

LAB FEATURE – MIT EECS (ELECTRICAL ENGINEERING AND COMPUTER SCIENCE) - <https://www.eecs.mit.edu/>

Note: this “lab feature” is given to you as a set of guidelines, using a very high-profile example, and it contains a lot of very generic information, but in your own project, you are expected to make the presentation more personal, as much as the available information allows. The objective of this sample is to suggest what to look for.

The institution (University, Company...), the laboratory / research center and the team.

It is a department of the MIT (Massachusetts Institute of Technology), located in Cambridge, MA, across the Charles river from Boston [Show map].

The MIT is a very prestigious private research University [not historically Ivy League (explain the term), but included in “Ivy Plus”, and historical attempts from Harvard to absorb it – now, relations with Harvard are marked by cooperation on a number of projects such as EDX...], and it is still a leading teaching and research institution worldwide today [Possible discussion of differences between French model and American model, and of funding and endowment, public funding vs high tuition fees and alumni endowment].

Computer Science at MIT is grouped with Electrical Engineering within EECS [Discuss choices in term of research opportunities and collaboration, but also of potential “dilution” due to size].

4 main labs:

- Computer Science and Artificial Intelligence Laboratory (CSAIL)
- Laboratory for Information and Decision Systems (LIDS)
- Microsystems Technology Laboratories (MTL)
- Research Laboratory of Electronics (RLE)

Focus on CSAIL, for example:

- 900+ researchers, students...
- \$65 million annual research budget
- Origins in a 1963 project, but formally the 2003 merger of 2 research labs (Computer Science and AI)

The main research field (area of IT...)

- Artificial Intelligence & Machine Learning
- Algorithms and Theory
- Human-Computer Interaction
- Programming Languages and Software Engineering
- Computational Biology
- Robotics
- Computer Architecture
- Security and Cryptography
- Graphics and Vision

- Systems and Networking

[Remark: it is a big structure with significant funding, so it covers most areas of CS. A catalog is not enough, but going in-depth is not possible for all fields, so we need to focus on maybe one field].

Focus on Security and Cryptography. It has various research groups working on various projects [Note: groups can be in more than one research field]:

- ➔ Cryptography and Information Security Group. Projects:
 - Basing Cryptography on Structured Hardness
 - Splinter: Practical Private Queries on Public Data
 - Data Garbling: Computing on Encrypted Data
- ➔ Focus on Splinter Project (3 researchers are members of the project).
“Splinter protects users’ queries on public data and scales to realistic applications.”

The technology involved – hardware and software, the specific research

From the website: “Splinter uses and extends a new cryptographic primitive called Function Secret Sharing (FSS) that makes it up to an order of magnitude more efficient than prior systems based on Private Information Retrieval and garbled circuits. We develop protocols extending FSS to new types of queries, such as MAX and TOPK queries.”

Mostly software, goal of improving efficiency of a certain task by using a different method.

- ➔ If available, link to research publications (articles...). This aspect is not developed in detail here, but would need to be. For the Splinter Project:
<https://frankwang.org/files/papers/wang-splinter.pdf>

(If applicable) Concrete applications, possible future developments, how software or hardware being developed could be marketed

- ➔ Real-world applications in terms of protection of privacy (more efficient at preventing information providers from obtaining sensitive identifiable user information when the user queries information from a dataset. Sensitive information such as location, political affiliation, sexual orientation, income...would be better protected).
- ➔ They are exploring more types of applications of their new methods (“new types of queries, such as MAX and TOPK queries”), so possible future developments, in the short term, could come from such an extension [research application of MAX and TOPK queries and consider benefits of the more efficient method].
- ➔ Any other benefits for database management (within companies) and cross-database data mining (from outside companies)?

For fundamental research, the impact on our knowledge, possible future research.

Seems less relevant – possibly impact in terms of research and development method, and cross-domain transferability of method?

Most importantly: why you would like to join this lab.

- One of the best, most prestigious universities in the world, with more budget than others
- World-leading research lab, doing cutting-edge research
- Joining a team of some of the world's most brilliant minds [Give example(s)]
- Doing research on... [THIS POINT IN PARTICULAR NEEDS TO BE PERSONAL]
- New England clam chowder, oysters, and other seafood

The reasons above are generic (except for clam chowder – sorry, not sorry), but in your own project, you need to make them more personal.

In particular, the more focus you can put on their research, the better (but don't skip the lab presentation part).