and the relevance it has with our project.

INTRODUCTION

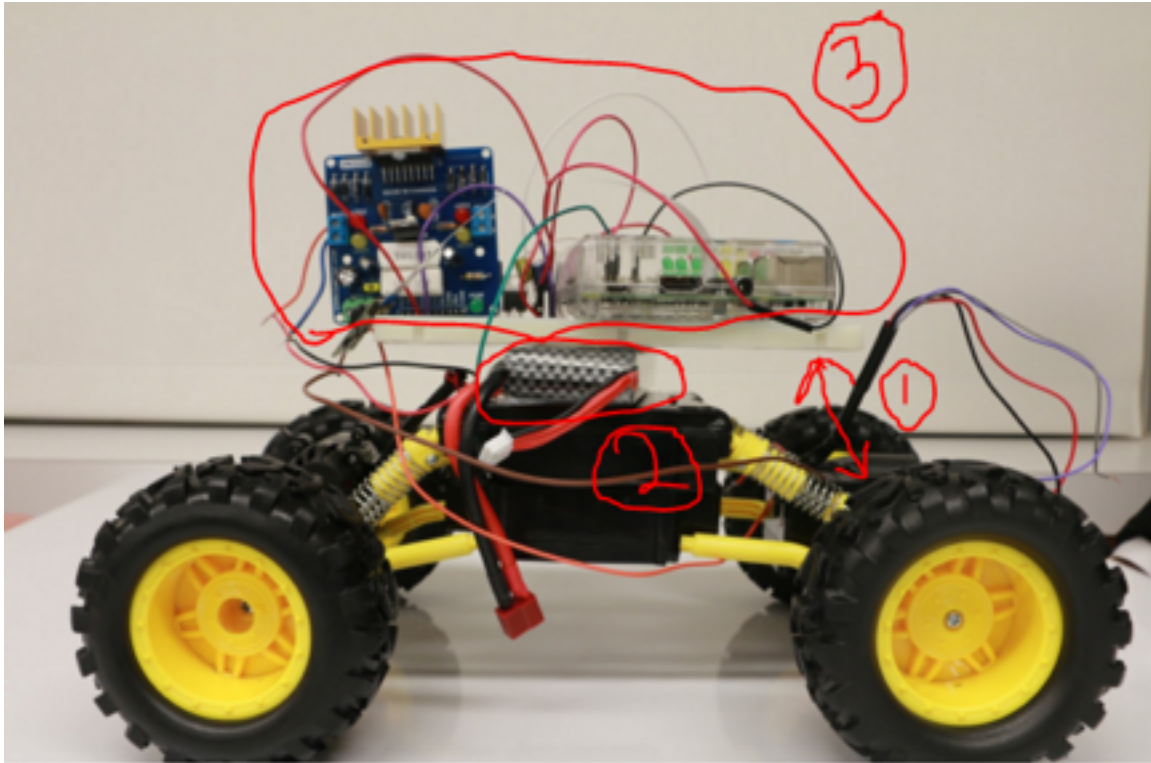
The agBOT competition required us to build a robot that can autonomously navigate and plant seeds on the agriculture field. Thus, it needs to have various components mounted on the robot itself. This includes a circuit to power the robot and the various components, a camera, a microprocessor and also various sensors. To mount all this on the robot, we needed some kind of a base that could accommodate all the various components without disbalancing the robot. As we used a RC car body, the base also needed to meet some size specifications.

OBJECTIVE

This objective was to build an appropriate base for the agBOT that could sufficiently hold and accommodate the various components on the robot itself. The base had to be big enough to accommodate the battery as well as the circuit and the various components.

ISSUES

In building the base, there were various issues that needed to be addressed in order to build a base that is a good fit for our project. The various issues are displayed in this picture below:

