

C O M B A T Z O N E

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BUILD REPORT:

Horses for Courses

● by Pete Smith

Combat robotics is — in many ways — a game of Rock-Paper-Scissors. If everything else is equal, a brick will beat a spinner; a flipper will beat a brick; and a spinner will beat a flipper.

However, life is more complex than a game and there are many varieties of bots. To increase your chance of winning a fight, it's a good idea to be able to modify your bot to take advantage of your opponent's weaknesses or to neutralize its strengths.

My Beetleweight Trilobite allows for the attachment of different devices; you can design these so you can match up better with opponents. In preparation for Motorama, I developed some new attachments to counter those bots that I thought were the toughest competitors.

First, there are the

wedges and flippers. These need to get under your bot to be effective. To beat them, you stop that and, in turn, get under them so you can push them around, overturn them, or slam them against the wall.

The top Beetleweight flipper at the moment is The Revenge of Doctor Superbrain (Figure 1). I designed a low angle, pivoted wedge (Figure 2) that works even if the bot is inverted. The shallow angle

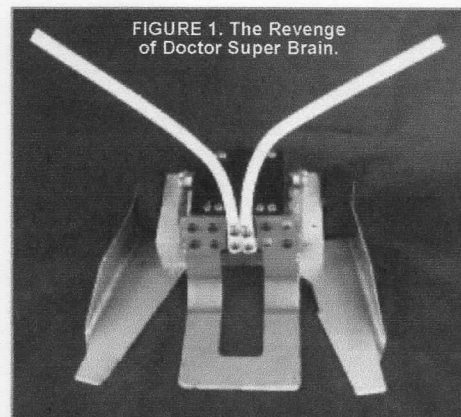


FIGURE 1. The Revenge of Doctor Super Brain.

and sharpened front edge mean that it will have a good chance of success over most wedges and flippers if driven well.

Traumatizer (Figure 3) is an effective horizontal bar spinner and the best defense is a simple solid wall. As the spinner hits the wall, it can do little damage. However, Newton's 3rd Law applies the same forces to the spinner and with luck, the spinner will break before your bot does. I attached a 1/2" thick block of UHMW (backed by a foam block to further absorb the hits) to the same standard mounts on Trilobite (Figure 4).

Weta — God of Ugly Things (Figure 5) — is a fairly typical drum spinner. These designs work by biting into the opponent and using the kinetic energy stored in the rotating drum to rip parts off or throw the opponent up into the air. To defeat them, I attach a narrow and very solid UHMW wedge to a thick titanium plate (Figure 6). This works by getting under the drum so that when the teeth contact the wedge or the plate, it's the drum bot that gets thrown not Trilobite. With the weapon on the drum bot neutralized, it becomes a pushy fight and the advantages shift to Trilobite with its more powerful drivetrain.

Mr. Croup (Figure 7) has been one of our main rivals in recent years. Its powerful vertical beater is combined with a ground-hugging

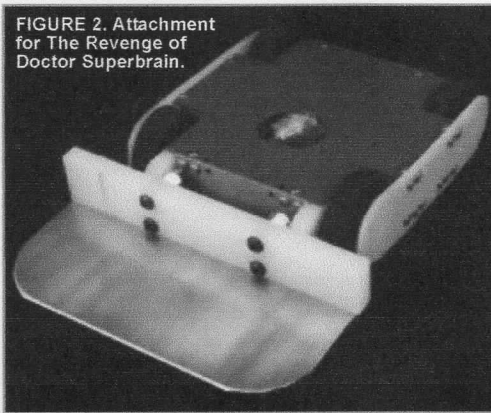


FIGURE 2. Attachment for The Revenge of Doctor Superbrain.

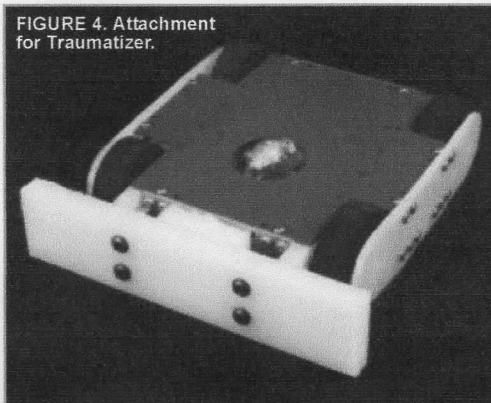


FIGURE 4. Attachment for Traumatizer.

