COMBAT ZONE

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BUILD REPORT:

Keres: 150 g Fighting Robot

● by Mike Jeffries

Keres was built to test some prototype Mini-Spark gearboxes from FingerTech Robotics. *(See the accompanying article on page 41.)* After spending some time debating between several weapon systems, I decided that a horizontal spinner with a relatively large spinning bar would be a good test setup.

With a horizontal spinner, you need to be able to move quickly to allow the weapon time to spin up, and to give more options for attack locations. You'll also likely spend a decent amount of time flying around the arena on larger hits, which will be a good way to test how the gearboxes handle sudden impacts without having to intentionally expose your wheels to the other robot.

After settling on the concept, it was time to move to CAD. The specifics of the design changed several times during this period as I saved up to cover the cost of new components, and as part availability changed.

The design uses a laser sintered nylon internal section from Shapeways, and .032" thick titanium top and bottom plates.

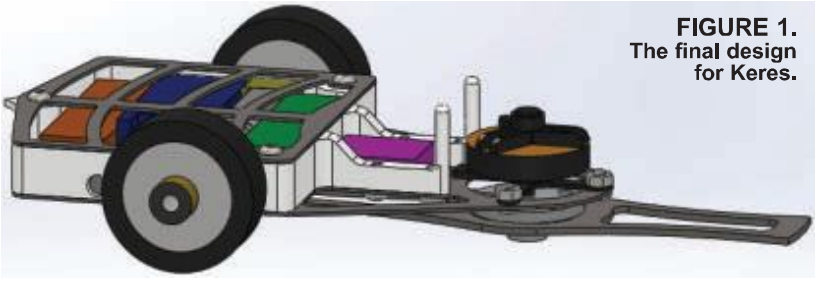

FIGURE 1.
The final design for Keres.

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The three pieces are held together using threaded inserts in the main body section and four Plastite screws near the weapon motor.

The electrical system is fairly standard. Keres uses tinyESCs (electronic speed controllers) for drive, a HobbyKing R410 Rx and a two-cell 180 mAh Turnigy Nano-Tech LiPo for power. The weapon motor is a 1560KV GT2203 brushless outrunner from **HiModel.com** and uses a Plush10 ESC from HobbyKing. The weapon motor has been modified via the replacement of the stock shaft with a hardened O1 tool steel shaft.

With the tight weight limit and lack of space necessitated by the design, it took careful planning to fit in all of the components and wire without burning off my fingerprints. The weapon ESC is mounted partially outside of the main body to save space and reduce wire run lengths. Doing this allows for easier access to the motor wires should they ever need to be reversed; it also reduces the overall system weight.

The tinyESCs are mounted between the front wall of the body and the drive motors which also allow for very short wire lengths between the motor and ESC.

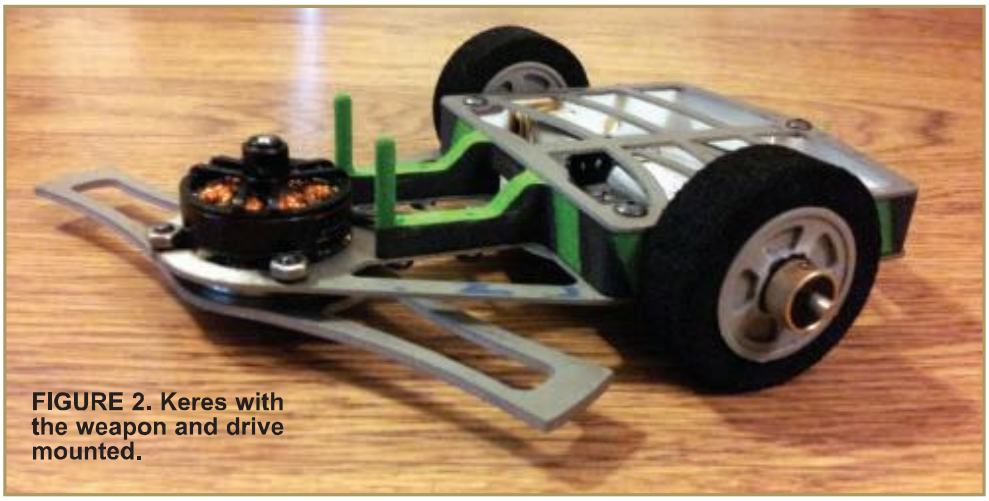

FIGURE 2. Keres with the weapon and drive mounted.

