The Fourth Year Project Selection Process

Andrew Gee

Department of Engineering, Cambridge

14 March 2022

Type A and B projects

Type A and B projects

Type A projects are proposed by staff, Type B by students.

Type A and B projects

Type A projects are proposed by staff, Type B by students.

Tuesday 26 April is the deadline for sending Type B proposals to coordinators.

Type A and B projects

Type A projects are proposed by staff, Type B by students.

Tuesday 26 April is the deadline for sending Type B proposals to coordinators.

If a Type B project is not viable, a Type A project must be selected instead.

Type A and B projects

Type A projects are proposed by staff, Type B by students.

Tuesday 26 April is the deadline for sending Type B proposals to coordinators.

If a Type B project is not viable, a Type A project must be selected instead.

Most students choose a Type A project.

Group centres

A: Thermodynamics and Fluid Mechanics
Prof Stewart Cant

B: Electrical Engineering
Prof Sir Mark Welland

C: Mechanics and Materials
Prof John Durrell

D: Civil, Structural and Environmental Engineering
Prof Abir Al-Tabbaa

F: Information Engineering
Prof Sumeet Singh

Overall coordinator
Prof Andrew Gee

Group centres

A: Thermodynamics and Fluid Mechanics
Prof Stewart Cant (Mrs Kate Graham)

B: Electrical Engineering
Prof Sir Mark Welland (Mrs Susan Murkett)

C: Mechanics and Materials
Prof John Durrell (Mrs Sara Seddon)

D: Civil, Structural and Environmental Engineering
Prof Abir Al-Tabbaa (Mrs Sue Stocks)

F: Information Engineering
Prof Sumeet Singh (Mrs Lina Zvaginyte-Bagociene)

Overall coordinator
Prof Andrew Gee

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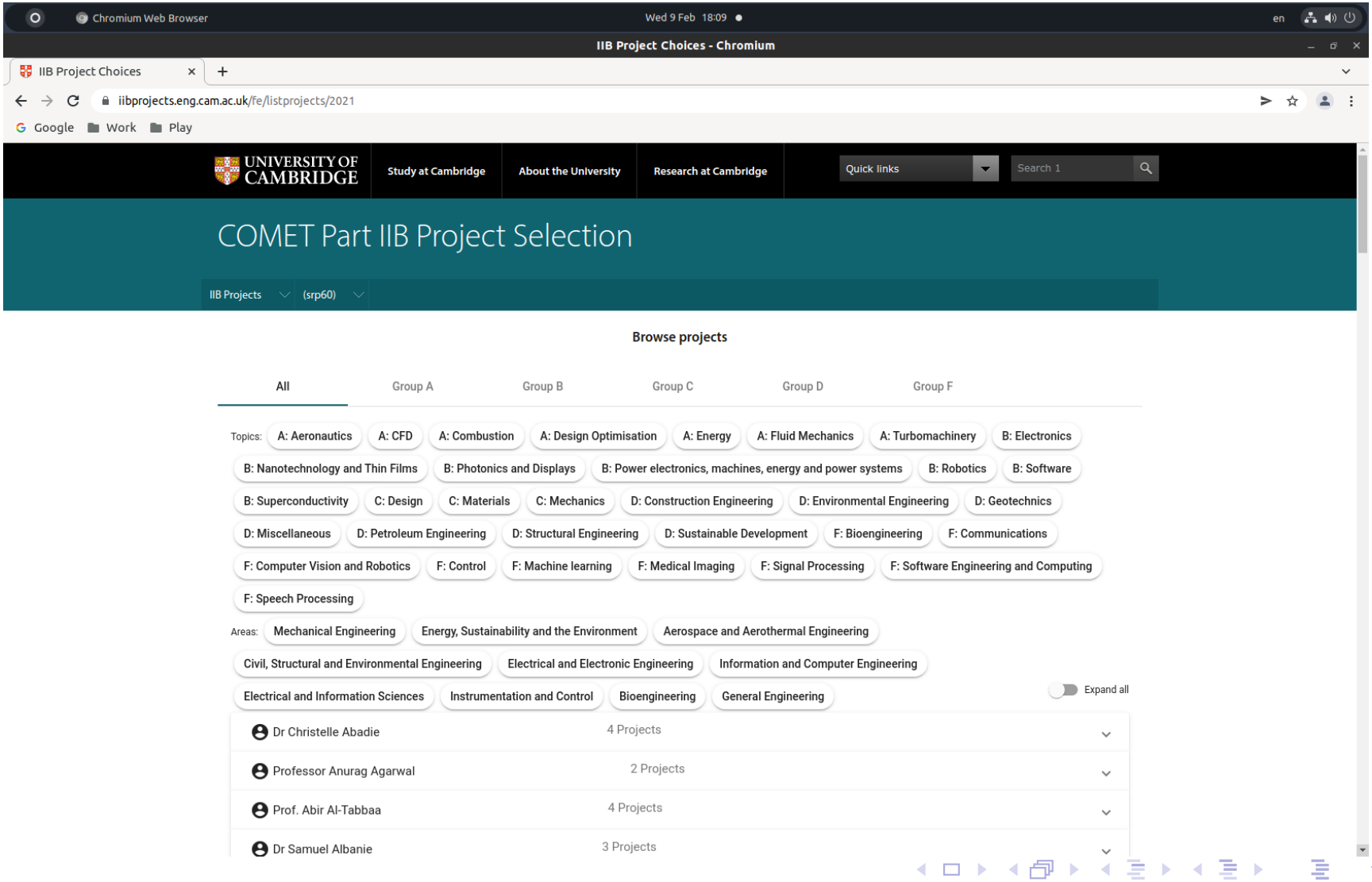
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A: Design Optimisation
A: Energy
A: Fluid Mechanics
A: Turbomachinery
B: Electronics
B: Nanotechnology and Thin Films
B: Photonics and Displays
B: Power electronics, machines, energy and power systems
B: Robotics
B: Software
B: Superconductivity
C: Design
C: Materials
C: Mechanics
D: Construction Engineering
D: Environmental Engineering
D: Geotechnics
D: Miscellaneous
D: Petroleum Engineering
D: Structural Engineering
D: Sustainable Development
F: Bioengineering
F: Communications
F: Computer Vision and Robotics
F: Control
F: Machine learning
F: Medical Imaging
F: Signal Processing
F: Software Engineering and Computing
F: Speech Processing
Areas:
Mechanical Engineering
Energy, Sustainability and the Environment
Aerospace and Aerothermal Engineering
Civil, Structural and Environmental Engineering
Electrical and Electronic Engineering
Information and Computer Engineering
Electrical and Information Sciences
Instrumentation and Control
Bioengineering
General Engineering
Expand all
Dr Christelle Abadie
4 Projects
Professor Anurag Agarwal
2 Projects
Prof. Abir Al-Tabbaa
4 Projects
Dr Samuel Albanie
3 Projects

