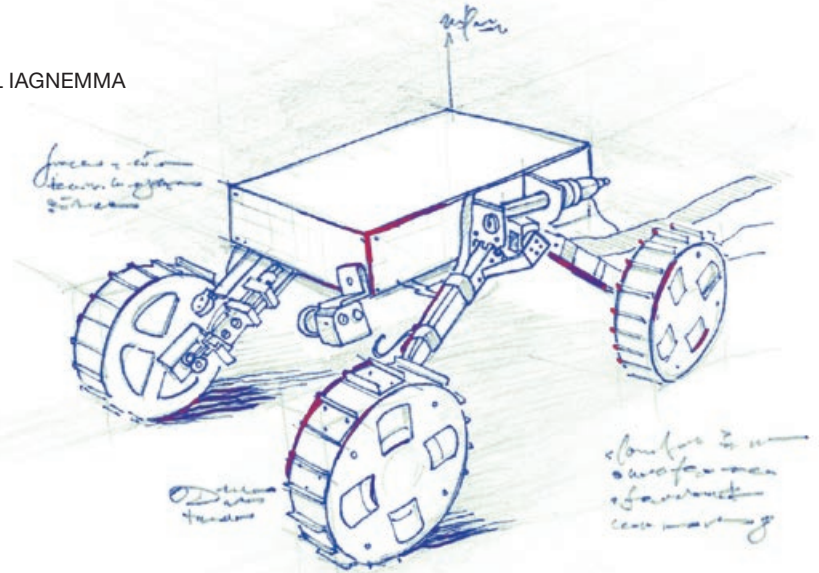




BY KARL IAGNEMMA



Let me tell you a story.

When I was a young, eager PhD student at Massachusetts Institute of Technology (MIT) searching for a thesis topic, I would take long, late-afternoon walks around the Institute, hoping to stumble upon inspiration in the paint-scabbed hallways. Inevitably I ended up in Building 4, the domain of the music department. The pianists would be practicing, usually something difficult and melancholy, and music would trickle from the instruction rooms and fill the corridor. For a moment, my unwritten thesis would be forgotten, and I would remember that there were, in fact, other things in the world besides simplex algorithms and Bode plots and Kalman filters. (These random musical interludes were, I'm sorry to say, some of my most pleasurable moments as a graduate student.)

I eventually found a thesis topic in the field of robotics. Specifically, I investigated autonomous control algorithms for planetary surface exploration rovers. (Full disclosure: my research was sponsored by the wonderful folks at NASA's Jet Propulsion Laboratory.) To complement my major field of study in robotics, I chose as a minor field a subject that had interested me since I was a boy: fiction writing. Making up stories. Lying, though in a classy and interesting way. If musicians could find a home at MIT, I figured, then so could an aspiring fiction writer.

When I proposed this course of study to my PhD thesis committee, I expected to be reminded that my work lay in the

realm of fact, not fiction. Instead, the three professors nodded vaguely. "If that's where your interests lie ..." one offered. I interpreted this as enthusiastic approval.

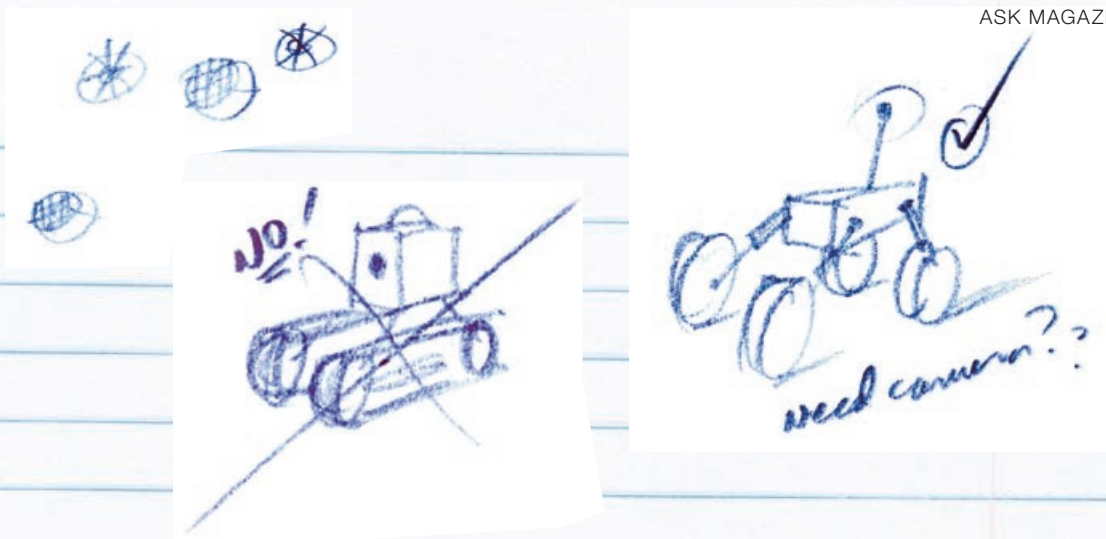
Fast-forward three years. I was strolling the Institute corridors, my thesis recently defended, my mood brighter than it had been in a long, long time. Through a combination of sweat and luck, I'd had my first book of short stories published, and the event was accompanied by an article in the campus newspaper. I happened to bump into one of my thesis committee members. He offered me a bemused grin. "I read about your book in *Tech Talk*," he said. "I didn't know you were writing short stories!"

