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Theory of Robot Design

48 min read • original

***(Note:** Sections with this color are written by* Kevin Hertzberg*, everything else by Eric Foley)*

(Click here return to the RoboWar HQ) Greetings, warrior. You have somehow summoned the courage to wade through the alien mixture of robotics and sorcery to the tortu... er, research labs of Oromorth, to learn of the Dark RoboMaster's observations on the design of warrior machines and to partake of his instructive sample machines to learn something of how these warriors may be constructed. The information and samples contained herein is provided as a rare token of public service from the Lord of the Darkbringers, and is not promised to be a complete rundown of all the Master knows or is capable of building on any provided subject. It is also not promised to contain all ideas the Master may have swarming about his twisted mind, so beware... there may exist Darkbringers that do not follow the paths mapped out here. If you have the courage to face some of them, and you came from the portal maintained to this place by the RoboCreator, you may climb the stairs to

the main fortress of Oromorth and see them. Or perhaps you sought not the discourse on the design of machines, and were instead looking for the Master's tale of the History of RoboWar Tournaments.

The theory of robot design is central to RoboWarfare, and long thought on the subject is what made the Dark Lord one of the most prolific RoboMasters in the history of the game. The Archfiend has devised many creatures of his own, and has corrupted the warriors of other origins to his own uses. His main weakness as a designer is that he sometimes does not pursue his own new ideas until the minions born of them are mature. He has on several occasions envisioned new paradigms of robotic construction that were months or years ahead of their time, but which he had not the patience to develop to their potential in favor of existing, already-proven paradigms. His main strength as a designer is that he is extremely capable of determining the weaknesses in existing machines, and on devising methods of tinkering with them so that he might turn his enemies' powers against them in new ways they had not conceived themselves.

Before we go on, let it be known that this page will often make reference to two different ages of RoboWar. There actually have probably been three, but this essay considers the first two to be one single first age. These three "semi-ages" are divided very cleanly by the advent of the 5000-instruction limit and by the implementation of the doppler

register. The instruction limit made a major difference, simply because the robots were able to use much more elaborate and effective designs once the limit on the number of instructions they could use was raised from 500 to 5000. It is a fair estimate that an effective modern robot usually has about 2000 instructions for a single mode, to provide a perspective. However, since the basic tactics of robots didn't change as much as they did surrounding the advent of the doppler register, and since the pre-5000 semi-age was rather short, this discussion places the first two "semi-ages" together.

This essay traces the ages of RoboWar by calling them the "pre-doppler" age and the "post-doppler" age. There simply has been no single feature of the game that has changed the robots fighting in it like the doppler register. This register allows extreme ease of leading one's shots, whereas doing so before required a careful timing and spacing out of the look and aim registers. Only two robots in tournament play were able to aim their shots at all accurately by leading them in the pre-doppler age: Excelsior by Jeff Rommereide in the Fifth Tournament, and the Dragon Knight by this essay's author in the Sixth. Excelsior did so by use of complex trigonometry, and this author did so by doing a simple multiplier on how much the look offset was when an enemy was allowed a chronon in which to move.

However, the doppler register made all such considerations obselete. Before the doppler register, any movement at all was assured of moving you out of the way of an incoming shot, so long as that movement wasn't parallel to the shot's path. A robot simply had to be assured that his movement was at a right angle to the shot in question, and he was fairly safe. Defensive algorithms were extremely effective in the pre-doppler age, though many defensive algorithms from then are still effective in the post-doppler age. However, in the post- doppler age, the game has been changed enough that *some* defense is needed in order to stay alive against an enemy that uses a defense of its own. The only form of robot that can expect to be effective without much defense of any sort is a very good offensive robot, though even these need to use *some* form of defense to be effective in a tournament.

At that, the sections on known RoboWar design paradigms are given below. For those who don't want to wade through this document looking for them, there is provided a table of contents of links below. Those links with a green ball or an asterisk, depending on your browser, are those that are mostly defensive paradigms in nature. The ones with a red ball or the "at" sign are those that are mostly or purely offensive. Each robot paradigm described here (except for pacifists and drone-swarmers, since these are no longer viable tournament fighters) has a link provided to a sample machine of that type. These samples are not copyrighted, and may be copied in whole or in part by any who may

download them. They are provided in the hopes that they will be instructive and useful, but with the warning that the author makes no warranties as to their bug-free status (though they should be bug-free) or to their effectiveness in an official tournament.

- The Gun Turret - (Win Sample) / (Mac Sample)
- The Defensive Gun Turret - (Win sample) / (Mac sample)
- The Wanderer - (Win sample) / (Mac sample)
- The Machine Gunner - (Win sample) / (Mac sample)
- The Wall Hugger - (Win sample) / (Mac sample)
- The Corner Hopper - (Win sample) / (Mac sample)
- The Stun-Streamer - (Win sample) / (Mac sample)

The Machine Stunner - (copy of B-ko (Win)) / (copy of B-ko (Mac))

- The Yo-Yo - (Win sample) / (Mac sample)
- The Hesitator - (Win sample) / (Mac sample)
- The Fadeaway - (Win sample) / (Mac sample)
- The NeoDasher - (Win sample) / (Mac sample)
- The Arcstunner - (copy of Mortality (Win)) / (copy of Mortality (Mac))

Strategies that are not allowed anymore:

- The Dasher - (Win sample) / (Mac sample)
- The Drone-Swarmer - (Win sample)

Download all Samples (Win)

The Alliance of Pacifist Scum

One quick note on terminology: this essay will commonly use the term "hellbullet" and "hellmissile" to refer to bullets and missiles that are fired along with hellbores synchronized to move at the same speed as the weapon they're expected to knock out the target's shields for. This is because hellbores are never fired by themself, and it makes a nice shorthand for the weapon as a whole, rather than using the long phrase "hellbore-tipped this or that."

The Gun Turret

(click here to download sample)

The gun turret is a machine that has had two different heydays in RoboWar. The first, of course, was the early days before people could design much in the way of moving machines. The second was in the early days of the doppler register in our modern era, when a few designers decided that since robots could aim their shots to catch anything, there was no point in bothering to move, and instead energy should be conserved for pure firepower. One of these designers even asked philosophically if RoboWar design theory had indeed come full circle.

As the name implies, a gun turret basically acts like a gun emplacement, doing nothing more than sit there and look around with its turret for targets to shoot at. The ancient gun turrets didn't lead their shots, modern ones do. Modern gun turrets sometimes will use a shield, and their weapon of choice is usually explosive bullets. They don't use a great deal of their hardware on processor power, since the processor speed necessary to just aim and shoot isn't all that big. Instead, they reserve their hardware points for resilience, energy, and weaponry, all of which are necessary to an effective gun turret. When you don't move, you're going to get hit a lot, and if you're going to get hit a lot, it's best to have plenty of armor on you to take it before you go out, as well as plenty of energy and the weapon type to use it efficiently in hopes of eliminating your opponent before he can do so to you. If you have the long range so that you can safely fire explosive bullets, saving the extra for shielding while conserving enough that you can make a follow-up shot never hurts. Modern gun turrets usually fire their weapons in big enough doses that any unshielded robot that is struck by them is going to be destroyed in one shot. When you're this vulnerable, it doesn't pay to dink around.