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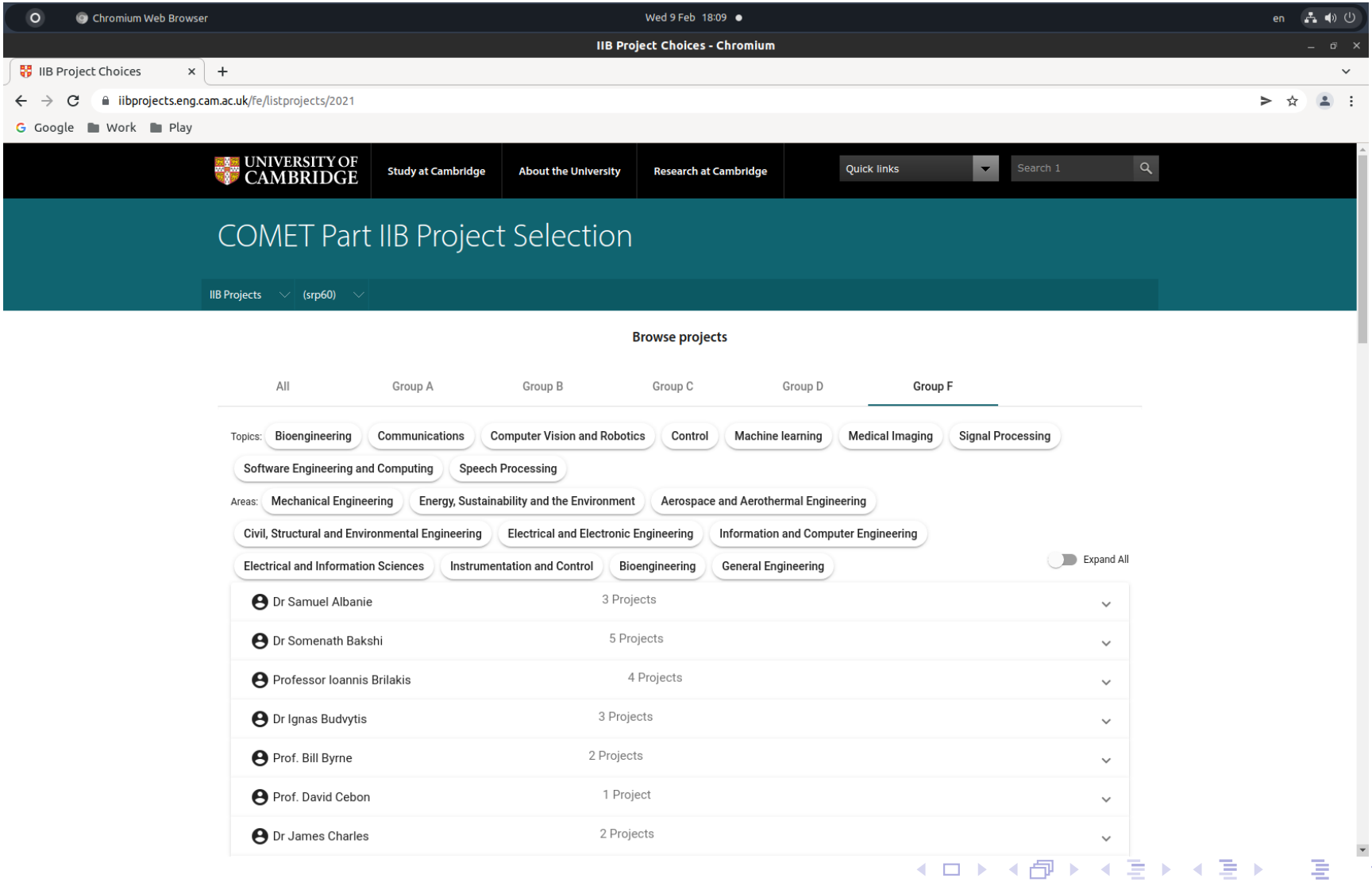
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Dr Samuel Albanie
3 Projects
Dr Somenath Bakshi
5 Projects
Professor Ioannis Brilakis
4 Projects
Dr Ignas Budvytis
3 Projects
Prof. Bill Byrne
2 Projects
Prof. David Cebon
1 Project
Dr James Charles
2 Projects

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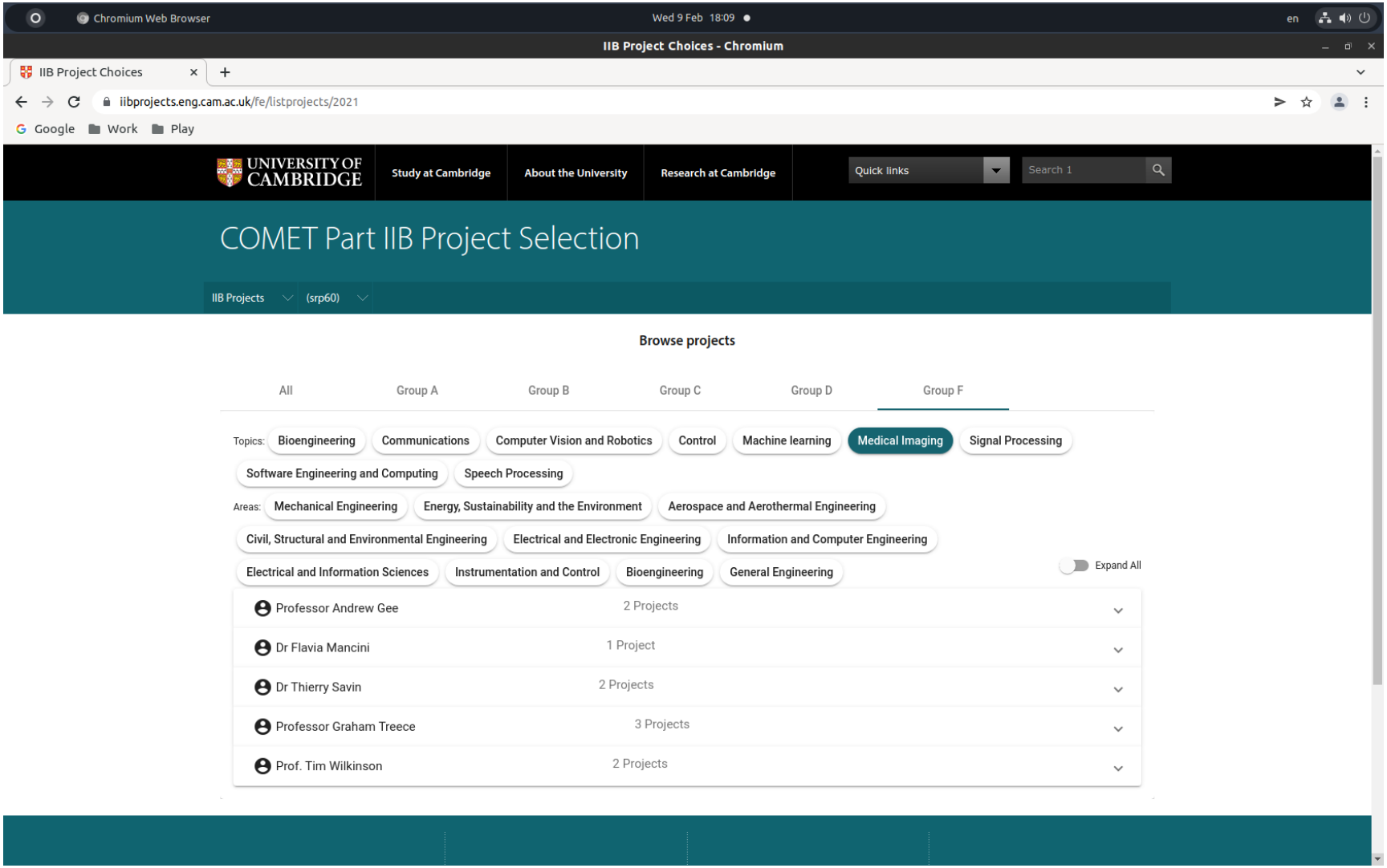
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Expand All
Professor Andrew Gee
2 Projects
Dr Flavia Mancini
1 Project
Dr Thierry Savin
2 Projects
Professor Graham Treece
3 Projects
Prof. Tim Wilkinson
2 Projects

