



MIT EECS

Electrical
Engineering

Computer
Science

Artificial Intelligence +
Decision-making

Faculty jobs: Why and how to get them

Frédo Durand, MIT EECS

Who we are

Frédo Durand <http://people.csail.mit.edu/fredo/>

- On the MIT faculty since 2002.
Computer Graphics & Computational Photography
- Experience on the faculty search committee,
promotion & tenure committee, Equity Officer



Mina Konaković Luković <https://people.csail.mit.edu/mina/>

- Just joined in September 2022
(on the market fall-spring 2020-21, postponed by 1 year)
- Computational fabrication & design



Getting to know you (poll)

Who is applying this cycle?

Who will apply in a later cycle?

Who is just curious?

Who knows they most likely want industry?

Who is applying outside US and Canada?



Why be a faculty member?

Intellectual freedom, stimulation, breadth

Work with students, nurture them, see them have impact

Amplify your research capability through students

Teach

Can have impact in the real world

- e.g. our compiler Halide is used at Google, Adobe, Facebook; many of our algorithms are used in Adobe, Google, Sony products
- Many faculty members start companies

Well paid

- I am in the top 2% of individual income in US
- with opportunity to make a lot of money (consulting, startup)

Prestige, if you care about that

Lots of opportunities to travel



Why it can be hard

It stacks a number of different medium-difficulty problems on top of each other
(M. Y.)

No limit to the amount of work that can be done. Be disciplined

Limited supervision, limited feedback

How do professors spend their time?

Depends on people

Fair amount of multitasking

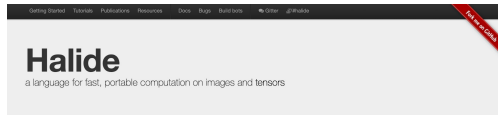
Main tasks:

- Research (meetings, thinking, sometimes coding/experimenting)
- Teaching
- Service e.g. graduate admissions, faculty search, qualifying exams, committees, reviewing papers/grants, writing letters of recommendation
- Fundraising (grant writing, reports, presentations)

A while back I did some time tracking: 50% research (majority meeting with students & collaborators), 30% teaching, 10% service, 10% fundraising



Intellectual freedom and stimulation



Overview

Halide is a programming language designed to make it easier to write high-performance image and array processing code on modern hardware. Halide currently targets:

- CPU architectures: X86, ARM, MPP, Hexagon, PowerPC, RISC-V
- Operating systems: Linux, Windows, macOS, Android, iOS, Qualcomm QNX
- GPU Compilers: CUDA, OpenCL, OpenCL Compute Shaders, Apple Metal, Microsoft Direct X 12

Rather than being a standalone programming language, Halide is embedded in C++. This means you write C++ code that builds an in-memory representation of a Halide pipeline using Halide's C++ API. You can then compile this representation to an object file, or JIT-compile it and run it in the same process.

The following function defines and sets the schedule for a 3x3 box filter defined as a series of two 3x1 passes:

```
Func blur_3x3(Func input) {
    Var blur_x, blur_y;
    for (x, y, xi, yi)
        // The algorithm - no storage or order
        blur_x(x, y) = input(x, y) + input(x, y) + input(x, y);
        blur_y(x, y) = blur_x(x, y) + blur_x(x, y) + blur_x(x, y);
        // The schedule - defines order, locality implies storage
        blur_x.tile(x, y, xi, yi, 10);
        vectorize(blur_x, 3);
        blur_y.compute_at(blur_x, xi);
        return blur_y;
}
```

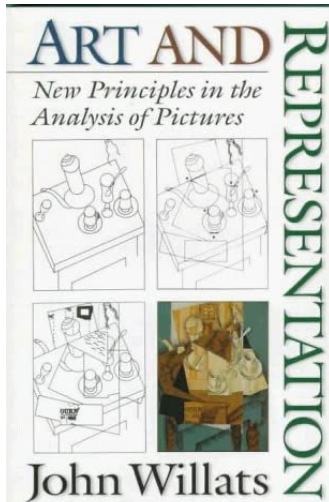
Getting Started

First, download a [binary release of Halide](#).

For the freshest builds, see the [continuous build server](#). The status of the build on each platform is 'here', if it's green, then it has passed all of our internal tests.



(a) Input



Defining Pictorial Style: Lessons from Linguistics and Computer Graphics.

JOHN WILLATS, Senior Visiting Fellow, LUSAD, Loughborough University, United Kingdom and

FREDDO DURAND, Laboratory for Computer Studies, Massachusetts Institute of Technology, United States.