Gun turrets are very effective in an arena against other robots that have defenses as poor as their own. Wanderers and wall-huggers that don't use any means of defense get

chopped to bits by these guys in a big hurry. Any robot who uses effective defense will win the vast majority of battles against these guys, however.

Modern examples of gun turrets in tournament action include the Happybot VII's, the Snow Goons, and the Benzene critters. All of these appeared in the Eight Tournament. However, with the discovery that defensive algorithms have not been negated by the doppler register, few tournament robots have opted to be gun turrets since then. The only ones known to have been built at all have been various team-combat members of the continuing Happybot line.

Defensive Gun Turret

(click here to download sample)

Some might not consider this category as a relative of a stationary gun turret, but it's so close in terms of how it acts while it's shooting that there really isn't a good reason not to describe this as a real relative.

The defensive gun turret typically doesn't fire all its energy into single shots, like the regular, stationary gun turrets do, unless the target is at really close range. At long range, a defensive gun turret just tracks its lone target and shoots modest firepower at a time. When the robot sees a shot coming in, it moves out of the way and resumes a stationary

position a short distance away. It then continues to track the target and resumes its preparations to shoot. A defensive gun turret usually has a "magic number" of energy, at which point it will fire its shot. Most defensive gun turrets are designed for single combat, and will track a single target. Others are more general, and just look around at random and shoot when they find something. This latter approach makes the defensive gun turret more effective in group combat.

It is at this point that a definition should be given of a "defensive algorithm." A defensive algorithm is any technique which is designed to evade an incoming shot. Defensive robots maintain a certain speed or position, and change speed in a manner intended to be unpredictable by an enemy shooting at the defensive robot, in hopes of evading incoming fire. There are two main general methods of defense. The first, and most easily-recognized, is what is called "active" defense. An actively defensive robot explicitly watches on his radar to see if a shot is coming at the robot, and moves to evade the shot at that time. The other method, which is more subtle, is what is called "passive" defense. A passively defensive robot, usually some form of robot that is in virtually continuous movment, will go in a given movement pattern, but will change its speed suddenly in order to throw off any shots that had been fired at them at the previous speed.

The defensive gun turret uses active defense. It usually has a general algorithm used to track and shoot at its enemies, and an active defense that determines where to go depending on where it is at the time and which way the shot is coming in. The robot's programmer programs the general aim-and-shoot algorithm without a real concern for where he has to go. If a shot is coming from a vertical direction, the robot dodges horizontally. If it's coming from a horizontal direction, the robot dodges vertically. For safety reasons, the robot usually dodges towards the wall they are farthest away from, i.e. if they're on the left side of the screen, they dodge right and vice versa.

The defensive gun turret has an advantage over other defensive shooters in that they can work anywhere on the screen, and as such the range to their enemy is less than if they were shooting from the corner. However, the main disadvantage of a defensive gun turret is that they are *extremely* vulnerable against the machine gunner paradigm (described elsewhere in this page). This is because the machine gunner shoots so many low-power shots that the defensive gun turret is spending all of its time dodging back and forth without getting any shots of their own off. The defensive gun turret quickly is forced to the midpoint it selects as the border between when they will dodge in one direction or the other, and bounces back and forth over this border while the machine gunner slowly melts him down.

The first defensive gun turret was Excelsior, the winner of Tourney 5. However, the weakness against machine gunners was quickly exposed, as the first machine gunner, Skittish, also appeared at Tourney 5. Though Skittish was unable to stop Excelsior from winning the tournament due to the minimized effects any one robot can have on another's performance in a round-robin tournament, the illustration of the weakness right on the verge of the introduction of what was then a revolutionary strategy dimmed the glory of Excelsior's greatness.

Many recent machines have adopted a defensive scheme very similar to a defensive gun turret in conjunction with other techniques. Modern examples of effective use of this defense as a backup for other purposes include Retiarius, Bach Plus, B-ko, and Nightshade.

Some other recent robots use the same basic structure as a defensive gun turret (i.e. they track, and dodge in a way determined by the way their turret is currently aimed) but will run all the way across the arena rather than stopping a short distance away. After they have had to dodge shots a few times, these robots begin to closely resemble corner hoppers, because they quickly begin spending most of their time in stationary positions in the corners of the arena. However, this is more of an accident than a real blurring of the paradigms, since the basic features of a defensive gun turret and a corner hopper are distinct.

The Wanderer

(Click here to download sample)

The wanderer is basically a robot that wanders. To be more specific, it just moves around in a relatively aimless fashion, and shoots when it sees a target. A wanderer has only one state in which it executes a continuous search loop without caring where it is or where it's going, and remains in this state at all times except for momentary interruptions when it either changes its movement at the edge of the arena or when it fires. Wanderers will often rotate their turrets somewhat, and shoot a modest-power shot. Their rate of fire usually isn't much, as they often will shoot a shot of fixed power that is great enough that they can't do it too often without going into negative energy.

The wanderer has been around since the ancient days of RoboWar. The first wanderer was the very Movebot himself, one of the first two robots ever created. The first effective wanderer was Silo IV, created by Matt Sakai. Probably the most effective pre-doppler wanderer was the Jachyra, created by this author before the Third Tournament, and which survived long enough as an effective machine all the way to the end of the pre-doppler age. The first effective post-doppler wanderers include most of the winner's circle from the Seventh Tournament.

Wanderers are not particularly effective in the modern, post-doppler age unless they have at least some form of defense. A robot that moves without any regard to defense is easily tracked and shot, even by the most primitive of gun turrets. A typical defensive wanderer will move very slowly at one time, and speeds up quickly when an incoming shot is detected. An example of this is the ToonBot by Jeff Lewis (though the ToonBot sometimes also acts like a defensive gun turret as well). A few wanderers have also opted for the hesitator defense.

The Machine Gunner

(click here to download sample)

A machine gunner fires large numbers of low-power bullets in hopes of defeating the defenses of an enemy by sheer volume of bullets, making it as hard as possible to dodge every shot. The first two machine gunners were Skittish, sent to the Fifth Tournament, and the Dragon Knight, sent to the Sixth.

Every known machine gunner uses either normal or explosive bullets. Most effective modern machine gunners use explosive bullets. This is because the use of so many low-power bullets is not all that efficient in terms of how much energy is expended compared to how much actually hits. Thus, explosive bullets are often used in hopes of making up for this.

Battles between machine gunners are often fairly exciting to watch, because of the sheer amount of firepower being slung around. Battles between machine gunners and corner-hoppers are also somewhat interesting to watch the balance of two shooters slinging shots at each other, one of which is getting a lot more firepower in the air while the other is playing more conservative and only shooting when they have a clean angle of attack.