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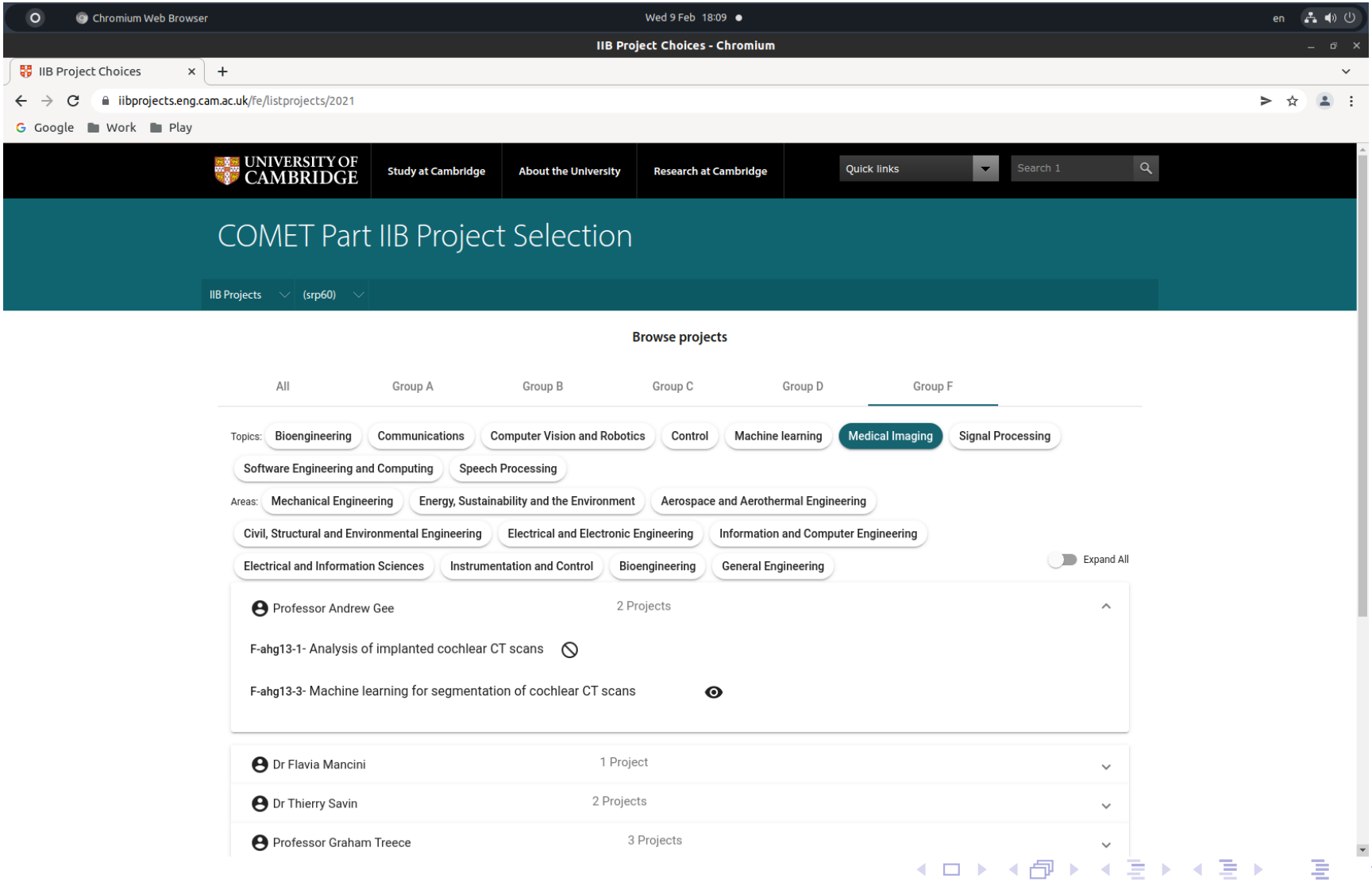
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Expand All
Professor Andrew Gee
2 Projects
F-ahg13-1- Analysis of implanted cochlear CT scans
F-ahg13-3- Machine learning for segmentation of cochlear CT scans
Dr Flavia Mancini
1 Project
Dr Thierry Savin
2 Projects
Professor Graham Treece
3 Projects

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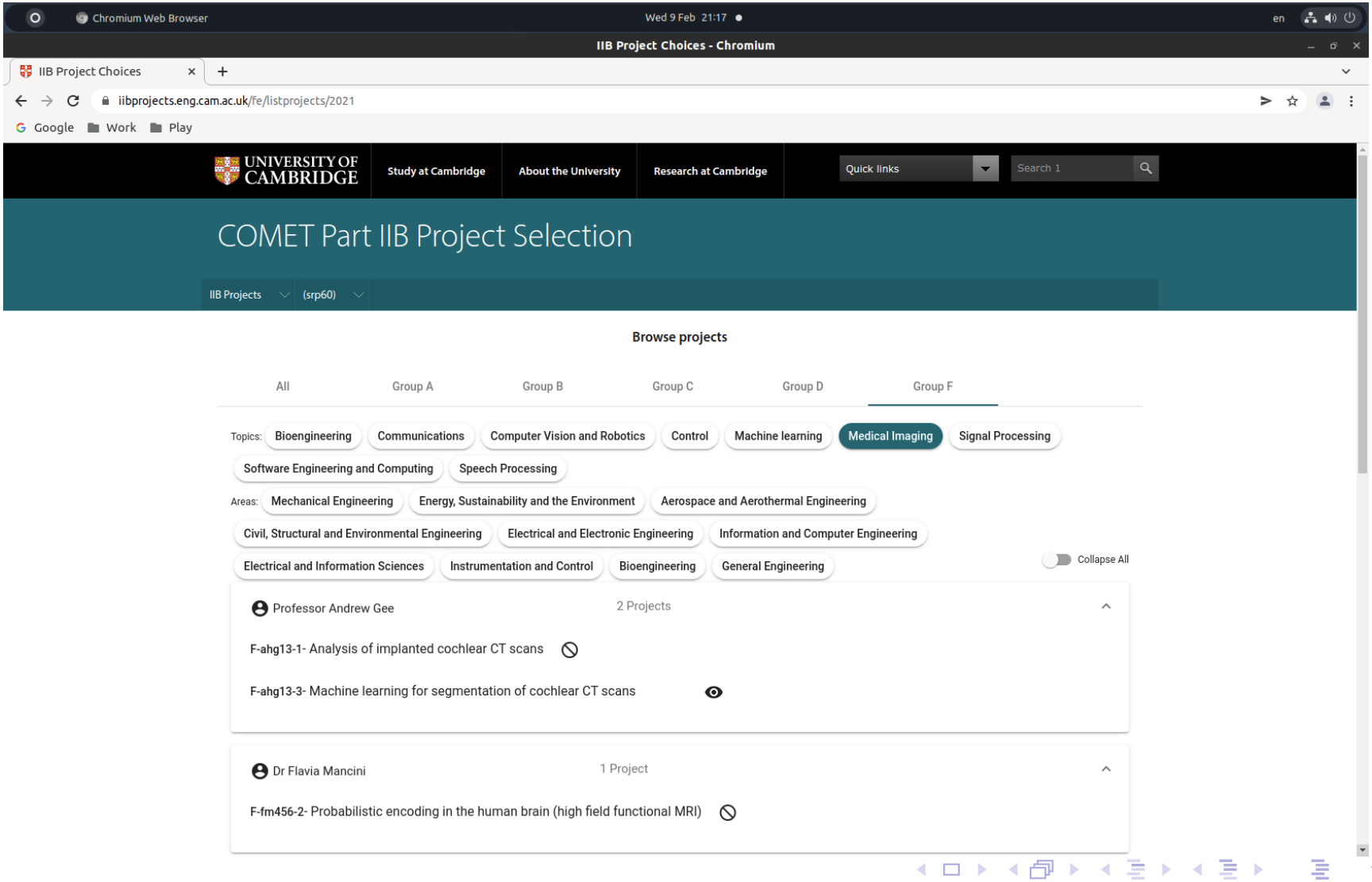
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Collapse All
Professor Andrew Gee
2 Projects
F-ahg13-1- Analysis of implanted cochlear CT scans
F-ahg13-3- Machine learning for segmentation of cochlear CT scans
Dr Flavia Mancini
1 Project
F-fm456-2- Probabilistic encoding in the human brain (high field functional MRI)