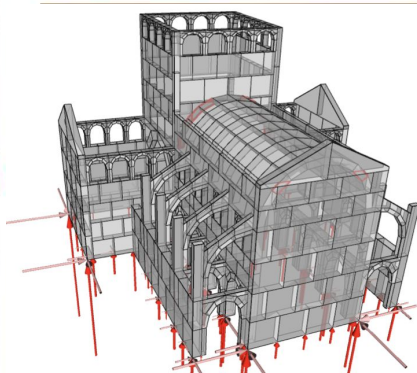
ABSTRACT

A definition of pictorial style in terms of distinctive combinations of pictorial devices characteristic of a particular culture or period or the work of an individual artist is proposed. Four kinds of pictorial structure are described: the drawing (spatial) system, the denotation system, the mark system and the attribute system. Three pictures by Poussin, Rembrandt and the Achilles painter are then analyzed in terms of these four systems. It is suggested that descriptions of style of this kind can be thought of as hypotheses about the nature of the implicit rules that generated the pictures in which they were applied. Examples of ways of testing this suggestion by embodying such stylistic rules in computer graphics programs are given.

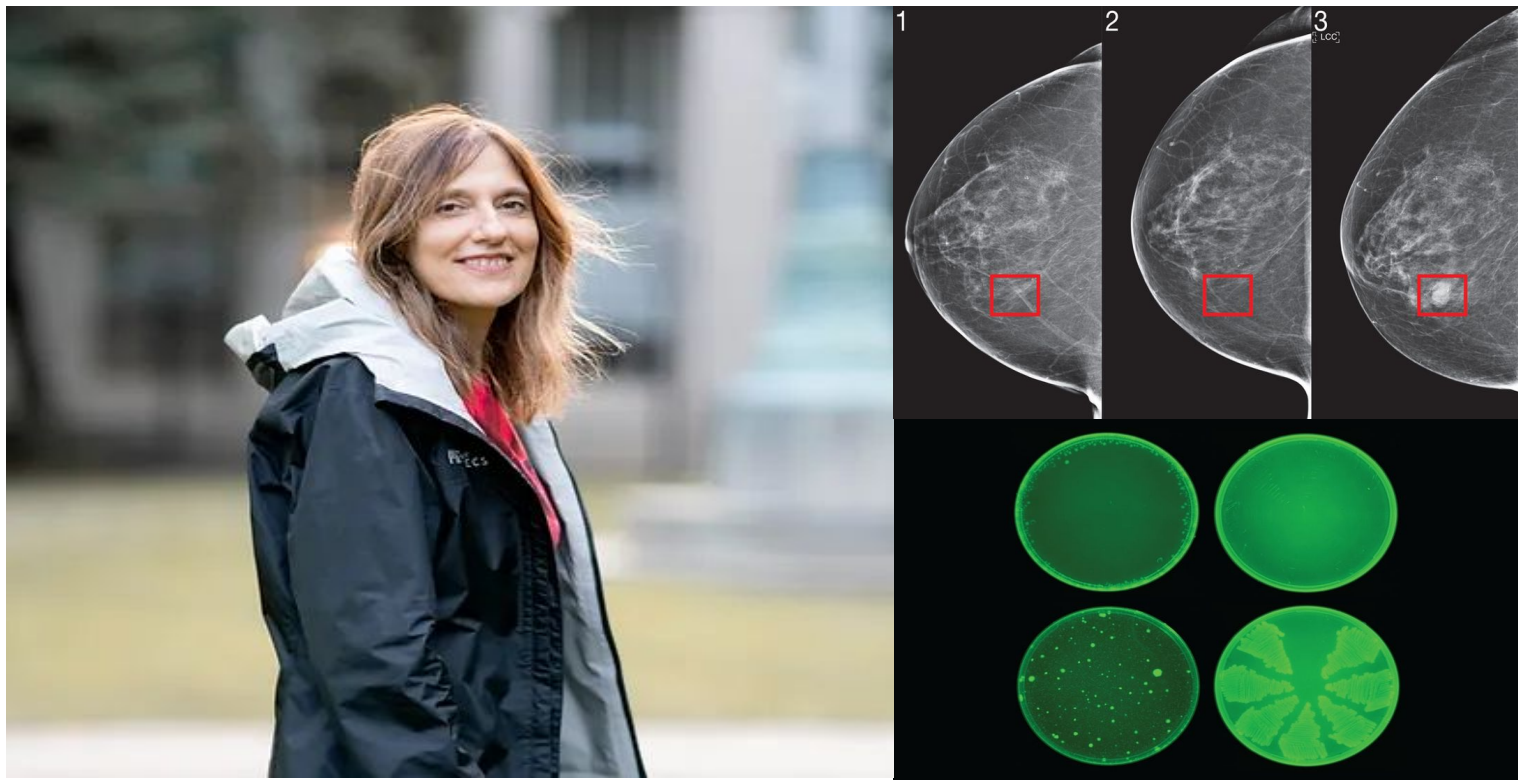
1. INTRODUCTION

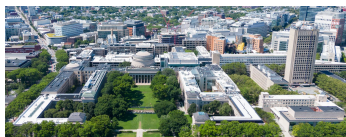
The term 'style' as applied to pictures has been used in many different ways, ranging from its application to features of pictures belonging to whole cultures or periods to the works of individual artists. The different categories to which it has been applied have also varied very widely. These include aesthetic categories, such as the beautiful, the sublime and the picturesque, and different modes of representation related to different techniques or media. In Greek vase painting, for example, the term 'geometric style' refers to the inclusion of geometric patterns, and the term 'orientalizing style' to the inclusion of exotic motifs derived from the Orient, while the terms 'black-figure style' and 'red-figure style' are derived from the different colours of the silhouettes. As Gombrich (1960/1980) has pointed out, the terms used to describe style often depend on metaphor: the 'hard' style of archaic sculpture contrasted with the 'softness' and 'sweetness' of fourth-century sculpture.

The term 'style' has also been applied to different ways of seeing the world. In *Art and Illusion* Gombrich (1960/1980) began his chapter on the 'middle of style' by asking: 'Why is it that different ages and different nations have represented the visible world in such different ways? Will the paintings we accept as true to life look as unconvincing to future generations as Egyptian paintings look to us?' (p. 3). Thelander (1933) suggested that the difference between the styles of Western and Oriental art might be due to racial differences in visual perception. Differences in pictorial style have also been considered to carry moral connotations: when Winkelman first applied categories of style to the history of art he equated the plain and humble style



Intellectual freedom and stimulation





Compared to industry



Faculty pros:

- Intellectual freedom
- More people to work with and amplify your research impact
- Mentoring and nurturing young researchers
- Teaching (if you enjoy it)
- No boss
- Easy to start companies, limited IP entanglement
- Sabbaticals are wonderful
- Long term stability once tenured (industry labs come and go)
- The university revolves around you (as opposed to cog in the machine)
- No need to pretend to align with goals of company (increase ad revenues?)
- More flexible schedule

Industry pros:

- Can have impact on real-world products (although not always true, and possible in academia too)
- Can mean more resources (compute, data, sometimes engineers)
- More structured, you have a supervisor, feedback, praise
- Probably better pay
- Less multitasking
- No teaching (if you don't like it)
- Probably easier to control workload (although I claim it can be done in academia too)
- Less/no fundraising (although you need to get projects approved & sensitive to economy)

Quotes from people who have experienced both:

In industry, when the boss says "jump", the subordinates say, "how high?"

In academia, when the dept head says "jump", the faculty say, "define what you mean by the word, 'jump' ?"

In industry, you have to pretend to really care, or else to really care, about the company's mission, whatever it is. "I really love increasing ad revenues at Ama-Meta-Google".

In academia, you work for a place that has a wonderful mission: do research and help people grow.

You know for sure that your university will be doing fundamental research for all of the rest of the time of your career.

You know that virtually every great industrial lab has changed and soured eventually.

My subjective experience has been: in academia, the highs are higher and the lows are lower.

If you want to be able to follow the research that you love, academia is probably the place for you.

I can't decide which place treats you better, as a human. In industry, you're a well-treated cog in a machine. In academia, you're a well-respected human, but asked to do an insane amount of work.

In the industry I really did not like the economy cycles. During economic downturns, the industry tightens the belt and it is really not fun anymore. no interns, layoffs, the need to contribute to the bottom line of the company. Since I started as a faculty in Jan 2011, folks in the industry have been really spoiled. It looks like it might change very soon. I think people almost forgot how it used to be.

I also did not like that it is very difficult to have large projects in the corporate research lab. Typically, the best you can do is a product feature. Overall, I think it is very difficult to have a very large impact as a part of the corporate lab.