"Well, I did minor in fiction writing," I said. "You approved my course of study. Remember?"

"Ah!" he said, as though a profound mystery had been explained. "I thought you were studying *friction!*"

And so it has continued in both my careers, as a robotics researcher and fiction writer. Whenever I reveal that I'm a researcher who writes fiction—or a fiction writer who dabbles in research—I'm met with curious disbelief, as though it's impossible to pursue such singularly distinct activities.

But what I've come to realize is that the two efforts—conducting engineering research and writing fiction—are much more similar than my thesis committee members (and many other people) might think.



view; the choice of point of view—first person or third person (or second person, even)—strongly influences the lyrical and dramatic possibilities of the work.

In our efforts, we have progressed from a pair of blank pages to ones filled with scribbled notes and crossed-out questions, scrawled reminders in the margins. Our desk is piled with journal articles written by previous researchers, novels written by other writers. And as we probe equations and sketch scenes, we conduct what amounts to a search through the constrained space of our idea, hunting for something *good*: an analysis technique that lends insight into a particular form of equation; a combination of character and tone and setting that yield the unmistakable whiff of good fiction.

In our rover research example, this stage requires us to identify visual features of the Martian surface that yield clues about the terrain's physical characteristics. Are features drawn from terrain color more descriptive than those drawn from texture? Should we approach the problem as one of classification or segmentation? And in our fictional example, is this failed PhD student in his late twenties or early forties? Did he quit graduate school by choice, or did he flunk out? And should the story be told from his point of view or that of his flaky girlfriend?

(For those of you scoring at home: in the rover research we decided to pursue a Bayesian approach to multiclassifier fusion, to merge the outputs of supervised classifiers operating on image color, texture, and elevation features. In *On the Nature of Human Romantic Interaction*, I wrote about a forty-one-year-old ex-PhD student named Joseph who dropped out of the (fictional) Michigan Engineering Institute but continued to man the twenty-four-hour computer hot line as he wooed his young girlfriend. (The equations describing the time evolution of her affection, by the way, were of the Lotka-Volterra variety.))

The final stage of the creative process is revision and refinement. We've figured out how to solve the research problem at hand; we understand what story we want to tell, and how we'll tell it. Our simulation results are promising; our characters are

vivid and our scenes compelling. Our conclusions feel surprising but somehow inevitable.

What remains is to bring the work to a state of near perfection by making minor (or, occasionally, not so minor) changes. This stage focuses primarily on individual words and numbers: adverbs and adjectives and gain levels and parameter values. Should the image features be extracted over an 8 x 8 pixel window, or 12 x 12? Should a filter be used to mitigate noise, or not? And if so, what are the best locations for the filter poles?

And should Joseph—poor, hapless Joseph—be forty-one years old, or will making him forty-three increase a reader's sympathy for his plight? Should his girlfriend be named Kate or Alexandra? Should the evening sky be "eggplant-colored," or "the color of a deep bruise?" Our work nearly finished, we scrutinize every choice—every metaphor, every variable—hoping to transform something decent into something good, something good into something excellent. And eventually—weeks, or months, or even years after we began—we quit, exhausted, unable to bear another moment's contemplation of the work. The creative process ends with a whimper, rather than a bang.

There are individuals, I know, whose creative processes are profoundly different than the one I've just described. Writers who pen a single, inspired sentence, then watch a story unspool with little revision. Researchers who bash every problem they encounter with a single, well-worn analytical hammer. I'd suggest that these differences, however, say more about differences in personality than they do about the (supposed) gulf between art and science. *What if?* can be answered in many different ways—through an elegant assembly of equations, or through pages of interesting lies. ●

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