The first machine gunners were constructed as a small modification on the wanderer paradigm. This made for rather poor defense, which prevented most of them from getting all that far in the tournaments. One of the first post-doppler machine gunners, Mjolnir, integrated the machine-gunning offense into a yo-yo defense, which was quite effective against most enemies other than dashers.

Most machine gunners today incorporate either a hesitation stop-and-start, a yo-yo motion, or a defensive gun turret scheme in order to facilitate defense while they fire a lot. One of the challenges machine gunners face is that they have a very small distance between themselves and their shots through which they can see incoming shots. Hesitating machine gunners largely cure this problem with passive defense, while yo-yos or defensive gun turrets will either space out their shots a little more or simply be prepared to use a "move" instruction to dodge whenever a shot comes within the exceptionally short radar perimeter it allows

itself. Bach Plus, who placed sixth at the Thirteenth Tournament, combined the highest rate of fire ever seen from a machine gunner with a defensive gun turret algorithm, thus largely curing the defensive problems that plagued past machine gunners. A number of machine gunners have also opted to make use of hesitator defenses in order to avoid the problem of having to use lots of CPU time for defense at the same time as trying to put out lots of shots.

By the way, this robot paradigm is not to be confused with the "strafer," an ancient idea that took hold of folks' heads before the tournaments even started, that never was all that effective to begin with, except that people seemed to think it was really great because it could blow away lots of TimBots teamed together. Aside from that great accomplishment (snicker), the strafers were kind of pitiful. The idea was to cruise along the walls and shoot scads of missiles of one point of energy each. They sucked to begin with even in the wee days of the pre-doppler age, and they'd get annihilated if anyone was stupid enough to use one today, because the missiles would only do two points of damage per hit, and any decent shooter would reduce the things to their component atoms unless they employed a good passive defense, and even then it would not be amiss to give at least ten to one odds in favor of any decent robot fighting a strafer. Strafers aren't covered except to mention that they aren't the same as machine gunners because of this lack of effectiveness.

The Wall Hugger

(click here to download sample)

The wall hugger is another of the most venerable designs in the game. The wall hugger moves either back and forth along one wall or in a rectangular motion around all four walls. The wall hugger shoots at basically whatever shows up in his sights while he's at it.

Probably the first effective wall hugger was Aeneas III, by the creator of RoboWar himself, David Harris. It's also probably the last robot that David ever wrote that was effective in its day, which gives you a rough idea of how long it's been since he undertook to play his own game.

Wall huggers today all employ passive defense if they expect to survive very well. Two examples stick out. One is the hesitator strategy used by the Horta series, among others, built by Jeff Lewis. However, those are different enough from all other wall huggers that this essay separates them into their own section. The only ones that have been submitted to the last few tournaments are the Orb of Doom IV by this author and Wonderdog in the Seventh Tournament. Wonderdog doesn't have any particular defense to him, and as a result he's not different from pre-doppler age wall huggers except that he uses doppler himself. Orb of Doom IV, however, represents a passive defense strategy in the normal sense of the words. The Orb

IV starts from a given corner at a moderately fast speed, and continues outward from there for about a third of the length of a wall. At that point, he speeds up to his maximum for the remainder of the wall. Any shots that are aimed at him while he was going at his first speed will fall behind him at the faster speed. Any shots that are shot at him in his second speed, it is hoped, will miss him because he'll reach the wall before they catch him.

The basic idea of most passive defense is to change speed at intervals the enemy can't predict, so that his aiming will be ineffective because his target isn't being cooperative enough to move in a consistent manner.

Coyote could be considered to be a wall hugger with passive defense, in that he continuously moves and changes direction often. This is not always as effective a passive defense, because changing direction at his speed costs a lot of energy, and is completely ineffective if the shot intended to be dodged is coming from a parallel path to his movement. In this case, a means of moving to a different wall to resume a similar algorithm is in order.

The Corner Hopper

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The corner hopper is probably the most classic strategy in RoboWar of all time. It is also one of the ones that has proven to have the best staying power of any paradigm ever devised.

The corner hopper's design is characterized by a defensive algorithm that puts the robot in a corner to start the battle. The robot then has an optimal defensive scanning position, since he only has to make four radar checks to survey the entire area from which shots might come at him. If the robot sees a shot coming in, he dodges towards the corner away from the direction the shot is coming from. For instance, if the (in)famous corner hopper commonly referred to by this RoboMaster as Boring Birdo (AKA Pacifist Penquin III, but this author prefers to call that miserable avian by this alias to express his intense dislike of just how good a cure for insomnia this insidious creature is) were in the top right corner, and saw a shot coming from below, he would zip out of the corner along the top wall towards the top left corner. If he were in the top right corner and saw a shot coming in from his left, he'd go along the right wall towards the bottom right corner.

Although the unutterably dull Boring Birdo is often given credit for starting the corner hopper trend, the origins of this paradigm go back farther, to pre-5000-instructions semi-age (which made it quite a feat to cram a full corner hopper algorithm within only 500 instructions with no interrupts). The first corner hopper was Chicken & Corn II,

sent to the Second Tournament. The first corner-hoppers to emerge in the semi-age of 5000 instructions were His (first) All Seeing Eye, sent to the Third Tournament, and Dark Lord version 4, built in this author's own private machinations before that tournament, and eventually evolving into the titan who was cloned off as the Krulockh Lord to win the Fifth Tournament's titan round.

Some more recent robots to use this tactic in individual combat were the Artful Dodger, who placed third at Tourney 8, and the Soul Deliverer and MAGIC BUNNY, both entered in Tourney 10. The Soul Deliverer uses a variant of this tactic, in that it will wander a short distance out from the wall in hopping between corners in hopes of dodging shots along the wall. In addition, he attempts to evade stun-streamer attacks by going so fast that he is free of the stream before the stun effect of the first hit can take hold.

Denys Seguret has been a faithful devotee of the basic corner hopper idea, only in combination with other backup defensive tactics that make them more than simple corner hoppers. The fruits of this have been Anephode in the Tenth Tournament, a corner hopper that uses the hesitator scheme as a defensive backup, and Dialectix in the Twelfth Tournament, which uses the fadeaway scheme as a defensive backup. These are explained in those sections. Allan Crossman posted the most recent corner hopper in the

DeathSphere, who made his way through the unofficial tournaments with some success before posting a moderately good showing at the Thirteenth Tournament.

The Dasher

(click here to download sample)

The dasher is probably the most mindlessly aggressive, gutsy, and *in its day* was one of the most uniformly effective tactics in RoboWar. Today, however, the writing is clearly on the wall for this paradigm, with no dashers having placed anywhere in the Hall of Fame at the Thirteenth Tournament.