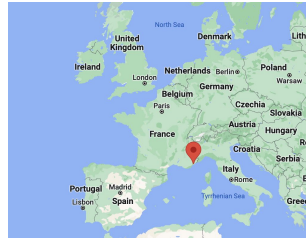
The workload in the academia is very high -- but ... we are really doing this to ourselves. When you think about it -- we only teach 7 months in a year (and only one class per semester). Say "no" more, take fewer students, etc.

See also my talk on academia vs industry in computer graphics

<https://www.thecomputationalphotographer.net/2023/06/can-academia-compete-with-the-resources-of-industry-a-historical-perspective-from-computer-graphics/>

Did I mention sabbaticals?

Every 7 years at MIT + one semester of junior leave



It is a very social job

My professional social world is broader than when I was a student or postdoc

Lots of human interaction

- Meetings with students
- Lots of faculty lunches
- People of different ages, background

Very collaborative

- I have co-authored papers with tons of faculty members inside EECS (~12 different faculty members), at other universities (Berkeley, Stanford, CMU, UCSD, UC Irvine, Tokyo, Cornell, Columbia, Aalto, INRIA, Grenoble, UCL, EPFL, Bern,...), outside EECS (architecture, Brain and Cognitive Science, Mechanical Engineering, MDs, psychology, art history) and at companies (Google, Nvidia, Adobe, Microsoft, ILM)
- A large fraction of my PhD students are co-advised



Work-life balance

It can be a demanding job

- Especially at the beginning, teaching can be a lot of work
 - We try to pair you with an experienced faculty member, though, to reduce your load
- You can overwork yourself, let the pressure of tenure overwhelm you, and grow your group too big. **But you don't have to.**

It is a flexible job (remember, no boss)

Teaching and some meetings are constrained. The rest is flexible

Be disciplined about your schedule, keep time for fun, hobbies, friends and family

Remember that quality matters more than quantity. Don't overextend yourself.

Learn to say no.

Take vacations. Use sabbaticals and junior leaves



A faculty job is compatible with (friendly to?) a family

It has become easier and more common for junior faculty members to have children, and for dual-career couples to have children

- Good leave policies (1 semester, tenure clock extension)
- Child care assistance
- Flexibility of schedule
(better than in industry according to people who have experienced both)
- Increased understanding that scheduled events must be family-compatible



My personal experience with workload and balance

These days I work ~ 40-50 hours/week

- I refuse meetings after 5pm. I do school dropoff/pickup for my kids, cook dinner most nights, read books to my kids every night
- little work on the weekend
- sometimes leave early on Friday to drive to Maine, NH, or Cape Cod

I probably take ~ 7 weeks of vacation per year

- 4.5 days Thanksgiving, 10 days Christmas, 1 week February, 4 weeks summer, plus all 3-day weekends
- No more than 30 min of email work/day during vacations

During tenure track (before I had kids), probably

- 55-60 hours / week average (I could have gotten away with less, I got tenure 1 year early)
- 6 weeks of vacation with median ~1h of email/work per day



Some of my vacations in the last 12 months

Vacations



Highly recommended.

The world will not stop turning

While I was on tenure track:

- 2 weeks in Galapagos & Ecuador (no internet!)
 - 2 weeks in Tanzania (no internet)
 - 2 weeks in Botswana (no internet)
 - 2 weeks in Alaska (no internet half of it)
 - 2 weeks in Italy
 - Two 1-week trips to the Everglades
- + ~2 trips to France every year to visit family & friends

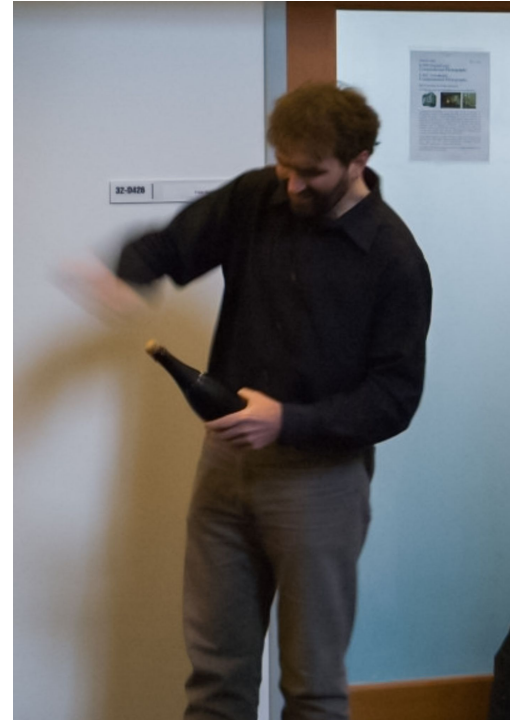


Tenure rate at MIT

Pretty high

- Hard to come up with fully meaningful number, though, but I am working on it. Stay tuned.
 - Essentially you can look at two numbers, both imperfect:
The number of people who apply for tenure and get it is super high but does not capture people who leave before applying for tenure.
The full attrition (number of people who start on the tenure track and get tenure) also includes a majority of people who leave for personal reasons (2-body problem typically)

We want our junior faculty to succeed. We invest a lot in them.