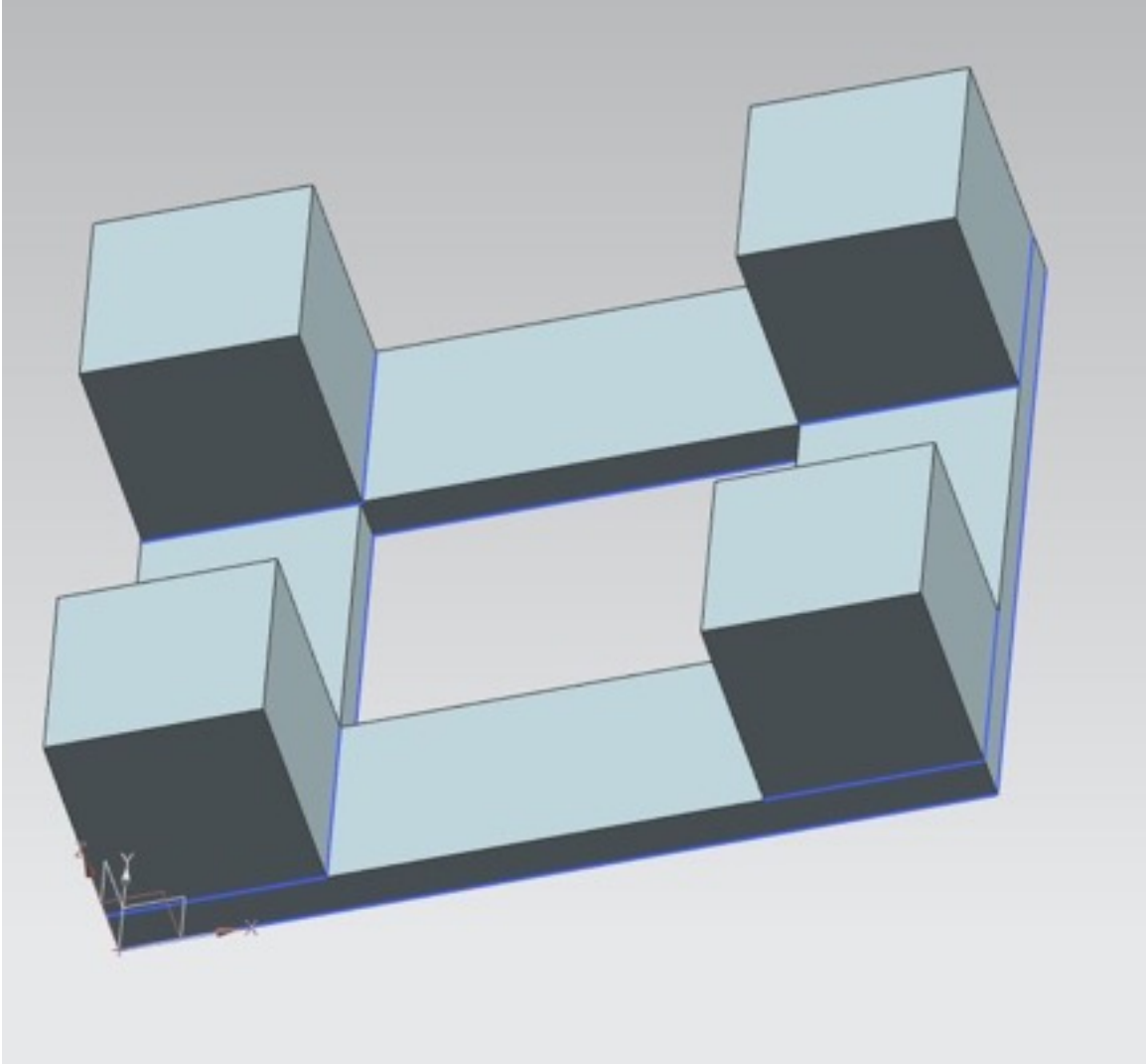


There are 3 main issues that needed to be solved:

- 1).** The base had to be of substantial height so that even if the components are heavy, there is ample distance between the tire and the base. It is because we do not want the base to come in contact with the tire of the robot while it is moving.
- 2).** There needs to be some space on the base to accommodate the two batteries that we will be using to power the robot and various components. Thus, we needed the base to have some compartments to fit the batteries.
- 3).** There are various components on the circuit such as the motor driver and the microprocessor that need to be on the robot itself. The base should be able to accommodate all these components as well.