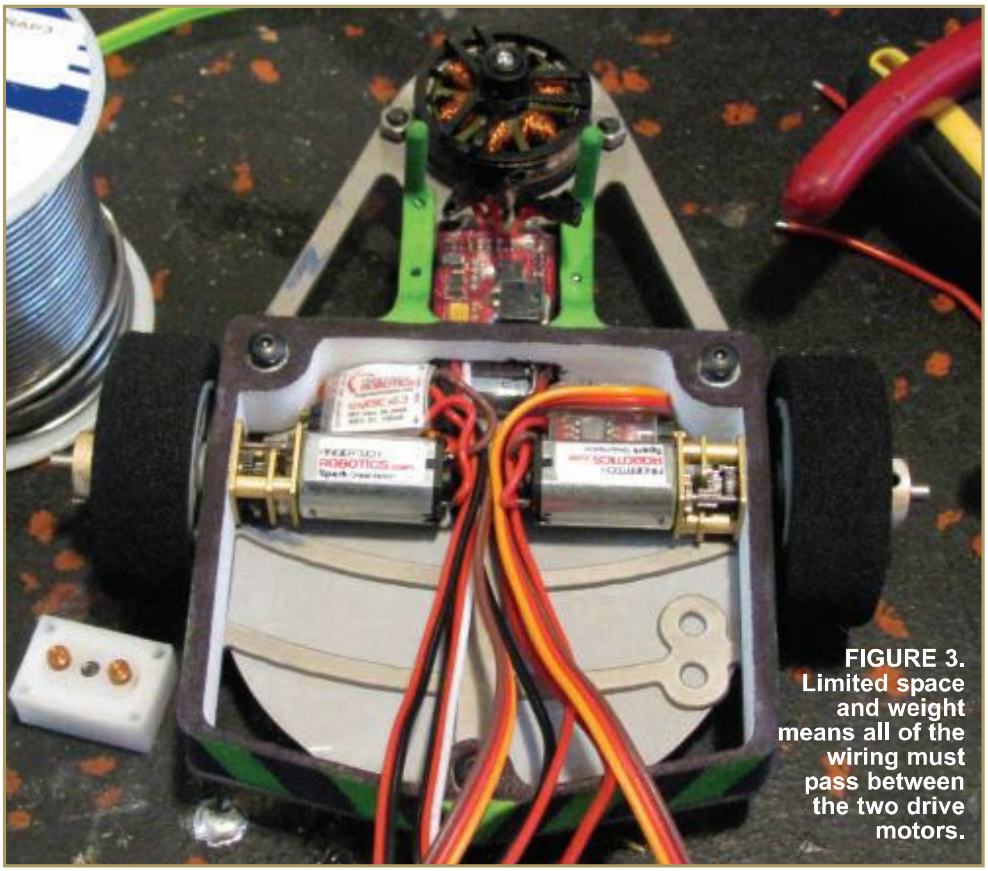

FIGURE 3. Limited space and weight means all of the wiring must pass between the two drive motors.

PARTS LIST

Total cost: $122.19 + materials, labor, and TBA Mini-Spark retail price.

ITEM	QTY	COST	WEBSITE
FingerTech Robotics tinyESC	2	$69.66	www.fingertechrobotics.com
FingerTech Robotics Mini-Sparks	2	Prototype	www.fingertechrobotics.com
GT2203 outrunner	1	$14.14	www.himodel.com
Printed nylon chassis	1	$17.25	shpws.me/m1b7
2S 180 mAh Turnigy Nano-Tech battery	1	$4.16	www.hobbyking.com
R410 orange Rx	1	$9.99	www.hobbyking.com
Lightweight set screw hub 3 mm bore	1	$6.99	www.servocity.com
Chassis components .032 titanium	1		www.nearchaos.net/KeresParts.rar
Weapon bar .080 titanium	1		www.nearchaos.net/KeresParts.rar