Is the grass greener elsewhere?

In my anecdotal and limited observation, work-life balance and stress level are not necessarily better at less “prestigious” institutions.

You have fewer resources, more teaching to do, and the internal politics can be worse.

In general, a lot of the pressure is self imposed and people elsewhere are pretty good at putting pressure on themselves too.

Application material (MIT EECS)

Research statement (2-4 pages)

Teaching statement (1-2 pages)

Diversity, inclusion and belonging statement

Letters of recommendation (3 or more, submitted by letter writers directly)

CV, cover letter

Option to include sample papers

- probably a good idea to select your 1-3 top papers

Due Dec 1

<https://www.eecs.mit.edu/career-opportunities-at-eecs/>

<https://mitcommlab.mit.edu/eecs/commkit/faculty-application/>

Research statement

<https://mitcommlab.mit.edu/eecs/commkit/faculty-application-research-statement/>

About both past and future work

With an overarching vision

Ideally your past work shows credibility for future work

Majority should be readable by any EECS faculty member

- But there can be more technical bits

Combination of high-level goals and more concrete article-sized ideas.

Application timeline (MIT EECS)

Applications due December 1

- Reviewed by one of our search committee (CS, AI+D, EE), usually by ~2 members closest to your area
- Often ask for opinions of other more expert faculty members outside committee
- Big emphasis on research track record, but teaching and diversity statement affect the decision.
- We read your papers
(probably biggest factor, personally first thing I do)

Example of committee instructions

Folder review. Some key points useful to write about in the review are:

- Describe the candidate's area of work.
- Describe what has the candidate done that stands out
- Why is the candidate important for that area of work
- How does the candidate contribute to the diversity of thought in the department
- Is the candidate worth of further consideration?
- Have you consulted area experts in the department? Who?
- What are the DEI plans?
- What drives your initial decision? Papers, research statement, DEI statement, teaching statement,

For a subset of applications, committee discussion

Example of instructions:

Prepare 1-2 slides per candidate. The slides should:

- Bring input collected from area experts outside the committee.
- Describe your findings during initial review.
- What are the main research contributions of the candidate?
- Which papers have you read?
- Describe the candidate's area of work.
- Describe what has the candidate done that stands out.
- Why is the candidate important for that area of work.
- Describe some highlights from the DEI statement, and teaching statement.

Application timeline (MIT EECS)

Applications due December 1

First round of selection

Pre-interviews (zoom)~ end of January-early February, for a subset of candidates

- Short research talk + questions. 30 minutes total.
- Small set of people (subset committee + experts)
- Second round of selection

Interviews until ~ April

- See slide: talk + discussion + 1-on-1 (+ dinner)
- Input from broad faculty, decision by search committee and department heads

Offer late April-early May

Start job typically between July and September one year later

- i.e. possibility of 1 year deferral

Example of pre-interview instructions to committee

The goal of the questions is to find out what the candidates know and to complement the information in the folder. Do not expend time trying to find out what they do NOT know.

The decision to move forward with a full interview will be taken from the information we have from the folder and the pre-interview. This means that the pre-interview is not to be considered as the only source of information. The pre-interview is short and we should acknowledge its limitations and consider all the folder information when making a decision.

Interviews & visit

You give a ~45 minute research talk + 10 minutes of questions

- Make sure there is technical depth but any EECS faculty member should understand most of it.
- <https://www.eecs.mit.edu/career-opportunities-at-eecs/faculty-job-talks-tips-from-the-faculty/>

1-hour discussion

about your research/teaching/diversity statement

with subset of search committee

Several 1-on-1 interviews

with faculty members, department head, dean, students

A nice dinner with faculty members



The job talk (45 min)

It takes a lot of work to prepare a good job talk. 2-4 weeks full time.

Depth more important than breadth in US. Typically you can cover only 1.5 big contributions. Don't try to cover every single result you have.

80% of it should be understandable by any EECS faculty member

Invest time in explaining the problem you are trying to solve. Why it matters. Why it's hard.