A dasher is characterized by its effort to "dash" straight up to an opponent in order to deliver a single, lethal shot at point blank range. Modern dashers compound their quick movements towards their enemies with a last-minute hop for the final distance, in hopes of going from outside the boundary at which an enemy will fire a kill shot, to point blank range and deliver the death blow before the target realizes that he's there. With the advent of the doppler register in the post-doppler age, though, some robots have taken to shooting their kill shots from farther away, surmising that they will be more accurate. Against dashers that do not combine their courageous offense with some defensive idea, this is effective. However, against dashers that combine good offense and good defense, this can be

suicidal, particularly if the dasher can get away from the shot before making the final hop or perhaps even skip over it during the hop.

Not all dashers delivered lethal blows from that close up, nor do they all necessarily go all that fast in order to strike. One of the first dashers known to have been devised, this author's own Telzak from way back before the Third Tournament, wasn't smart enough to deliver a lethal blow. This author saw the potential for a dasher once the sin and cos operators were provided in the game, but this is one of those spots where his weakness of not having patience to develop new ideas when he hasn't seen their potential proven got the better of him.

The first dasher to appear in a tournament was the Terminator II, which showed up in the Third Tournament. However, he didn't do all that well at the time, and as a result not much attention was paid to the idea from him, either. The first effective dashers were the Darling series that was sent to the Sixth Tournament by Stephen Linhart, and the Death Penquin sent to the titan class round of that same tournament by Doug Harris. These two used completely different ideas for the final kill. The Darlings used the hop-in-and-kill idea in common use today, while the Death Penquin came in at light speed (defined by this writer as the maximum speed on the X or Y plane allowed in the game, 20 at this time) until he reached point-blank range, delivered

his kill shot and then hopped halfway into the next time zone to be out of the way of a retaliatory strike. Since then, several different forms of dashers have been used, with several different twists on the theory.

The Darling used the sin and cos operators to calibrate his direction, as virtually all modern dashers do. Death Penquin, on the other hand, zipped to the left wall at the beginning of combat and zoomed out horizontally or vertically without using trigonometry to dash. True to Doug Harris' long-time problems with making his robots bug-free, if Death Penquin misses his target on the first attempt, a bug of some form prevents him from operating properly enough to make a second try. The sequel to Death Penquin, CL97, seems to have patched this problem, and continued this offshoot dasher idea without using hellbullets. However, CL97's claim to fame is more because of his insta-nuking of the arena in group combat, rather than his ability in single combat.

His All Seeing Eye III, sent to the Seventh Tournament, used a variant on the dasher theme which had him moving in an arc path on the way in. This was in hopes of a passive defense to throw off enemy shots on the path of his dash. However, he goes slowly enough that he is fairly easy to kill off for a stun- streamer, if indeed it realizes that it's under attack in time (the old pacifist version of Arachnee didn't).

The original Darling and the sequel version in the Seventh Tournament, Sweetums, both fired little potshots intended to flush defensive robots out of their reveries to make sure that they didn't make any sudden moves while he was at close range. Sweetums, however, has a problem with keeping his head from hitting the wall. This problem was patched in the next installment in the Darling series of Stephen Linhart, Sweetie. Sweetie, in fact, is able to defeat Jade in single combat more often than not due to the havoc that Jade is subjected to by the potshots. Unfortunately, this is as good an example of any of how the round-robin format of the tournaments makes one's performance against any one enemy insignificant in a large tournament.

The current modern dashers are largely based upon Jean-Francis Lechat's Jade. Jade and his twin, Delsevart, won the top two spots at the Eighth Tournament, and the dasher plague dominated all tournaments run since until the streak was at last broken by Dialectix and Nightshade in the Twelfth. Jade travels at light speed towards his target and uses hellmissiles to make the kill. Hellmissiles are perhaps the most energy-efficient method of making a kill for a dasher, since the slow speed of the projectile is not a significant factor at the point-blank range used by dashers, and an expenditure of 80 points is guaranteed to kill any robot that hasn't been through a ResEdit session.

Jade's only real weaknesses in his solo mode are that his front end routine, which closes in on its target slowly until a shot is fired, at which point it goes into the hallmark scoot-aside-and-dash routine, is relatively weak if an enemy fires a dummy shot, is dashing itself, and can deliver a quick close kill-shot of its own before Jade realizes what's going on and does his own dashing. This is due to the fact that Jade is programmed not to dash yet if it detects its enemy moving at a high doppler, because Jade does not employ doppler itself to follow its enemy and thus needs an enemy to be going relatively slowly to follow it effectively. Thus, while Jade's still scooting aside, it stays in a blank search mode and will do nothing if you deliver a kill before Jade begins to dash. Numerous robots caught on to this in the Eleventh Tournament, and Jade's dominance fell at last then.

Most dashers use doppler to intercept their targets today. The first dasher to use this was this author's own clunky, graceless Hargon, built way back before the Eighth Tournament. He was never considered effective enough to enter a tournament, however. This tactic was first introduced to the public by the Death Bunnies (first edition) and the Krulockh in the Ninth Tournament. They were slightly less clunky than the Hargon was, though still far less graceful than Jade. Colin Jaffe took note of this tactic and incorporated it into his own dashers, more successfully than this author did. His Robocide and Killer DogCows (moof!) in the Tenth Tournament brought doppler interception

together with a bit more graceful movement tactics to provide more accurate following of a target. The DogCows have a much easier time making the final kill as well, since with the doppler interception it loses track of its target less often than without it, so it doesn't have to do as much checking to see if it's lost its target in the crucial chronon of the actual kill, in which getting everything within one chronon's worth of processor speed is the "make it or break it" factor.

What will likely prove to be the final evolution of the dasher is the "jerking" dasher, named after a phrase coined by Colin Jaffe. A jerking dasher delivers its shot and hops aside at the last second, rather than relying upon shields to protect itself from counterattack. Jerking dashers are probably the most effective form of dasher that is feasible in the game, as it becomes very difficult to counterattack by the normal anti-dasher means. Many anti-dashers will track a robot and try to kill it after it has made its final assault. They will then try to hop aside to dodge the counterattack. This usually can hold dashers to 25% scoring while getting 50% oneself (due to the bias scheme of RoboWar at the time of this writing, little more than this is possible with a direct head-on counterattack). Many dashers themselves employ an anti-dasher counterstrike in addition to their regular dasher assault today.

Today, it is quite possible that the dasher is obselete as a dominating paradigm at last. At the Twelfth Tournament, Dialectix defeated dashers with his fadeaway anti-dasher technique, exposing weaknesses in their tracking algorithms, while Nightshade and his horde held them down with sheer numbers and simpler anti-dasher counterattacks. At the Thirteenth Tournament, perhaps a more serious and long-lasting weakness of dashers was exposed: the hardware for effective dashers (fast CPU, high energy, missiles) is not effective in group mode against heavily-armored machines making good use of explosive bullets. In the finals of the mortal round of the Thirteenth, two hesitators were able to defeat both Dialectix and all the dashers in the tournament without even bothering to integrate an anti-dasher technique of their own, simply based on their dominance in group rounds. In the titan round, anti-dasher tactics were good enough that B-ko was able to dominate the bots that used them much more effectively than the dashers were, giving her a dominant win there. Much debate has broken out in RoboWar circles concerning whether dashers are truly obselete. The question, most likely, will be answered at the Fourteenth Tournament.