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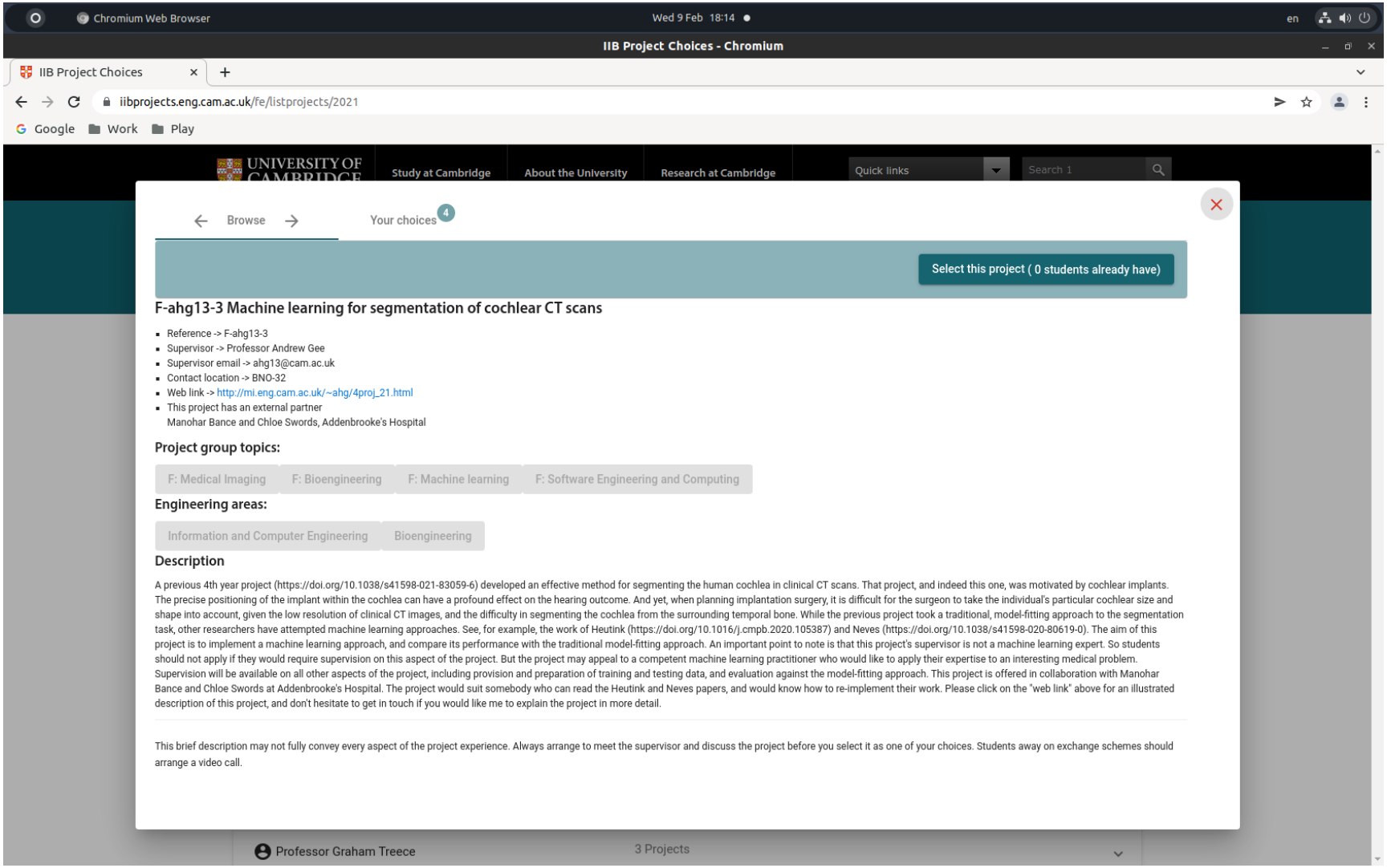
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Select this project (0 students already have)
F-ahg13-3 Machine learning for segmentation of cochlear CT scans
Reference -> F-ahg13-3
Supervisor -> Professor Andrew Gee
Supervisor email -> ahg13@cam.ac.uk
Contact location -> BNO-32
Web link -> http://mi.eng.cam.ac.uk/~ahg/4proj_21.html
This project has an external partner
Manohar Bance and Chloe Swords, Addenbrooke's Hospital
Project group topics:
F: Medical Imaging
F: Bioengineering
F: Machine learning
F: Software Engineering and Computing
Engineering areas:
Information and Computer Engineering
Bioengineering
Description
A previous 4th year project (https://doi.org/10.1038/s41598-021-83059-6) developed an effective method for segmenting the human cochlea in clinical CT scans. That project, and indeed this one, was motivated by cochlear implants. The precise positioning of the implant within the cochlea can have a profound effect on the hearing outcome. And yet, when planning implantation surgery, it is difficult for the surgeon to take the individual's particular cochlear size and shape into account, given the low resolution of clinical CT images, and the difficulty in segmenting the cochlea from the surrounding temporal bone. While the previous project took a traditional, model-fitting approach to the segmentation task, other researchers have attempted machine learning approaches. See, for example, the work of Heutink (https://doi.org/10.1016/j.cmpb.2020.105387) and Neves (https://doi.org/10.1038/s41598-020-80619-0). The aim of this project is to implement a machine learning approach, and compare its performance with the traditional model-fitting approach. An important point to note is that this project's supervisor is not a machine learning expert. So students should not apply if they would require supervision on this aspect of the project. But the project may appeal to a competent machine learning practitioner who would like to apply their expertise to an interesting medical problem. Supervision will be available on all other aspects of the project, including provision and preparation of training and testing data, and evaluation against the model-fitting approach. This project is offered in collaboration with Manohar Bance and Chloe Swords at Addenbrooke's Hospital. The project would suit somebody who can read the Heutink and Neves papers, and would know how to re-implement their work. Please click on the "web link" above for an illustrated description of this project, and don't hesitate to get in touch if you would like me to explain the project in more detail.
This brief description may not fully convey every aspect of the project experience. Always arrange to meet the supervisor and discuss the project before you select it as one of your choices. Students away on exchange schemes should arrange a video call.
Professor Graham Treece
3 Projects

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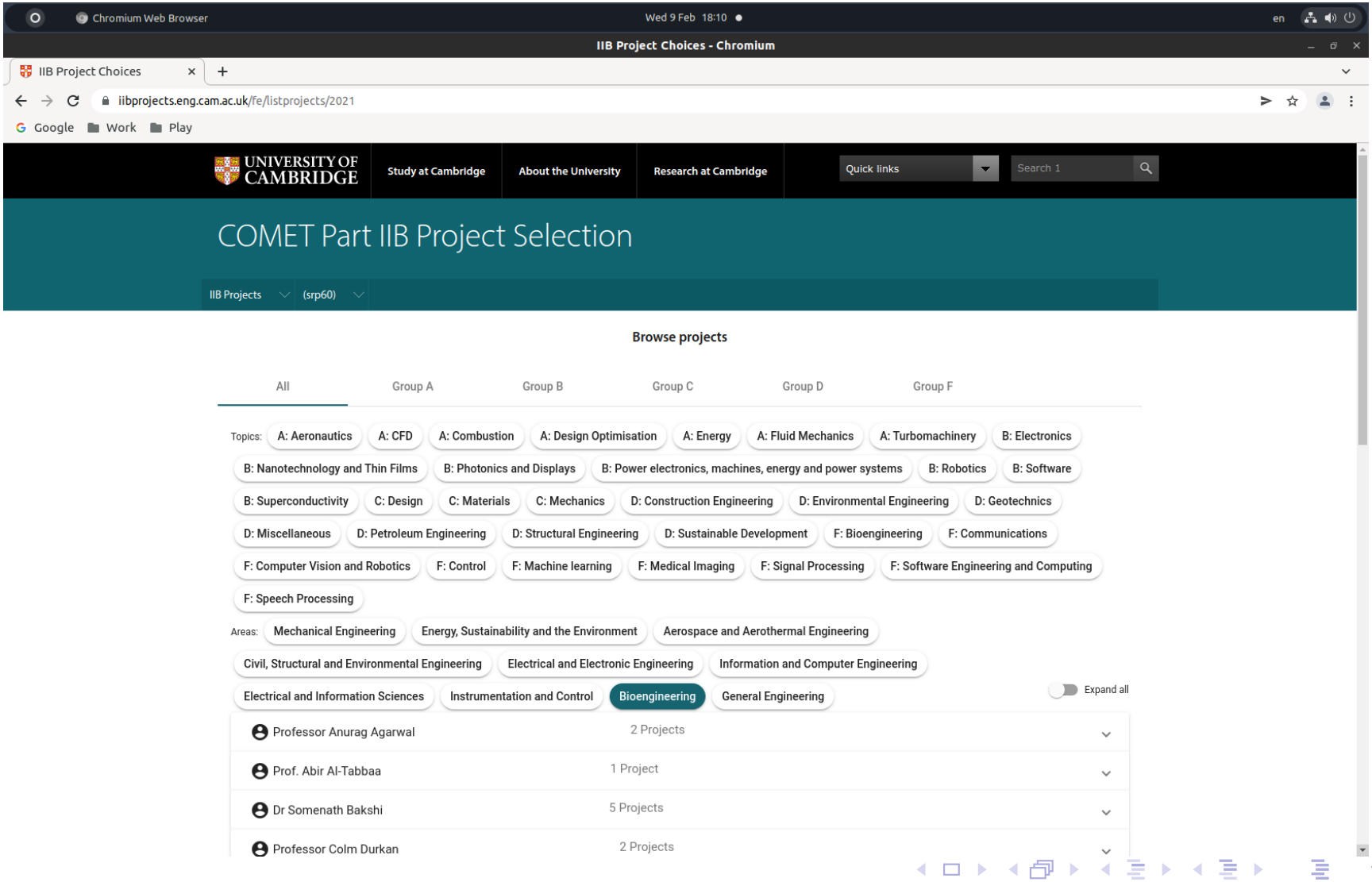
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Expand all
Professor Anurag Agarwal
2 Projects
Prof. Abir Al-Tabbaa
1 Project
Dr Somenath Bakshi
5 Projects
Professor Colm Durkan
2 Projects