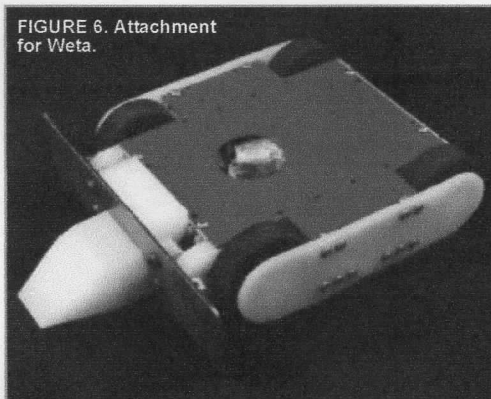


FIGURE 6. Attachment for Weta.

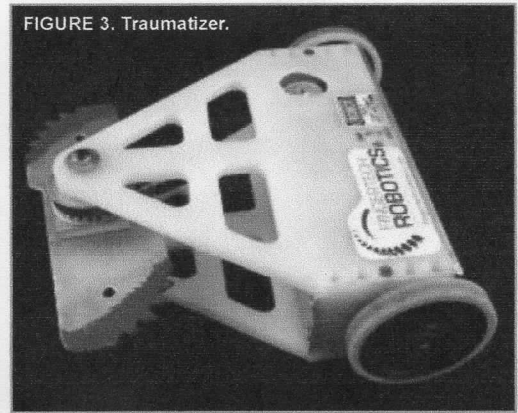


FIGURE 3. Traumatizer.

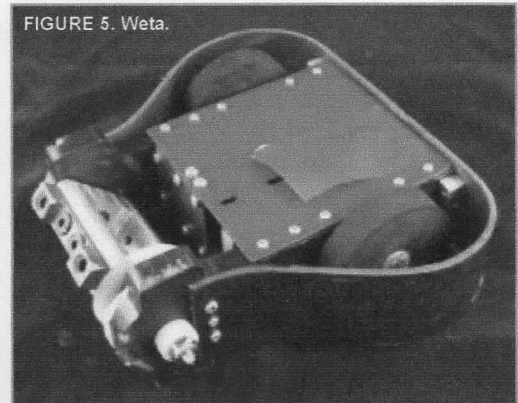
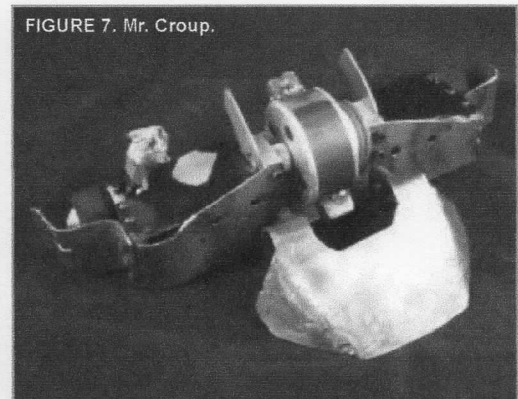


FIGURE 5. Weta.



wedge. It is, however, very wide with large vertical panels on either side of the wedge. I made a large U shape out of 1/4" UHMW and faced the center section with a thick titanium panel (Figure 8).

It is intended that the extremities of the U shape will contact the vertical panels on either side of the wedge and allow Trilobite to push Mr. Croup while simultaneously keeping the wedge and the beater bar from making contact. This neutralizes their weapon and again shifts the

advantage to Trilobite.

At Motorama, only two of the options were used. The wedge proved useful in beating Ripto and the anti drum attachment was used in a fight against Weta (a loss due more to luck than skill on my part, as I was driving Weta and my son, Andrew, was driving Trilobite). Mr. Croup was not at its best and was knocked out early by Weta; we were never drawn against a horizontal spinner like Traumatizer.

I will design at least one more

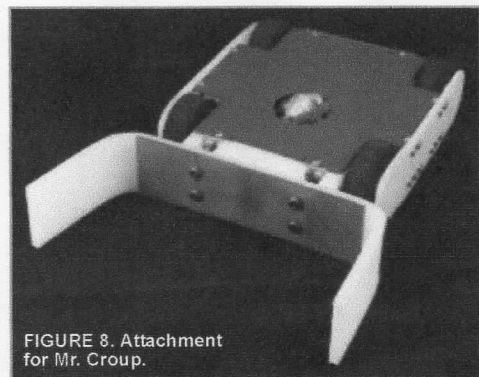


FIGURE 8. Attachment for Mr. Croup.