Dashers did however return in the fourteenth tournament. The game tended to become dull and boring when only one strategy dominated, so Eric Foley and Lucas Dixon implemented the **move-and-shoot restriction**. This means robots can't use movex/movey and shoot in the same

chronon. The **move-and-shoot** restriction was a brilliant idea by Eric Foley. There where ways to stop dashers before the Move-and-Shoot restriction was invented. But then again, it was way easier to build an effective dasher than an effective normal robot.

However, dashing is still an effective strategy in modern RoboWar, but not superior all other strategies as it used to be. For more info on modern dashers, see the NeoDasher.

The Stun-Streamer

(click here to download sample)

The stun-streamer launches a continuous stream of low-power stunners such that if a robot is struck by one of the stunners, they will be hit by the entire stream. A robot launching the stun-stream can then be assured that if he has struck his target with one of his stunners, that the enemy will never wake up to find out that he's dead.

The stun-streamer was once thought to be the optimal paradigm that uses stunners. The stun-streamer held this position because it is able to assure a kill without committing itself to the final assault until it actually has someone caught. The energy needed to shoot a stunner that stuns for just one chronon only takes 4 energy, and only one of these is fired each chronon, meaning that the net

expenditure over each chronon (the stunner power minus energy recovery from the robot's generators) is 2 energy per chronon. This minimal expenditure is made in return for an ironclad guarantee that the enemy is doomed from the moment any stunner in a stream touches them. If a stun-streamer misses with one stream, the energy used is so small that it quickly recovers enough energy to start over and shoot another stream.

This paradigm was pretty much defined by Jean-Francis Lechat's Arachnee. This author had thought of an idea similar to this before seeing Arachnee, but once again his own weakness of giving up too easily on neat ideas that haven't been proven prevailed.

It quickly became clear that Lechat was not investing more time into this paradigm beyond the simple proof-of-concept phase, as Arachnee went through several tournaments without major modifications to his stun-streamer engine. Arachnee might seem deadly, but he does have his weaknesses. The most obvious one was that his offensive potential was, until Tournament 10, squandered by the fact that he waited for his enemy to make the first shot. If he was up against a dasher worth his salt, and the dasher doesn't warn him by firing before he's close enough to melt Spider-Bot down, pacifist Arachnee was quite reliably toast. By way of example, the first Death Bunnies got clean kills on him

about 80% or more of the time. This has been corrected somewhat now that Arachnee has been modified for a more deadly world.

Another of Arachnee's weaknesses is that he has only a 30-speed processor, which slows down his ability to search for an enemy if he loses track of him. Once Arachnee has stopped shooting, he's fairly good at keeping track of the target, but his tracking routines while he's in the act of shooting suck. The usual result is that Arachnee will very often lose track of his target if the target changes direction or stops outright, and won't notice until his stun stream has been shot to its full length without hitting anything. If the opponent is a dasher and is coming in at a path away from the stream, this leaves Arachnee dead more often than not.

Perhaps Arachnee's most long-standing weakness is that he only can fire one or two streams before he has to stop and recharge to leave himself with enough energy for the final run-in and kill. As a result, a good defensive robot, particularly a defensive gun turret, can do very well against Arachnee by simply dodging his streams indefinitely. A defensive gun turret does this by moving away from the first one when it is fired at him while he is stationary, while stopping before running into the second stream fired to hit him while he is moving. Arachnee stops, recharges, and the process is repeated.

This inability to flush defensive robots out of their trenches is the one weakness that will be most difficult to overcome in the race between stun-streamers and dashers. A dasher has little problem overcoming this against anything short of a true fadeaway, since they will simply follow the defensive robot around and kill them wherever they run. A stun streamer cannot react so quickly, since the stunners already in flight cannot change direction like a dasher can. The flip side of this is that a stun streamer is not putting its own hide at risk by simply firing a second stream, whereas a dasher inherently puts itself at risk by going into close proximity if an enemy is ready for them.

Some of these potential problems have been patched in subsequent stun-streamers, such as the Succubus, this author's entry entry to the individual round of Tourney 10. However, that one amounted to little more than a rather kludgy prototype. The Archfiend's second attempts to implement this in Tourney 11, the fearsome titan Nightshade and his less effective mortal brother, Direwraith, were much more effective. Direwraith was able to reliably defeat the concurrent version of Arachnee in battle, as was Nightshade. These two were significantly more aggressive than Arachnee, firing several more streams at a time and keeping much closer to a target in order to leave the least room for escape. However, Nightshade's anti-dasher counterattack wasn't prepared for the hop-aside dasher strikes of SPAMbot and Defense Drone, and as such he performed a bit less

successfully than the Dark Lord had hoped. Nightshade is an example of a thoroughbred titan. Indeed, the hardware it required to implement his complex algorithms (both a 50-speed processor and probes were required to pull off all of his improvements over Arachnee) burdened Direwraith so greatly that he was unable to weather the storm against many fast-shooting enemies that Nightshade would have laughed at.

Direwraith is not reappearing as a result. Nightshade has been upgraded significantly in both his solo and group modes for Tourney 12, leading to him and his apprentice Igor (also a stun-streamer) placing first and second in the Twelfth Tournament titan rounds as well as (with a second upgrade) a second place finish in the Thirteenth Tournament's titan rounds.

Denys Seguret has recently dipped his finger into the stun-streamer paradigm. His effort, Retiarius, borrows a page from Arachnee at long range and zooms in for the kill once he has caught a target in his stream (though, unlike Arachnee, he steps aside first to avoid Arachnee's mistake of getting caught in other stun-streamers' streams in the process), and borrows another page from Direwraith and Nightshade and simply firing a lethal missile shot at closer ranges. In addition, Retiarius patches up one of the major weaknesses of this paradigm: the inability to dodge while in the process of firing a stream. Retiarius will cease firing a

stream and scoot aside if he is himself fired upon during this time. Alas, this band-aid fix is often more of a liability than an asset: if an enemy simply keeps pressure on with continuous harassing firepower, Retiarius will never "set his feet" long enough to deliver a stream long enough for it to hit and follow upon. Retiarius made up for this somewhat by being quite effective against dashers and at close range, but in the end it is this weakness that will bring him down. Even if he had made it to the finals of either the mortal or titan rounds at Tourney 13, he wouldn't have won against either the semi-machine gunning tactics of Magic Sword and Obsidian or the machine stunning tactics of B-ko.

All in all, the stun streamer had evolved to a point that it for a while it was coeval with the dasher as one of RoboWar's dominant paradigms. In the mortal rounds, dashers had the advantage over stun streamers, as they have over every other paradigm other than the fadeaway. However, in the titan rounds, stun streamers were ruling with a vengeance: starting with Nightshade at Tournament 12, all the official and unofficial titan rounds were won by stun-streamers. However, this period of dominance came to a screeching halt when Eric Foley's B-ko soundly defeated the stun-streamers at the titan round of Tournament 13. Nightshade managed to defend his title with a second place showing at that tournament, but it now appears that stun-streamers may also be on their way out.