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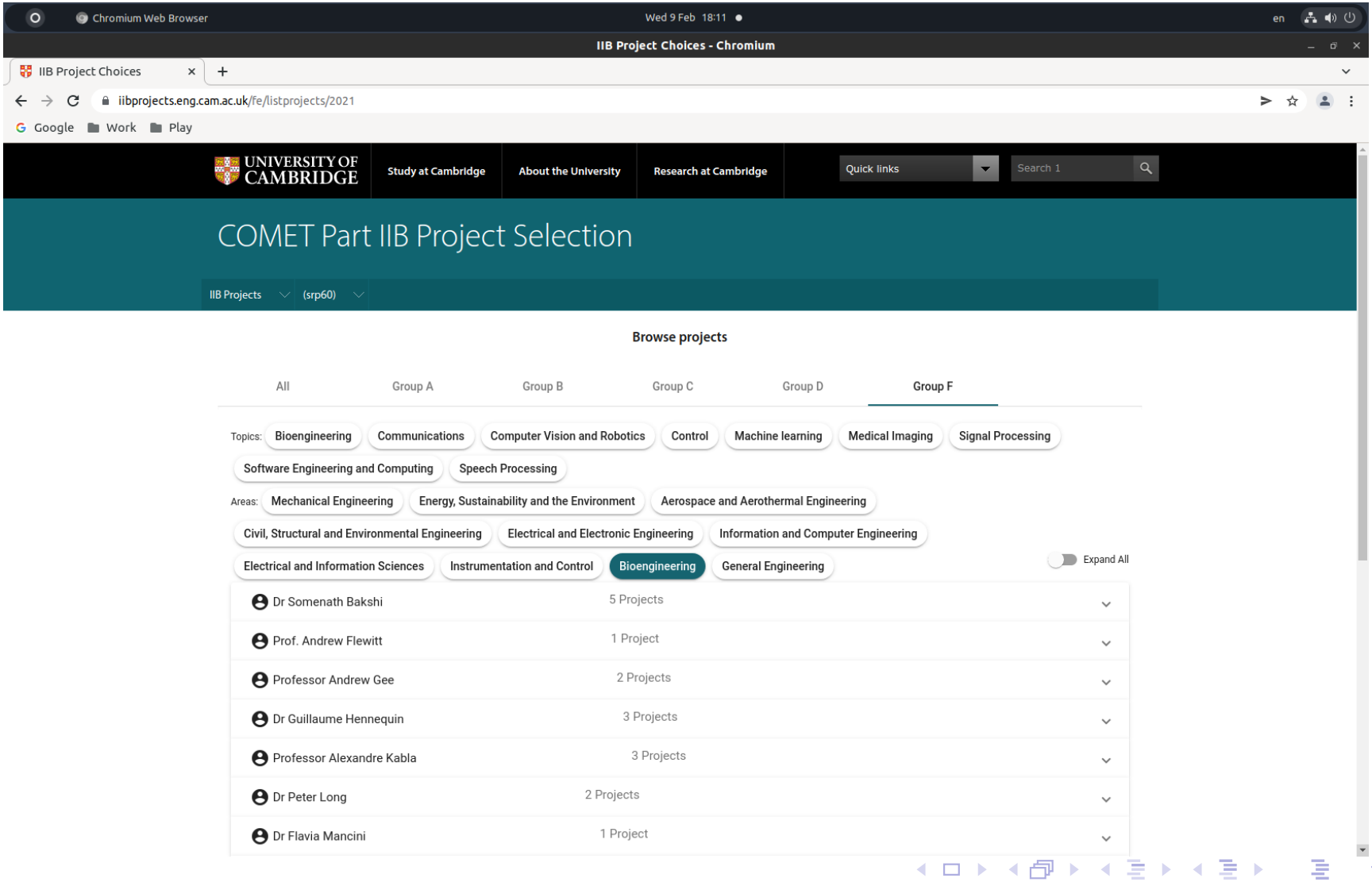
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General Engineering
Expand All
Dr Somenath Bakshi
5 Projects
Prof. Andrew Flewitt
1 Project
Professor Andrew Gee
2 Projects
Dr Guillaume Hennequin
3 Projects
Professor Alexandre Kabla
3 Projects
Dr Peter Long
2 Projects
Dr Flavia Mancini
1 Project

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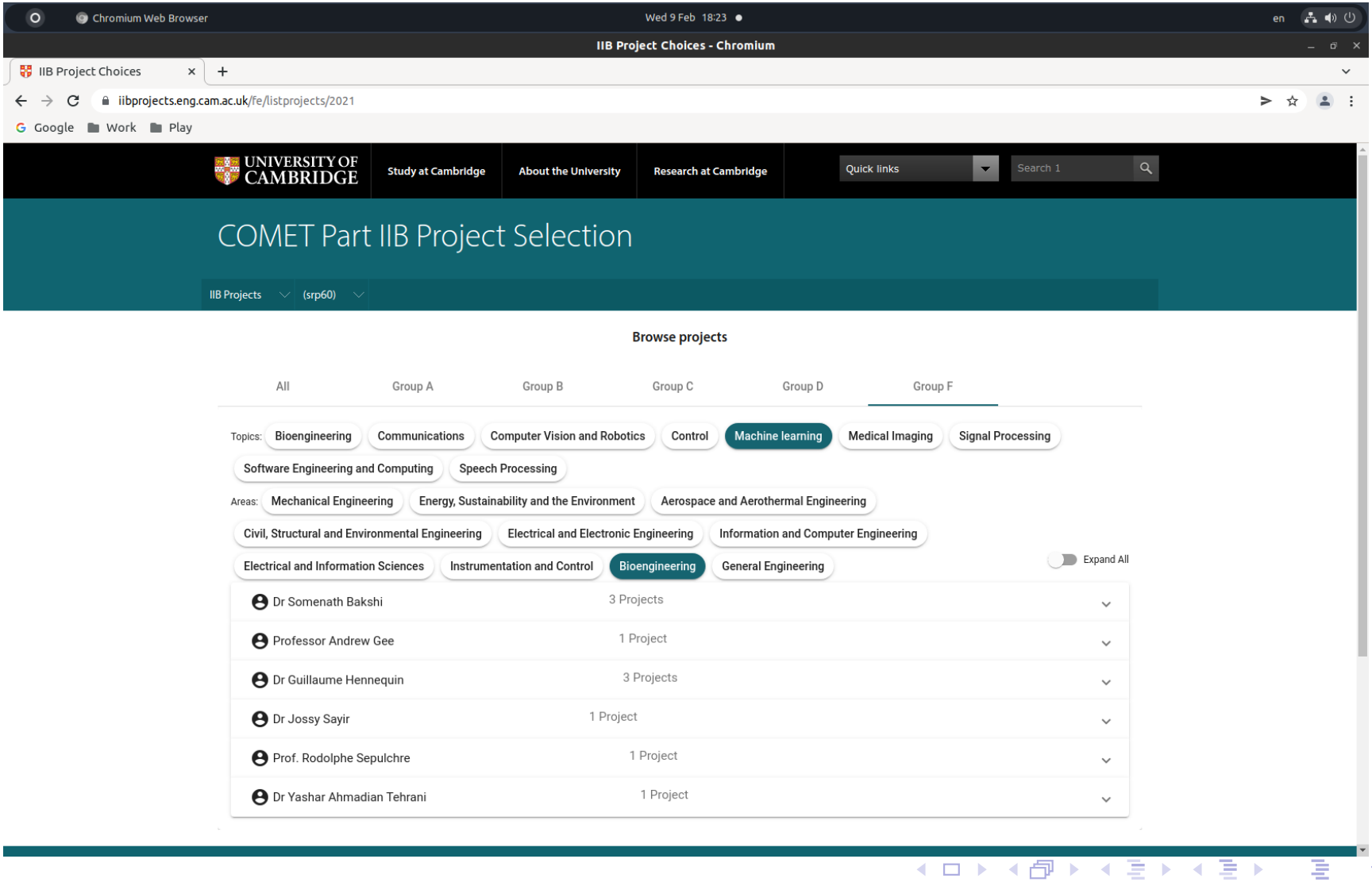
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Expand All
Dr Somenath Bakshi
3 Projects
Professor Andrew Gee
1 Project
Dr Guillaume Hennequin
3 Projects
Dr Jossy Sayir
1 Project
Prof. Rodolphe Sepulchre
1 Project
Dr Yashar Ahmadian Tehrani
1 Project