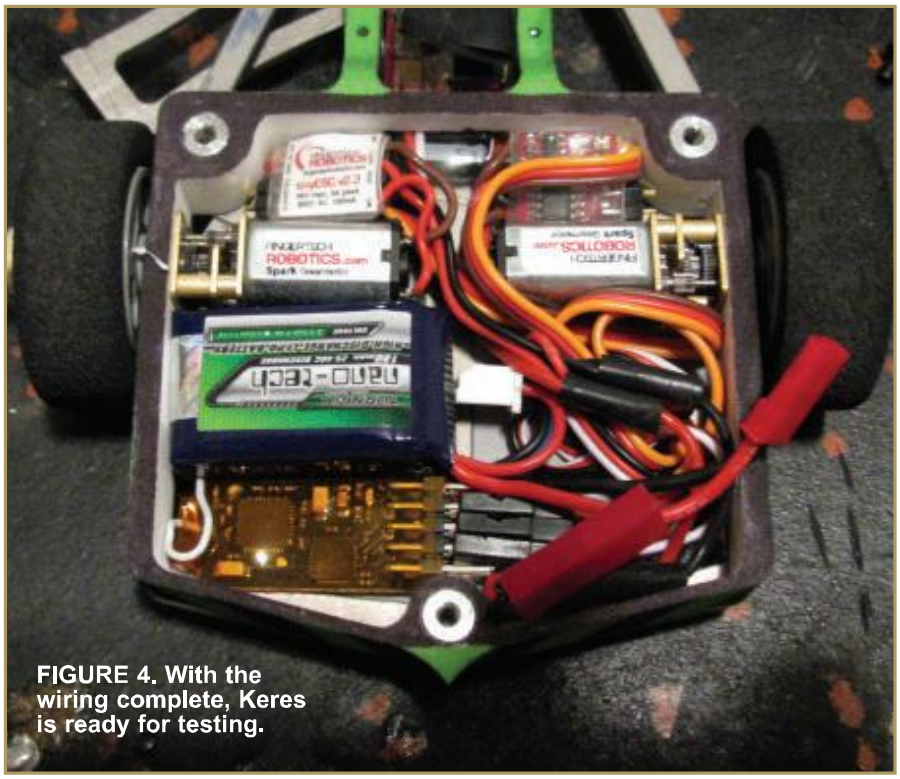

FIGURE 4. With the wiring complete, Keres is ready for testing.

Placing them forward of the motor helps to shift the weight balance slightly forward of the drive wheels, which should reduce how often the front of the robot lifts off of the ground. The receiver and battery are behind the drive motors near a spot that allows for the future addition of a power switch.

An afternoon of soldering later, and Keres was nearly ready for testing. I tossed the batteries on the charger and spent a bit of time "neatening" up the wiring and securing the weapon motor wires in a way that would keep them from getting caught on anything. Not long after that, the batteries were fully charged and Keres was ready for the first test.

Testing went well, and all systems performed as expected. The new drive motors resulted in a very nimble robot, and the weapon appears to pack a decent punch without breaking itself. SV

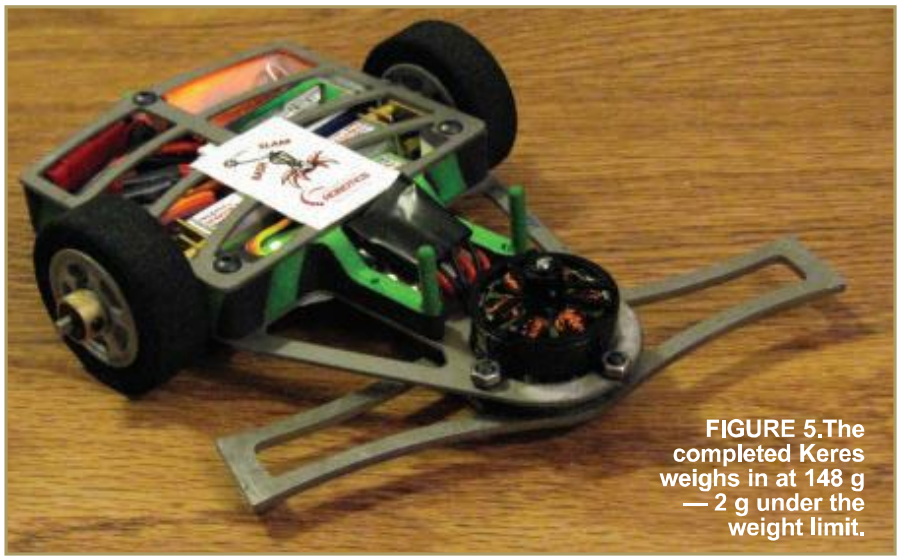

FIGURE 5.The completed Keres weighs in at 148 g — 2 g under the weight limit.