The Machine Stunner

(At this point, B-ko is the only example in existence, so click here to download her)

The machine stunner has recently usurped the role of the optimal paradigm that uses stunners from the stun-streamers. The machine stunner is characterized by its use of large numbers of small shots with a rapid rate of fire in order to confuse an enemy's active defense, leaving it unprepared for the machine stunner's real threat: a single, powerful stunner. The constant harassment of the machine stunner's facade shots keep an actively defending enemy constantly off-balance so that they never see the stunner coming until it's too late. If the stunner hits, the result is exactly the same as when a stun-streamer connects with a stream: the target never wakes up to find out that he's dead.

The machine stunner holds its primary advantage over stun-streamers because it eliminates the primary weakness that stun-streamers have: they must remain completely stationary from the time they fire a stream until the time when the stream connects and they make their kill shot. The earlier stun-streamers used no defense when firing, thus making their streams more effective if they could hit but giving up a lot of hits. Retiarius solved this to some degree by being able to dodge while firing, but this required him to abandon any stream in progress, enabling enemies to slowly wear him down simply by keeping continuous gun pressure

on him. The machine stunner does not need to remain stationry, and as such it can keep its defensive movement intact without sacrificing its offense. Also, a stun-stream can often be avoided even when the first stunner hits by executing a "move" instruction. If you move out of the path of the stream, you only get hit by one stunner, thus allowing you to keep from facing a lethal situation. If the single stunner from a machine stunner hits, you're dead whether you hop aside or not, because the one stunner is much more powerful than any one stunner in a stream.

This paradigm was and is defined by Eric Foley's B-ko. B-ko used a light hail of machine gunning weaponry as her confusion device. B-ko demonstrated the advantage of this tactic over the older stun-streamer paradigm quite clearly at Tournament 13, where she soundly crushed all of the stun-streamers at the tournament on her way to winning the titan round going away. At present, no machine stunner other than B-ko has yet been published, so it remains to be seen what other authors may do with this tactic once they figure out how B-ko does it. It remains to even be seen if this tactic, which requires a great deal of hardware to support it, can even be constructed effectively at the mortal level.

The Yo-Yo

(click here to download sample)

The yo-yo might seem like an unusual name, and you're probably wondering what this essay is referring to. What this refers to is those robots that stick to a corner in a defensive mode similar to a corner hopper, but when they see a shot coming in, they move a short distance out of the corner and then turn around to resume their position in the same corner. The reason they've been dubbed a yo-yo is because they act like there's a guy in the corner playing with a yo-yo, slinging it out of the corner whenever a shot comes in and inevitably pulling it back in when the danger is past.

The Superzot series is comprised of yo-yos, and Mjolnir from the Seventh Tournament was a yo-yo. The first yo-yo was way back in the ancient times with 500 instructions, by the name of LK Penquin by Doug Harris. However, this was a rather primitive attempt at it, limited by the small instruction limit. However, functionally he was, in fact a yo-yo, since he did actually move outward in an active radar defense and zip back to the same corner after moving out diagonally a short distance.

The first effective yo-yo was the Hall of Fame icon winner from the Fourth Tourney, Lewis by Robert Hogg. Specifically, his group mode was a yo-yo paradigm. Dirty Lewis, the sequel and winner of the next icon contest, was a pure yo-yo, using the same tactic in both group and solo combat, as well as borrowing a tactic from Boring Birdo and only firing at point-blank range.

The yo-yo tactic has an advantage over the corner hopper in that it combines the passive defense of switching directions after only a short movement time with the active defense of radar checks and evasions. However, it has a disadvantage, in that it is somewhat vulnerable to machine gunners unless they put out similar amounts of firepower. They are on an even level with most corner hoppers against dashers.

The Hesitator

(click here to download sample)

The hesitator is probably the most effective form of passive defense in existence in RoboWar today. Jeff Lewis was the originator of this tactic in its latest form, and for long had a monopoly on its use. For a while it was thought that he had built the first hesitators in general, until this author happened to go back and look at Antoine Duchateau's Sylvestre, who won the Sixth Tournament.

The tactic is subtle enough that, though this author recognized its effectiveness, it wasn't until Horta's (Sr.) comments were spotted mentioning the idea explicitly that this author was sure this was even deliberate, though it was suspected mightily before then. It has taken other designers just as long to notice this trick, because the first non-Lewis hesitators did not appear until the Anephodes of Tourney 10.

A hesitator in typical design at the time of this writing is a wall hugger that moves somewhat slowly along the walls, and uses its energy to both maintain a shield and fire weapons. However, it is deliberately not careful about going into deficit energy, and as such it stops and starts fairly often from it. (Which is why it is dubbed the "hesitator" -- it resembles an automobile with a bad engine that hesitates while trying to move, stopping and starting in rather jerky motions, which isn't a bad description of Jeff's hesitator bots at all.)

Of course, the question might be asked (and the author asked it himself at the robots on the screen before he did some thinking and careful observation), why even give these robots credit for being nothing more than clunky, clumsy, inefficiently programmed robots that can't even move without running out of gas? The answer is, because their frequent and sudden starts and stops make them damned hard for an enemy robot to shoot at. If they get shot at while they're in negative energy, they recover and start moving again, throwing off the aim of their assailant. The hesitators typically keep their deficits small, so they're never stuck for very long. And if they get shot at while they're moving, they often soon use up enough energy to run a deficit in a counter attack, and thus stop dead in the water and throw off the aim there, too. It's a very subtle and quite ingenious form of passive defense that has been slowly developed over the last couple of tournaments. It's subtle enough that most people

probably scratch their head and never realize why Horta Jr., the most effective hesitator to date, took second place in Tourney 9, ahead of the far deadlier pacifist Arachnee, no less. The hesitation defense together with his robust armor and shielding kept Horta Jr. alive very nicely. Hat's off to Dr. Lewis...

Since then, a new hesitator robot, Anephode, has also appeared. This machine combines the hesitation passive defense with corner-hopping active defense. Unfortunately for Denys Seguret, its author, its defense did not serve it very well against the huge number of dashers that appeared there.

Hesitators had their greatest success to date at Tournament 13. Two heavily armored and shielded (at least at first) hesitators, Seth Zenz's Magic Sword and Eric Foley's Obsidian, tied for first in the mortal round and placed first and second in the team round (with Obsidian edging 'Sword for first there). Magic Sword and Obsidian are very similar in many ways, but their movement and shooting techniques are slightly different (Obsidian borrows a page from the Foley's Orbs of Doom of ancient times and scoots out into the middle upon spotting an enemy directly ahead of it, and also fires a two-shot spray designed to deal with defensive bots). The bruising firepower that these two bots sling out along with their hesitation defense around the walls makes

them a formidable presence in the group arena as well as in one-on-one situations, carving the way to their success in Tourney 13.