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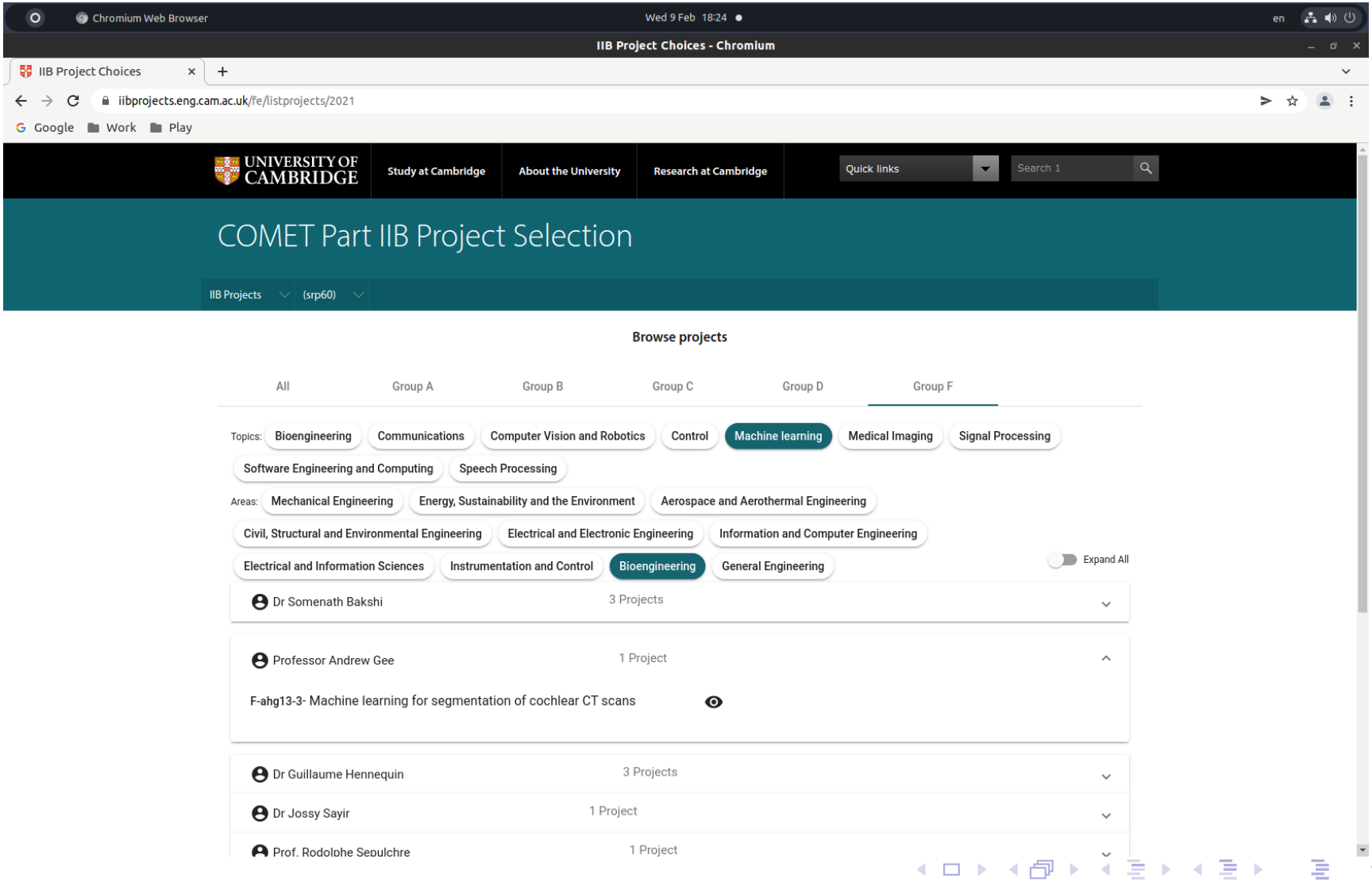
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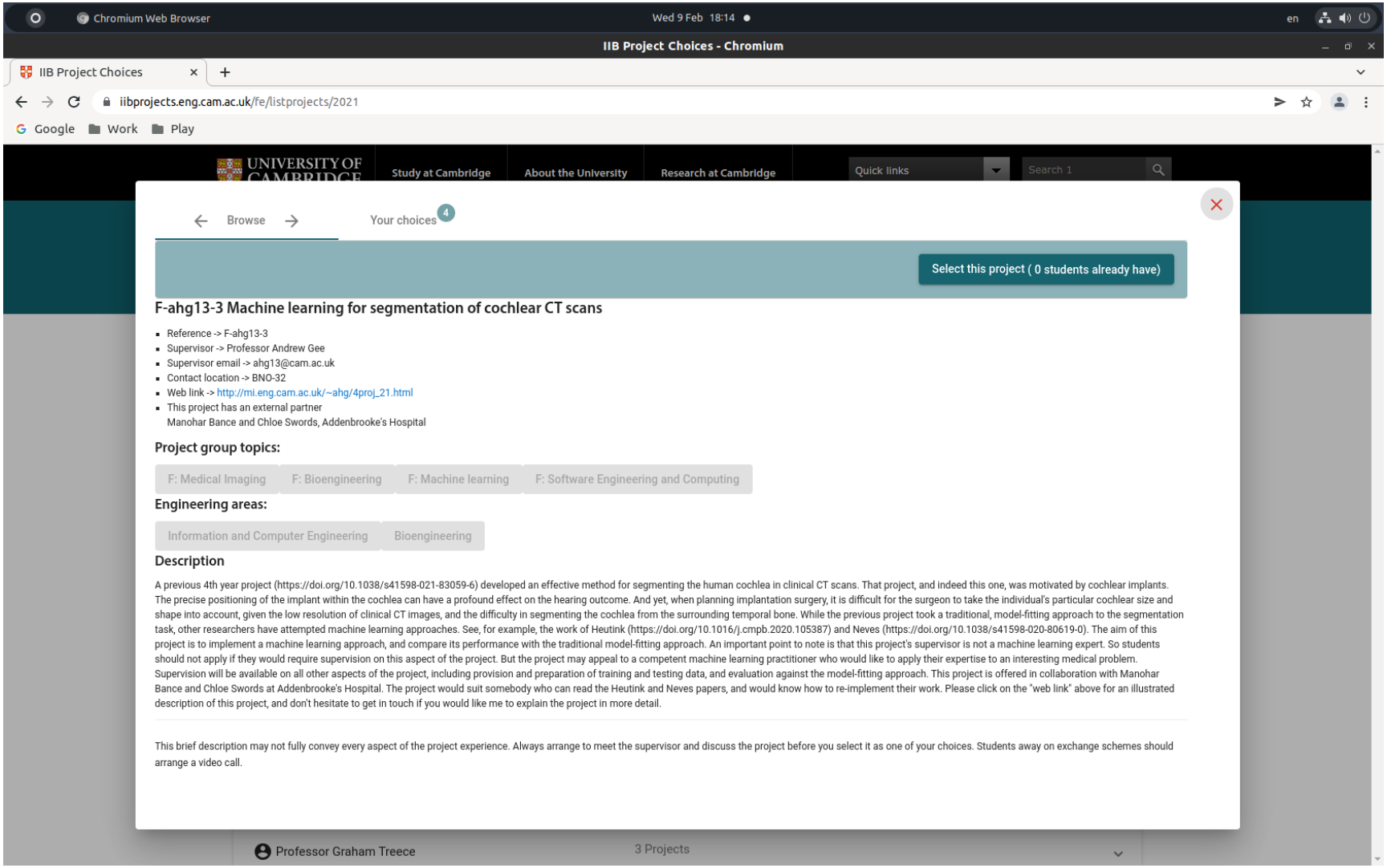
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3 Projects

Meeting supervisors

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Ask about supervision style, what you will *actually be doing*, research environment, chances of getting the project.