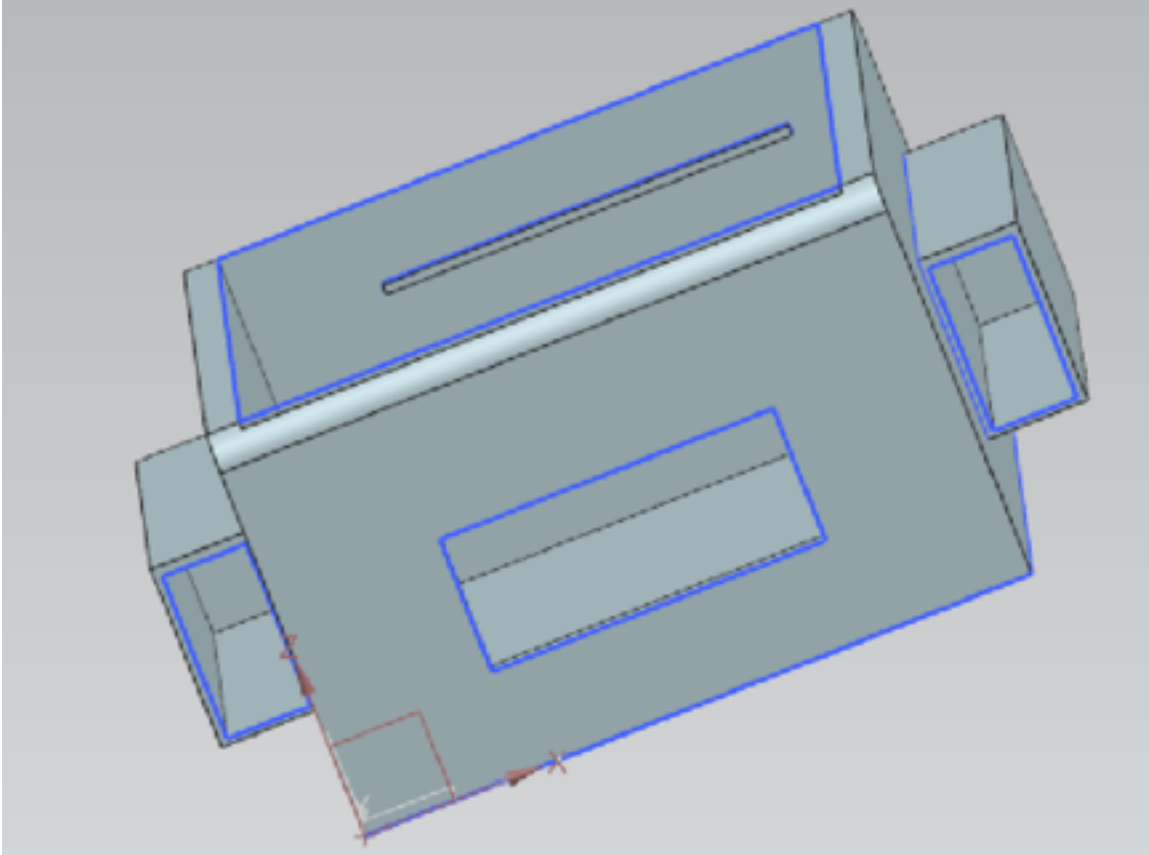
To address these issues, the best way to design the base was to use the Siemens NX 10.0 software. As it is the only CAD software that I have experience with, it was the best choice to go with.

To address the first issue, I decided to make the base with two different components. The first component looks like this:



It has four pillars on it to lift up the base so that it does not come in contact with the tyres while in motion. It is made so that it can be easily drilled on to the black box in the RC car body.

For the second main issue, the base needed to have compartments for the two batteries that will be present on the robot. For this, there were two side compartments made on the side of the bigger base to hold the two batteries:



One side of the compartments is open so that it can have connections to the circuit.

The third issue was to have a compartment for the various different components. The bigger base was made such that it is big enough to carry the two big motor-drivers and also the PCB. There are two slots at the front and back of the base so that it can incorporate the two raspberry pi microcontrollers. It is also sufficient to mount the front and back cameras on the robot.

RESULTS

The final design of the base is going to have the smaller base bolted on to the black box of the RC car. Then, the bigger base is will be bolted on to the legs of the smaller base. The PCB will be placed inside the bigger base, while the microprocessors will be placed at the front and back slots. The battery will be put in the battery slots at the two sides of the bigger base.

The different dimensions of the base are as follows:

For the Smaller base:

Length: 4 inches
Width: 4 inches
Height: 1.5 inches

For the Bigger base:

Length: 8 inches
Width: 5 inches
Height: 2 inches
Battery pack length: 5.5 inches
Ras-pi holder length: 0.75 inches
Ras-pi holder width: 2 inches

CONCLUSION

In the end, the NC file will be 3-D printed by the DECS division. It usually takes about 1-2 days for the final base to be built by 3D printing.