The Fadeaway

(click here to download sample)

Note about Fadeaway sample: this sample is an early version of Denys Seguret's Dialectix, provided for the express purpose of putting it on this page. I have made no change to it, per his request, with one exception: I had opened the robot and put the cursor in the drawing board at the beginning of the code.

The fadeaway robot is characterized by a super- active defense by which the fadeaway not only runs from bullets directed at him, but also runs away from the robots themselves if they get too close, often at great speeds, in order to prevent the enemy from ever getting close enough to deliver any real firepower. Longtime RoboWarriors in the post- doppler age who were particularly observant may also recognize this paradigm's cousin, which this author loosely calls the "Jade Principle" in group combat. Due to its effectiveness in both solo and group combat, the Fadeaway/Jade Principle is possibly the foremost defensive algorithm today.

The first known fadeaway bot was Brainiac II, which appeared in the Fourth Tournament. This robot sought to keep away from enemies as much as possible while making use of laser weaponry at long distance. However, it was generally ineffective at the time, and as such few people paid much attention to it.

Most people identify the modern fadeaway tactic by Denys Seguret's Dialectix. Dialectix used the fadeaway tactic as its primary anti-dasher technique, using it to throw off the tracking of enemy dashers once they get within medium range. At that range, a dasher coming in at light speed has little margin for error in its tracking. The angles of correction it requires to keep track of a target moving that fast at a right angle at that range are great enough that the dasher often cannot search and reacquire its target in order to finish its intended lethal strike. As a result, the fadeaway escapes, often having struck the dasher with a moderately powerful shot for its troubles before running. Amongst normal robots, dashers require enough hardware for processor speed and weapons that this is often all that is required; two passes usually are sufficient for Dialectix to kill a dasher. Amongst titans, it can often take a while longer. Major kudos to Denys Seguret for constructing this quite interesting machine.

The fadeaway robot does decently to well against most robots (Dialectix uses the history register to switch between a fadeaway mode and a dasher mode optimized particularly to kill other dashers). Its advantage against dashers is somewhat balanced by less effectiveness against some stun-streamers and machine gunners, particularly in titanic combat. Dialectix soundly defeated the dasher foes at the Twelfth Tournament, then defended his champsionship with a third place showing at the Thirteenth, vindicating questions about the paradigm's stability.

The Arcstunner

(click here to download sample)

Note about the Arcstunner sample: this sample is an early version of Randy Munroe's Mortality, provided for the express purpose of putting it on this page. I have made no change to it.

The arcstunners is a very effective offensive strategy, modern arcstunners having some resemblance to dashers. The arcstunner shoots several stunners (usually around 3-5) at the same time, hoping that one of them will hit and stun the opponents. Together, those multiple stunners take the shape of a bow, hence the name ARCstunner. The arcstunner also dashes towards their opponent. This is so firing the killshot would be easier. Hoping the robot is stunned by their

initial stunners, the arcstunner shoots a killshot to finish off the opponent. Some arcstunners doesn't care if the initial stunners hit or not and shoots their killshot either way.

The first arcstunner to appear and win and official tournament was Dark Knight by Peter Ström in the Titan round in T18. The strategy was further developed by Randy Munroe's Mortality in tournament 19, where Mortality scored the highest solo score (with only 298 instructions!). The arcstunner strategy was further perfected by Prf+noff with his robot Norobot and Randy Munroe with Mortality II in tournament 20.

Traditional arcstunners uses 4 or 5 stunners in their arc. While such arcstunners are powerful in attacking, their weakness is that they're virtually forced to live with low damage since the arcstunning itself requires both 150 energy, a pro speed of at least 30 along with both stunners and an additional weapon for the kill shot. While most arcstunners scores high in solo, they require a skilfully implemented group round to get a high total score. Arcstunners are also vulnerable against fadeaways.

Another variant of the arcstunner is attacking with 3 stunners in the arc. By doing this, the arcstunner free itself from the need for 150 energy, and just firing 3 arcstunners also lowers the processor speed requirement somewhat.

The NeoDasher

(click here to download sample)

The NeoDasher is the common name for a dasher from the post move-and-shoot age. In other words, a dasher that doesn't use movex and movey before and after it has made it's killshot. The similarities to the banned regular dasher are many. And the NeoDasher is still an effective strategy, and has claimed many prizes.

30 Minutes by John Abbott, Jr won third prize in the sixteenth tournament (which was the first tournament after the move-and-shoot restriction was implemented). Hence, 30 Minutes was the first robot to give NeoDashers attention.

The Drone-Swarmer

(click here to download sample) *by Brian K.*

The drone-swarmer is the sole known algorithm for using drones that is effective. Its effectiveness was attempted in ancient times during the pre-doppler age, but was not permitted to flourish until recently.

The drone-swarmer is characterized by its tactic of using huge numbers of small drones to swarm in a cloud at the enemy robot. The huge number of drones pulverizes most incoming fire that would otherwise harm the robot, thus making it virtually invulnerable to counterattack by anything except dashers, stunners, large numbers of

explosive bullets (at a rate far greater than all known tournament machine gunners have exhibited) and tactical nukes.

The first drone-swarmer was Beehive-9, which was entered way back in the Third Tournament. However, the illustrious author of this ahead-of-its-time robot was rewarded for his innovation by being given the first Golden BozoBot award and having large numbers of curses heaped upon him and his progeny by the judges of that tournament. This was because the large number of drones slowed down the older Mac the tournament was being run on to an extent that the judges chose to disqualify it with the Golden BozoBot award rather than allow it to fight.

In something of a forgetful double standard, the more modern version, Carne by Jean-Francis Lechat, was hailed as a "heretofore unknown" tactic and a brilliant idea when it placed third at the Tenth Tournament. This robot's only difference from the previous creature was its use of three drones in a flotilla instead of one, as Beehive-9 used, and its use of a stunner-missile combination as a backup weapon, which Beehive-9 did not have the option of using.

After Tournament 10, which featured a few robots using drones and lasers, Mr. David Harris chose to implement an "official rules" box which will immediately destroy any robot that uses an "undocumented feature." Since drones and

lasers are not in the hardware store (though they can still be used in the game) they are considered "undocumented features" by this little judgment. As a result, drone-swarmers are not going to be allowed in future tournaments.

The Alliance of Pacifist Scum

At this point, I have to step out of academic essay tone, because I felt very strongly about this matter at the time and remember it with great anger. As you might surmise by the numerous dog pictures and tongue non-smilies adorning reference to this section, I am of the opinion that this festering malignancy of the game should never have taken place. As you might also surmise by my unfriendly name for this bunch, as well as my earlier reference to a certain similar robot as Boring Birdo, I am a very devoted hater of robots that are less than exciting to watch. I had thought Boring Birdo was dull. I hated that insufferable avian with a passion that would frighten most sane human beings, and I was quite happy when it appeared for a while that RoboWar would turn down a path towards more active, interesting-to-watch robots.

Sadly, I was wrong.