Factors to consider

It is not necessary to choose a project in your engineering area.

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You need the time and space to be able to balance module and project work.

Factors to consider

It is not necessary to choose a project in your engineering area.

You need to be excited about the project.

You need to get on with the supervisor and have compatible working habits.

You need the time and space to be able to balance module and project work.

Be aware of any collaborations and confidentiality issues.

Pre-allocation

Supervisors may pre-allocate projects between 9 and 13 May, if they have seen enough students to make a reasoned choice.

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If a project you are considering is pre-allocated, you have at least one week to make a different choice.

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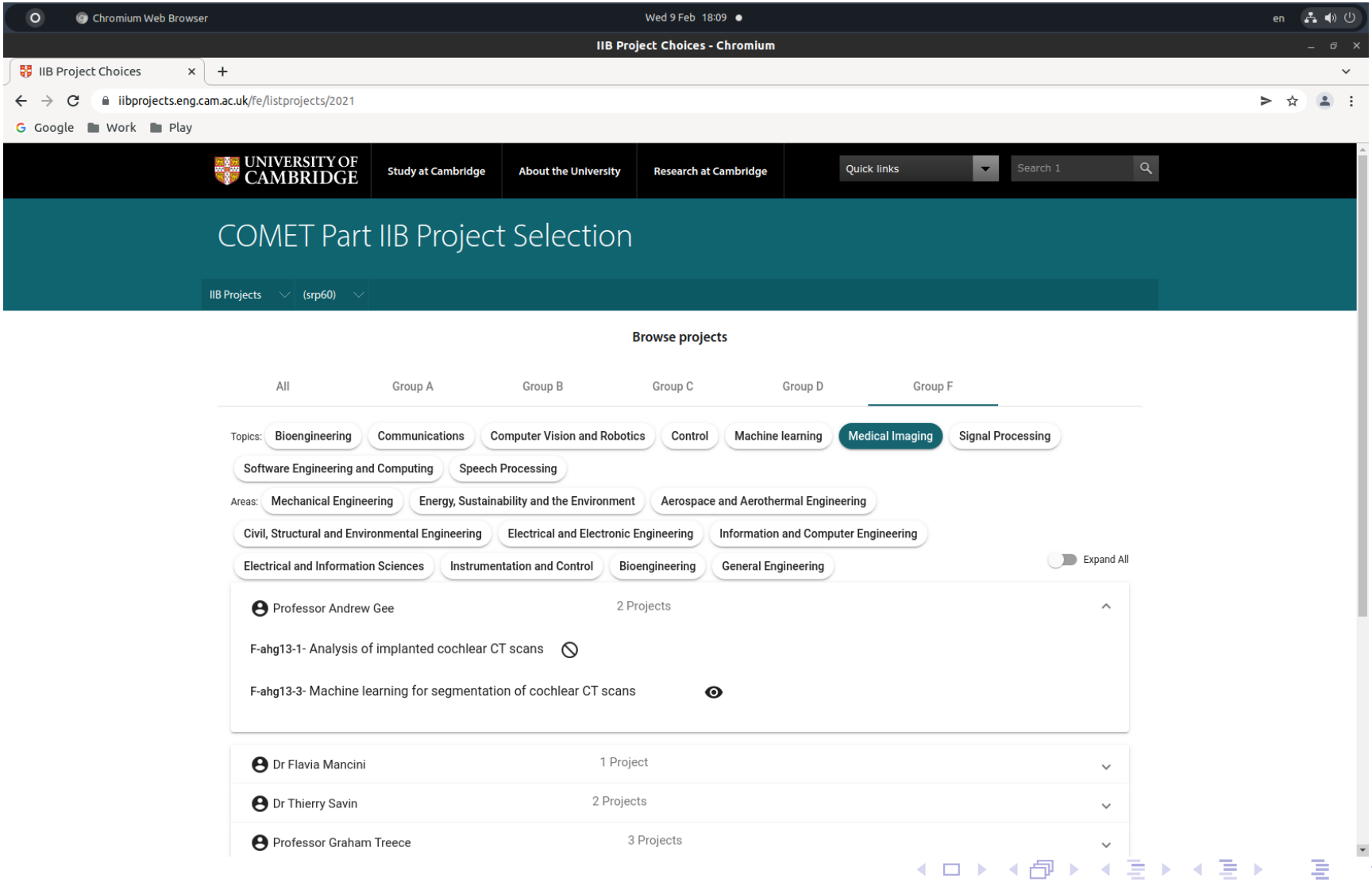
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3 Projects

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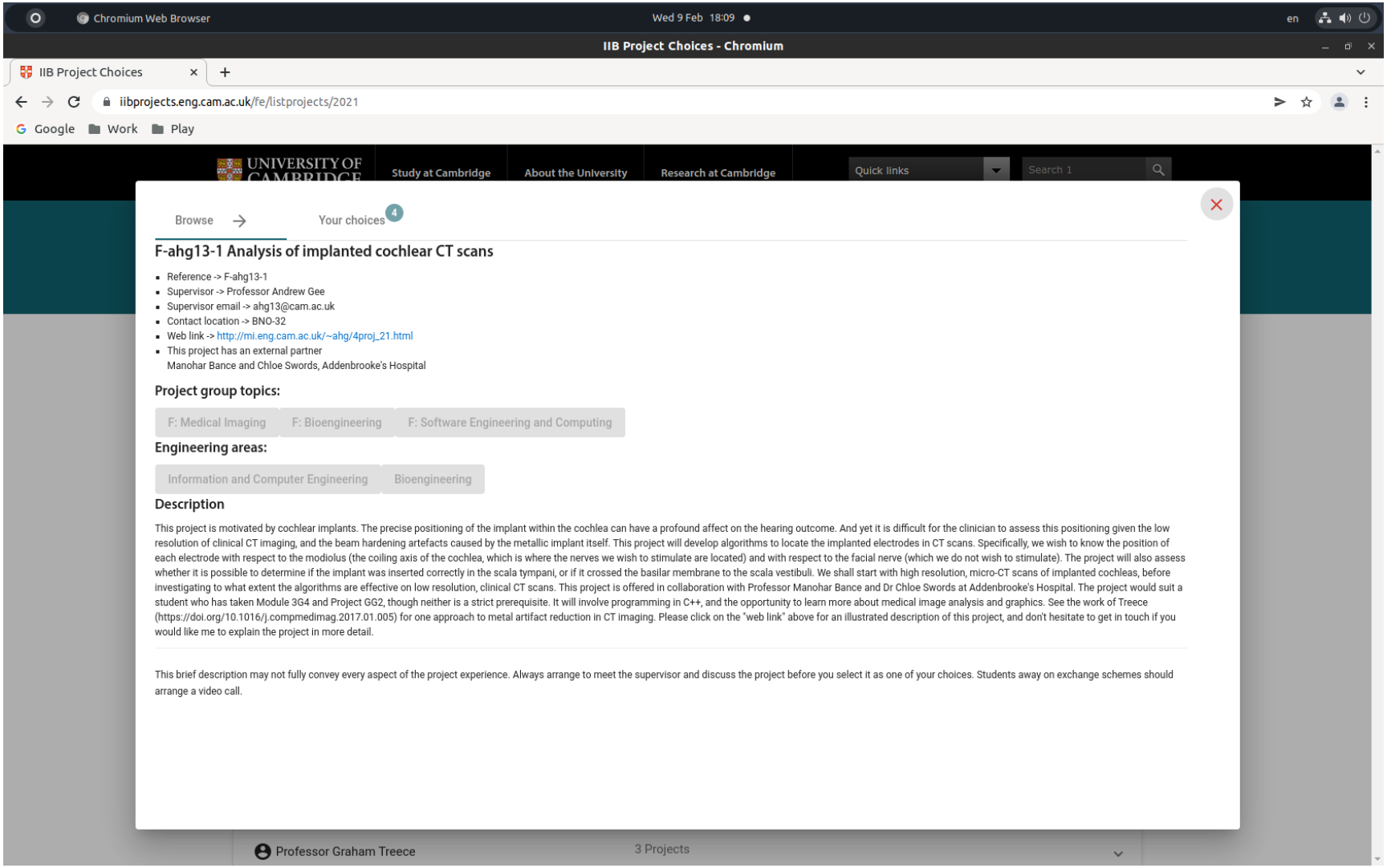
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F-ahg13-1 Analysis of implanted cochlear CT scans
Reference -> F-ahg13-1
Supervisor -> Professor Andrew Gee
Supervisor email -> ahg13@cam.ac.uk
Contact location -> BNO-32
Web link -> http://mi.eng.cam.ac.uk/~ahg/4proj_21.html
This project has an external partner
Manohar Bance and Chloe Swords, Addenbrooke's Hospital
Project group topics:
F: Medical Imaging
F: Bioengineering
F: Software Engineering and Computing
Engineering areas:
Information and Computer Engineering
Bioengineering
Description
This project is motivated by cochlear implants. The precise positioning of the implant within the cochlea can have a profound affect on the hearing outcome. And yet it is difficult for the clinician to assess this positioning given the low resolution of clinical CT imaging, and the beam hardening artefacts caused by the metallic implant itself. This project will develop algorithms to locate the implanted electrodes in CT scans. Specifically, we wish to know the position of each electrode with respect to the modiolus (the coiling axis of the cochlea, which is where the nerves we wish to stimulate are located) and with respect to the facial nerve (which we do not wish to stimulate). The project will also assess whether it is possible to determine if the implant was inserted correctly in the scala tympani, or if it crossed the basilar membrane to the scala vestibuli. We shall start with high resolution, micro-CT scans of implanted cochleas, before investigating to what extent the algorithms are effective on low resolution, clinical CT scans. This project is offered in collaboration with Professor Manohar Bance and Dr Chloe Swords at Addenbrooke's Hospital. The project would suit a student who has taken Module 3G4 and Project GG2, though neither is a strict prerequisite. It will involve programming in C++, and the opportunity to learn more about medical image analysis and graphics. See the work of Treece (https://doi.org/10.1016/j.compmedimag.2017.01.005) for one approach to metal artifact reduction in CT imaging. Please click on the "web link" above for an illustrated description of this project, and don't hesitate to get in touch if you would like me to explain the project in more detail.
This brief description may not fully convey every aspect of the project experience. Always arrange to meet the supervisor and discuss the project before you select it as one of your choices. Students away on exchange schemes should arrange a video call.
Professor Graham Treece
3 Projects

