The New York Times
At War
Notes From the Front Lines

JUNE 19, 2011, 11:17 PM

Imagining the Future of Military Gadgetry

By AT WAR

Micro air vehicles may seem like the stuff of science fiction, but, as our colleagues Elisabeth Bumiller and Thom Shanker report, they are a very real part of a drone explosion that is transforming the way America fights its wars. So as these "spy flies" — once found only in "Get Smart" and James Bond movies — are now being developed for espionage and the battlefield, The New York Times asked three spy novelists to speculate on the future of spy drones and military gadgetry.

What do you think will be next? Tell us in the comments section below.

Detecting Lies

By Joseph Finder

The spy business, when you get right down to it, is all about separating the truth from the lies. So you'd think our spies would be better at it than they are.

There aren't too many real-life Alan Lightmans (he's the hero of the Fox TV show "Lie to Me") who can take a glance at someone and determine from his microexpressions whether he's hiding something. The polygraph is famously unreliable. Even the C.I.A. doesn't really trust it.

When a Soviet K.G.B. agent defected to the West in 1964 and claimed that the Russians had nothing to do with Lee Harvey Oswald and the assassination of John F. Kennedy, the C.I.A. didn't believe him. The results of his polygraphs were inconclusive. They suspected he was a double agent, so they imprisoned him in solitary for four years, subjected him to sensory deprivation, gave him LSD and who knows what else. But he never broke. Finally, years later, they decided he was for real and paid him off.

In a novel I published in 1993 I had a secret C.I.A. project that used the functional M.R.I. scan as a lie detector, a concept I thought was pretty far-out at the time. Six years later scientists at the University of Pennsylvania began studying it for real, and now neuroscientists at Columbia, Stanford, Georgetown, and other places think there may be something to the idea of using M.R.I. scans to detect minute changes in the flow of oxygenated blood to the cerebral cortex when we lie. The Pentagon is financing a project that measures brain waves in about a second to detect dishonesty. They've already issued hand-held lie detectors for use by our troops in Afghanistan. A little screen shows red for

deception, green for truth and yellow for "not sure." No reports yet as to whether it surpasses the accuracy of the Magic 8 Ball. And a company called No Lie MRI is planning to start a network of VeraCenters where people can go to be brain-scanned for truthfulness.

But what if someone figured out a way to do it from a distance, the way you can use parabolic microphones to eavesdrop on a conversation from hundreds of yards away? Why not? After all, scientists have figured out how to measure the brain's electrical activity without putting electrodes into the skull.

Imagine: No more torture, er, "enhanced interrogation techniques." No more rubber truncheons. We'd be able to tell just by being in the same room whether someone — a spy, a terrorist, a politician — is lying to us.

Then again ... that might spell the end of press conferences by politicians. And who in Washington would dare authorize funding of a technology that might put politicians out of business?

It's a nice idea, but I don't think it's going to happen.

Joseph Finder is the author of 10 thrillers, including "Buried Secrets," to be released this month.

Hacking Life

By Paul McEuen

The next big revolution will be a physical nanotechnology to match our electronic one. Imagine thousands of dime-sized iBugs all over your house, with grippers, legs, or even wings. These ultrasmall semiconductor, plastic and metal devices will manipulate matter as readily as computer chips now process information. They'll clean up the mess you left in the kitchen, go weed the garden, then find and kill that cockroach you saw in the bathroom. Imagine even smaller machines the size of a pepper flake scouring the landscape inside your body for cancerous cells. This kind of physical nanotech is coming, but it's a huge undertaking and will take decades. We have to learn how to build the joints, actuators, and power sources for these tiny machines and then assemble them into functional systems. We're only in the early stages — say where electronics was in the 1970s.

But there is a shortcut, a cheat. We can hack the machinery of life.

Researchers at the University of California, Berkeley, are strapping tiny electronic packs onto the backs of beetles to control their flight. At M.I.T. and Cornell, engineers are creating moth cyborgs. These remote-controlled insects could fly through a crack in the wall of a distressed nuclear site or speed across a battlefield undetected by radar. A huge

push is also on to hack life at the cellular level. Synthetic biologists in industry, academia and national labs are remaking the genome in their computers, turning bacteria into tiny factories that manufacture antimalarial drugs like artemisinin or next-generation biofuels.

This co-opting approach, more akin to domesticating horses than building a car, is coming fast. In a few years, joystick-powered moths and designer cells could be commonplace. In a decade, kids may be staging beetle wars and redesigning bacteria for fun. Not that there won't be problems. We're grabbing the reins of a technology that we only half-understand. There will be spectacular screw-ups. But it won't be boring.

Paul McEuen is the Goldwin Smith Professor of Physics at Cornell University, director of the Kavli Institute at Cornell for Nanoscale Science, and author of "Spiral," a thriller.

Rewriting the Future

By Keith Thomson

Truth isn't just stranger than fiction — it's faster. In an espionage novel I wrote in 2007, I created what was then a futuristic million-volt stun gun disguised as an iPhone. Today, you can buy an even more potent stun gun online, albeit tricked out as a BlackBerry. A covert operations officer in the same novel deployed a miniature unmanned aerial vehicle (a k a drone) that in real life could be seen only on drawing boards, at least in declassified circles. In 2009, a German company offered a similar drone to anyone with $40,000. Earlier this year, I bought a new French model for $300 at a mall.

For my subsequent spy book, hoping to incorporate gadgetry that stayed futuristic past pub date, I interviewed an array of intelligence agency personnel — ranging from a temp at the N.S.A. to a director of the C.I.A. — and I visited several military installations, including Nevada's Creech Air Force Base, which is to drones what Silicon Valley is to the device with which you're reading this. The consensus was that technology's advance is so head-spinning that the only way to predict its future is to devise a way to predict the future. Which happens to be exactly where technology is heading.

Espionage has always centered on ascertaining the other side's plans. C.I.A. drones now drop undetectable "smart dust" particles that adhere to a human target, enabling intelligence officers halfway around the world to track him. Given ultraminiaturization trends, it's just a matter of time before the dust particles also provide audio and video. Not long after that, possibly, the dust will monitor electrical impulses from the target's brain too, converting them into a transcript of his thoughts. Or maybe an intelligence service will invent a way of collecting the same intel via an invisible beam fired from a satellite (that's the size of a grape).

Alternatively, an advance in bioelectromechanics combining human DNA and technology could effectively broadcast the target's thoughts 24/7/365 — and influence his thinking to

boot. And eventually, perhaps, software that forecasts world events will reach the point that it acts as a digital crystal ball, rendering spy versus spy passé and leaving me to write hard drive versus hard drive.

Keith Thomson is the author of two spy novels, "Once a Spy" and "Twice a Spy."