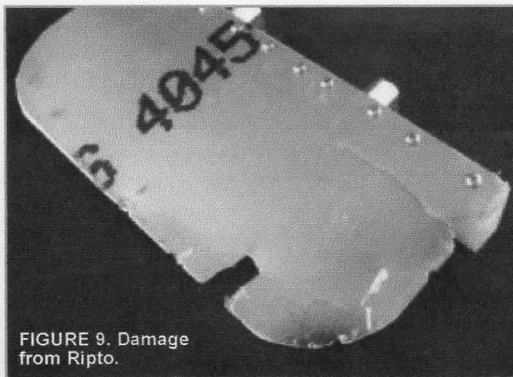


FIGURE 9. Damage from Ripto.

in a judge's decision. I will also replace the 7075 aluminum in the plain wedge with titanium, since it suffered a lot of damage (Figure 9) in its fights against Ripto.

It's not enough to just focus on making your bot. You need to also look at your possible opponents and

attachment. A large dustpan type scoop would have been useful to

help control an RC toy based bot, Chobham, which defeated Trilobite

be ready for when you meet them in the arena. **SV**

BUILD REPORT:

Siafu: an Army of Ants – Part 2

● by Pete Smith

In Part 1 of this series, I outlined the design process I went through to establish the basic layout of my new drum Ant kit. In Part 2, I will detail the design of the drive motor mounts, the hubs and wheels, the drum and its mountings, and the design of the front wedge profile.

The new motors are similar to the larger ones used in my Weta and Trilobite Beetleweight kits. They have a cylindrical gearbox and a motor no larger in diameter than the gearbox. There are two M2 tapped holes in the front of the gearbox – again similar to the larger motors.

I designed a flat plate that could be mounted onto the front of the motor (Figure 1). The first plates I made were 0.030" thick aluminum but while these worked, I found that 2 mm long screws were a little too short and 3 mm ones were a little too long and interfered with the mechanism inside the gearbox. A thicker 0.060" plate allows the 3 mm screws to secure the plate without damaging the internal gears. Four holes sized for #2 screws provide a method to secure the gearbox to its place in the chassis.

In the past, I have used Dave's hubs and Lite Flite wheels (Figure 2)

in my small bots. These have worked well. They are light and resistant to damage, but I have found that the Loctite® required to secure the outside washer can make it hard to remove, plus access to the motor mounting screws is difficult without removing it. This can be a problem in a competition if a wheel or motor is damaged and needs to be replaced. A different Loctite may help, but I decided to try out another design of the wheel and hub in the Ant.

Banebots (www.banebots.com) offers an alternative hub and wheel. The hub is hexagonal (Figure 3) and is held to the motor

FIGURE 1. Ant motor plus mounting plate.

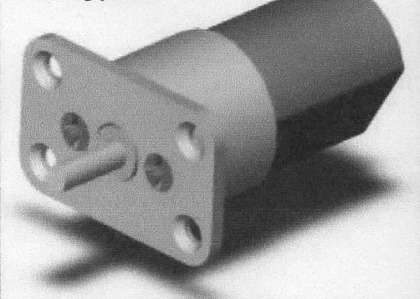


FIGURE 2. Dave's hub.

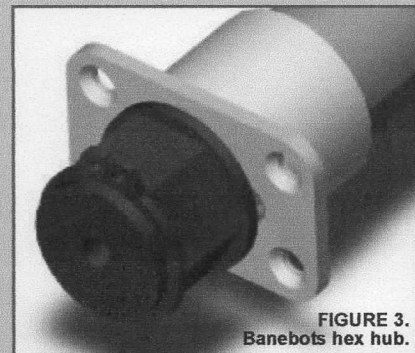
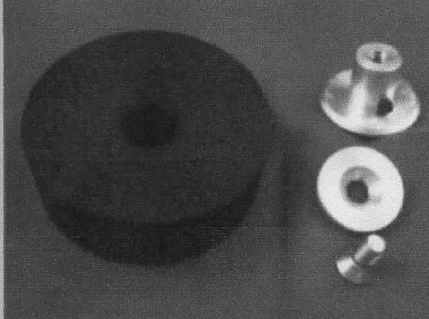


FIGURE 3. Banebots hex hub.