David Harris found the Alliance to be quite interesting and a great innovation of the game. I personally think he was nuts to think this was an exciting development, and I'm not afraid to say so. I have long advocated a turn of the tournament

scoring system towards kills rather than mere survival, because as early as the Fifth Tournament I saw that the game might well turn to a point very like this. But even in my worst nightmares I failed to foresee just how mind-numbingly dull people were willing to design their machines in order to win. The only thing that was good, in my opinion, that came from this bleak chapter of RoboWar history was that I finally got my wish, and the tournament scoring system now rewards aggressive robots, perhaps finally putting an end to any temptation to build boring robots in favor of survival instead of kills.

Even when I knew it would probably help them, I always resisted the temptation to build boring robots in favor of ones I felt were interesting to watch when I had a choice. When Boring Birdo and his ilk of dull defensive robots were ruling the game circa the Fourth and Fifth Tournaments, I tried to build Orbs of Doom that would flush these guys out of their defense and make a battle out of it. But against the Alliance, I had no choice. I hang my head in shame that I contributed even one tournament robot to this scourge of machines that won tournaments by boring their enemies to death.

Essentially, the idea behind the Alliance was a simple recognition that the scoring system for tournaments up to that point made no award at the time for killing one's enemy, only for surviving the battle. It mattered not even if the

enemy was still alive, so long as you were alive at the conclusion. So in the Eighth Tournament, someone came up with the screwball idea that maybe they shouldn't bother even fighting at all unless they came under attack from their enemy. Either it was amazing coincidence or there was an active conspiracy of communication going on that I was unaware of to build these horrible things, because a few more of these guys showed up at once than coincidence would seem to warrant in the Eighth Tournament.

I refer to this bunch as the Alliance because that's essentially what it is. The robots agree not to fight each other so that each gets full credit for all of their battles. When Allied Pacifist Scum are in battle with each other, both get 100% points for their battles. If they fought it out, each would get 50% if they were equally matched, and both might well get less than that, since a double kill doesn't benefit either one of them.

To realize just how insidious and unstoppable this was, consider the following idea. Say there are six allies and six aggressors at a tournament. Each of the robots is completely identical, save for the fact that some are pacifist scum and the others are more interested in something interesting. Say, further, that there will be ten battles between each robot, and that all battles that are actually *fought* will result in an even and perfect split of points between the two combatants. The allies will each get fifty points against each other (each

ally has five other allies to wait out 15000 chronons in their ten rounds with), because they will always wait out the combat and "win" each battle. The pacifists will get thirty points against the aggressors, since they are evenly matched and they get ten rounds against each of the six fighters to split. Each pacifist will leave the tournament with a total of eighty points. The fighters, on the other hand, will go with only fifty-five, five against each other robot. Thus, completely identical robots will have their fates decided in such a tournament based entirely on their willingness to join the Alliance of Pacifist Scum.

Now let's get even more drastic. Say that the pacifist scum are so rusty at fighting from lack of doing so that they can't handle their battles in an even match with the warrior caste. Say the warriors will get 7 of every ten battles with the pacifists, and will be evenly matched with each other. The pacifists still get fifty points against each other, together with their eighteen against the six warriors (reduced because they're inferior pacifist scum with three points per split). The warriors, on the other hand, get fourty-two points against the pacifists (seven wins times six pacifists to slaughter) and twenty-five against each other (five wins times five other warriors). The end result *still* benefits the pacifists: each of them gets sixty-eight points to the warriors' sixty-seven. And this, even when the warriors are able to win 70% of their battles against the allied pacifist scum!

Thus, even if a warrior caste arose that could completely dominate the pacifist scum in 70% of their battles (virtually unheard of in modern RoboWar between half-decent combatants; a serious advantage usually doesn't get more than 60% for one side unless one side is either really, really sad or if they aren't watching too alertly and they regularly get caught with their pants down), the benefits of forming an Alliance still outweigh the costs of fighting. And this assumes that all battles end in clean kills; the double kills that are inevitable in combat will reduce the warriors' chances still further.

Thus, if there is any sizeable number of Alliance members who faithfully will not break the "code", aggressor robots have no prayer. The game does not afford a method of attacking in a given round while leaving no chance for counter-attack, since the same amount of time it takes a robot to get the right position for a kill without warning is the same amount of time it takes for the other robot to realize he's under attack (if he's wary of such) and respond in kind. Thus, a surprise attack that truly kills a pacifist simply because he's a pacifist isn't going to work unless the pacifist is napping. Against someone like Jade, who'll respond with lethal force if his companion in the arena so much as twitches, this just ain't gonna happen. And pacifist Jade is tough enough that you were *not* going to be getting 70% kill ratios on him. Even if you did, someone else could devise a pacifist version of whatever could, and you're back

to square one. Which basically means that you're not going to have a prayer against pacifissts unless you swallow your principles and join the Alliance.

I did it once in Tourney 9, because I realized this before hand. However, I didn't go quietly. As the history file in the game's documentation correctly relates in a manner that was far more gentle than I probably deserve, I more or less filled Mr. Harris's emailbox with gripes such as this (including an analytical breakdown much like the one here, explaining why his hopes that a pacifist killer would evolve, and negate a need to make a fundamental change in the way tournaments are run, would never come to pass) and in no uncertain terms urged him to put an end to this madness, to scrap the survival-oriented scoring system that rewards ties and makes this unabashed idiocy possible, and go for one that rewards kills. As you may have noticed, I feel *extremely* strongly about this, because I love this game, and I hate seeing jaw-droppingly *stupid* things like this happen to it.

David went for a compromise: a scoring system that rewards for survival just like all the old one, but which in addition gives one point for every robot that dies at your hands in a given combat. Thus, being a pacifist gets you only one point, which isn't any better than getting a double kill. The best all is if you get a clean kill, which gets you twice the score you'd get for simple survival. It also lessens the tendency of group "combat" to get reduced to bore-fests, as they had been

tending to do even before the Alliance reduced the solo "fights" to such. This is because there's more of a goal than just surviving to be one of the last three robots alive. If you kill an enemy, it's just as good as making third place in group combat. If you kill one and make it, it's as good as second. Best of all is if you can kill a couple and be one of the last few left. The group scoring system, in summation, no longer rewards you only for staying out of trouble and trying to provoke as few shots at yourself as possible, which was basically the only way to do well in the old system.

In three words, I like it. In a fourth and fifth, *a lot*.

This paper on theory of robot construction was written by Eric Foley, human alter ego of the Lord of the Darkbringers. It has been written in order to give a complete overview of robot design theory and samples which may be used in constructing robots of any legal and/or viable paradigm to get a beginning or adept RoboWarrior started in building machines of their own, but without giving away too many secrets at the highest level. It is provided with the condition that any who reads it, who can think of a paradigm that is different enough to merit inclusion in a category of its own seperate from the ones already given, please email me at stiltman@(remove this)teleport.com. Any questions or bug reports about the sample robots, explanation requests, et al, may be directed to this address as well.

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