NIELS JOUBERT

NOTES ON QUADROTOR CINEMATOGRAPHY

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THE PUBLIC IS MORE FAMILIAR WITH BAD DESIGN THAN GOOD DESIGN. IT IS, IN EFFECT, CONDITIONED TO PREFER BAD DESIGN, BECAUSE THAT IS WHAT IT LIVES WITH. THE NEW BECOMES THREATENING, THE OLD REASSURING.

PAUL RAND

A DESIGNER KNOWS THAT HE HAS ACHIEVED PERFECTION NOT WHEN THERE IS NOTHING LEFT TO ADD, BUT WHEN THERE IS NOTHING LEFT TO TAKE AWAY.

ANTOINE DE SAINT-EXUPÉRY

. . . THE DESIGNER OF A NEW SYSTEM MUST NOT ONLY BE THE IMPLEMENTOR AND THE FIRST LARGE-SCALE USER; THE DESIGNER SHOULD ALSO WRITE THE FIRST USER MANUAL. . . IF I HAD NOT PARTICIPATED FULLY IN ALL THESE ACTIVITIES, LITERALLY HUNDREDS OF IMPROVEMENTS WOULD NEVER HAVE BEEN MADE, BECAUSE I WOULD NEVER HAVE THOUGHT OF THEM OR PERCEIVED WHY THEY WERE IMPORTANT.

DONALD E. KNUTH

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Introduction and Goals

Hello! Allow me to introduce myself. My name is Niels, and by the time you read this, I will hopefully have a Ph.D from Stanford's Computer Science department. At the start of writing this document, I'm in my 6th year, and working towards a thesis focusing on automating the use of quadrotor aircraft equipped with cameras to perform cinematography!

This collection of notes is my attempt to build a structure of sorts in which I can place the knowledge I'm gaining as I explore these worlds. You can view them as an account of my wanderings into the High Country of the Mind[1], exploring (mostly) old and (hopefully) a few new paths relating to the blossoming field of micro aerial vehicles and their usage in Computer Graphics. [2]

Now, before we jump into a big endeavour such as writing or reading a selection of notes, it's important that we establish some goals for this document. I find that, with good measurable goals publically stated, I work much better and my colleagues and friends find it easier to collaborate with me. Hopefully the same effect will extend here!

With this document I'd like to:

1. Create a continuity of ideas over the multiple years of work and thought in this field, and thus avoid losing too much of what myself and my team learns and thinks to the rush of getting on to the Next Thing.
2. Learn through Writing. Writing concepts down, just like teaching, forces me to clarify them and patch holes in my understanding! [3]
3. Disseminate what I've learned to my colleagues, especially as interest in this area grows
4. Track my own progress, what I don't know yet and what I've figured out, in a place where I can see the progress as I struggle and fight my way up into these mountains.[4]
5. Record some of the things that didn't work, the trails that led to a dead end. There's no place to publish such stuff, yet

[1] Robert M. Pirsig. *Zen and the Art of Motorcycle Maintenance*. Harper Perennial Modern Classics, 2005. ISBN 0060839872

[2] Shamelessly stealing metaphors from Robert Pirsig's Zen and the Art of Motorcycle Maintenance. One of my favorite books, both for a love of long distance motorcycle riding I share with the author, and it's views on the important strangeness of Quality.

[3] "Writing is nature's way of letting you know how sloppy your thinking is." - Guindon (cartoon)

"You have to learn, so you know what is it you know and don't know. In Science you must be very careful not to confuse yourself, which is very easy to do!" - Richard Feynman.

[4] Keeping up the motivation as a graduate student by tracking progress is crucial!

Preface: Doing Research

Research in Computer Science is a challening and potentially rewarding blend of:

- project management
- reading and learning
- thinking
- problem-solving
- experimentation
- mathematical modeling
- engineering systems
- psychology studies
- writing
- public discourse in the form of public speaking and argueing
- people management and collaboration skill

Becoming uncommonly good in all of these areas will serve you well during and after your Ph.D studies.

Niels' Good Meeting Tips

Agenda A meeting needs an agenda.

Making Talks

Talks are important, and fun! I refer you to the fantastic “”

Project Management Ideas

Maintaining Mental Health

Emotional Intelligence

word up indeed

Research Traits to Develop

- Integrity
  - Courage

Questions I'd Like To Know The Answer To

Dead Kittens Pile

Appendix Z: Unrelated yet Inspiring Works

I've been fortunate during my graduate school career to have explored several fields I found fascinating and fun. These offer little insight into Quadrotor Cinematography, but they did influence my thinking and I feel compelled to yot them down somewhere. Here they are:

Computer Science

Structure and Interpretation of Computer Programs Abel and Sussman's legendary text on the fundamentals of Computer Programs. This was the first real computer science text I read as part of Berkeley's CS61A course taught by Prof. Brian Harvey. Getting through this was a monumental experience of having my entire view of the world changed on a scale I've never experienced from a book before or since. I always find peace and a mischiveous grin in the opening dedication whenever I get disillusioned with my profession. [5]

Graphic Design, Visual Design, Typography

Thinking with Type

Tufte's Works including

History of Silicon Valley and Computer Science

The New New Thing Silicon Graphics is particularly dear to me heart. My introduction to SGI machines at a young age set my on the path of computer science, made me the nerd I am today, and arguably defined the direction of my life.

What The Dormouse Said This tells the story of how a military instrument of the 40s and 50s became a symbol of personal freedom and counterculture thinking. And of course the exploration of a link between Psychedelics and Computer Science is just awesome!

[5] This book is dedicated, in respect and admiration, to the spirit that lives in the computer.

"I think that it's extraordinarily important that we in computer science keep fun in computing. When it started out, it was an awful lot of fun. Of course, the paying customers got shafted every now and then, and after a while we began to take their complaints seriously. We began to feel as if we really were responsible for the successful, error-free perfect use of these machines. I don't think we are. I think we're responsible for stretching them, setting them off in new directions, and keeping fun in the house. I hope the field of computer science never loses its sense of fun. Above all, I hope we don't become missionaries. Don't feel as if you're Bible salesmen. The world has too many of those already. What you know about computing other people will learn. Don't feel as if the key to successful computing is only in your hands. What's in your hands, I think and hope, is intelligence: the ability to see the machine as more than when you were first led up to it, that you can make it more." -Alan J. Perlis (April 1, 1922-February 7, 1990)

Bibliography

Robert M. Pirsig. *Zen and the Art of Motorcycle Maintenance*. Harper Perennial Modern Classics, 2005. ISBN 0060839872.

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