I personally advise not to put too much about future work. 1-3 slides max. Make sure you have a lot more to say than what is in the slides. People will ask questions.

Practice in front of a diverse audience. Ask people for blunt feedback, and tell them it's important that people outside your field understand most of it.

The 1 hour discussion

About your future research, teaching statement, diversity statement.

Depending on the place, you may give an opening statement, maybe with slides, maybe ~5 minutes.

1-on-1

Have a short description of your research ready, practice it. Both a 30 sec version and a 2-4 min version. You may ask to show slides. People may not have seen your talk.

People may ask about the big challenges in your field. It's better if you have an answer and if you can say you are working on some of them.

If people ask you if you have questions for them, I recommend you ask about their research.

I personally don't think you need to research the people you will meet. But it's not a bad idea to check out their web pages.

It may be stressful, but it can also be fun: you'll get to talk to a lot of interesting people.

Two-body problems

“dilemma for life partners (e.g., spouses or any other couple) often referred to in academia, relating to the difficulty of both spouses obtaining jobs at the same university or within a reasonable commuting distance from each other.” Wikipedia

If applicable, we try to help your partner find a job in the Boston area

MIT Faculty Partner Career Transition Assistance Program

Apparently better than most universities

In some cases, the department can even pay for short-term positions

Good news: lots of universities, industry around Cambridge

Don't hesitate to talk about it early, it will not impact your application

- Seriously, I mean it. We have given job offers to people who had initially told us that their 2-body problem made it unlikely they would move to Cambridge. (and they actually accepted ;-)

You can mention it in the cover letter.

Should I apply this year or next year?

One thing to know: it is rare to get interviews a second time at the same university (in US)

- I.e. if you get interviews but not the job, it is unlikely that you will get interviews the following year(s), unless there is a huge change in your application
- Not unheard of, but unlikely

Pros of this year:

- You can apply a second time, more chances to get a job if some universities don't hire a given year.
- You start the next stage of your career one year earlier, and it's an exciting stage!
Your first sabbatical is one year earlier ;-)

Pros of next year

- Bigger critical mass of results, more maturity

Consider postdoc fellowships

MIT postdoc fellowships for members of groups underrepresented in the field

<https://www.csail.mit.edu/meteor>

<https://engineering.mit.edu/the-mit-postdoctoral-fellowship-program-for-engineering-excellence/>

You can apply in parallel to faculty jobs.

- It will not impact your faculty application.
- MIT CSAIL Meteor (which I know better because I co-chair it) can be used for a “gap year” before starting a faculty job

FAQ

Can I apply to multiple positions?

- Yes. We may even pass your application to other departments at MIT or different sub-committees

Can I apply late?

- Deadline not as strict as for grad school, but try to avoid it. Letters can be a bit late, but not too late. No, that's not a very precise answer.

The job posting says you're looking for X research area, but I work in Y. Should I still apply?

- Yes. Seriously: yes.

Resources

To help you prepare applications

<https://mitcommlab.mit.edu/eecs/use-the-commkit/>

<https://www.eecs.mit.edu/career-opportunities-at-eecs/faculty-job-talks-tips-from-the-faculty/>

My faculty onboarding slides

https://docs.google.com/presentation/d/1PCKQizP6NxxkTRNZzSaeP_n2LHD8ldI7bGrgdJcxTMnE/edit#slide=id.g15e8269b37d_0_289

Faculty jobs at MIT EECS and SCC

<https://www.eecs.mit.edu/career-opportunities-at-eecs/>

<https://computing.mit.edu/faculty/faculty-openings/>

MIT Postdoc fellowships to broaden participation in the field

<https://www.csail.mit.edu/meteor>

<https://engineering.mit.edu/the-mit-postdoctoral-fellowship-program-for-engineering-excellence/>

Links

<https://t.co/aHogBluP9P>

<https://yisongyue.medium.com/checklist-of-tips-for-computer-science-faculty-applications-9fd2480649cc>

<https://csguides.github.io/grad-job-guide/>

https://docs.google.com/document/u/1/d/e/2PACX-1vSeOnC_QdaJVc3OuuMfDHVlk3QotUxvghytRFaDsrdA0uovD5axQjp8kJCM4Evu1cCf9Hg_u_Stabu1/pub

<https://matt.might.net/articles/advice-for-academic-job-hunt/>

http://tokekar.com/docs/ExperienceFindingAcademicJobs_Tokekar.pdf

<https://sites.google.com/view/elizabethbondi/blog>