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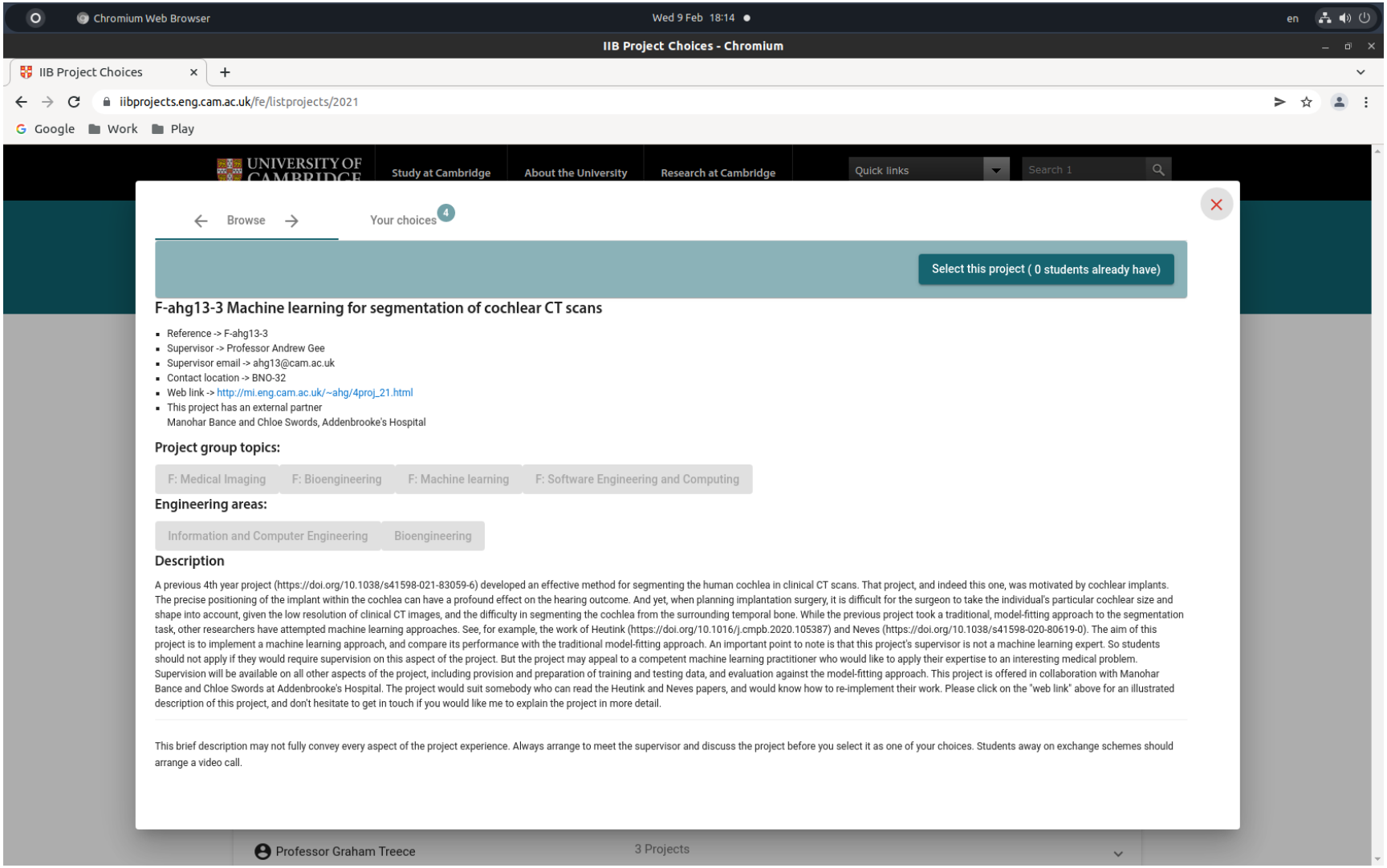
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Select this project (0 students already have)
F-ahg13-3 Machine learning for segmentation of cochlear CT scans
Reference -> F-ahg13-3
Supervisor -> Professor Andrew Gee
Supervisor email -> ahg13@cam.ac.uk
Contact location -> BNO-32
Web link -> http://mi.eng.cam.ac.uk/~ahg/4proj_21.html
This project has an external partner
Manohar Bance and Chloe Swords, Addenbrooke's Hospital
Project group topics:
F: Medical Imaging
F: Bioengineering
F: Machine learning
F: Software Engineering and Computing
Engineering areas:
Information and Computer Engineering
Bioengineering
Description
A previous 4th year project (https://doi.org/10.1038/s41598-021-83059-6) developed an effective method for segmenting the human cochlea in clinical CT scans. That project, and indeed this one, was motivated by cochlear implants. The precise positioning of the implant within the cochlea can have a profound effect on the hearing outcome. And yet, when planning implantation surgery, it is difficult for the surgeon to take the individual's particular cochlear size and shape into account, given the low resolution of clinical CT images, and the difficulty in segmenting the cochlea from the surrounding temporal bone. While the previous project took a traditional, model-fitting approach to the segmentation task, other researchers have attempted machine learning approaches. See, for example, the work of Heutink (https://doi.org/10.1016/j.cmpb.2020.105387) and Neves (https://doi.org/10.1038/s41598-020-80619-0). The aim of this project is to implement a machine learning approach, and compare its performance with the traditional model-fitting approach. An important point to note is that this project's supervisor is not a machine learning expert. So students should not apply if they would require supervision on this aspect of the project. But the project may appeal to a competent machine learning practitioner who would like to apply their expertise to an interesting medical problem. Supervision will be available on all other aspects of the project, including provision and preparation of training and testing data, and evaluation against the model-fitting approach. This project is offered in collaboration with Manohar Bance and Chloe Swords at Addenbrooke's Hospital. The project would suit somebody who can read the Heutink and Neves papers, and would know how to re-implement their work. Please click on the "web link" above for an illustrated description of this project, and don't hesitate to get in touch if you would like me to explain the project in more detail.
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Professor Graham Treece
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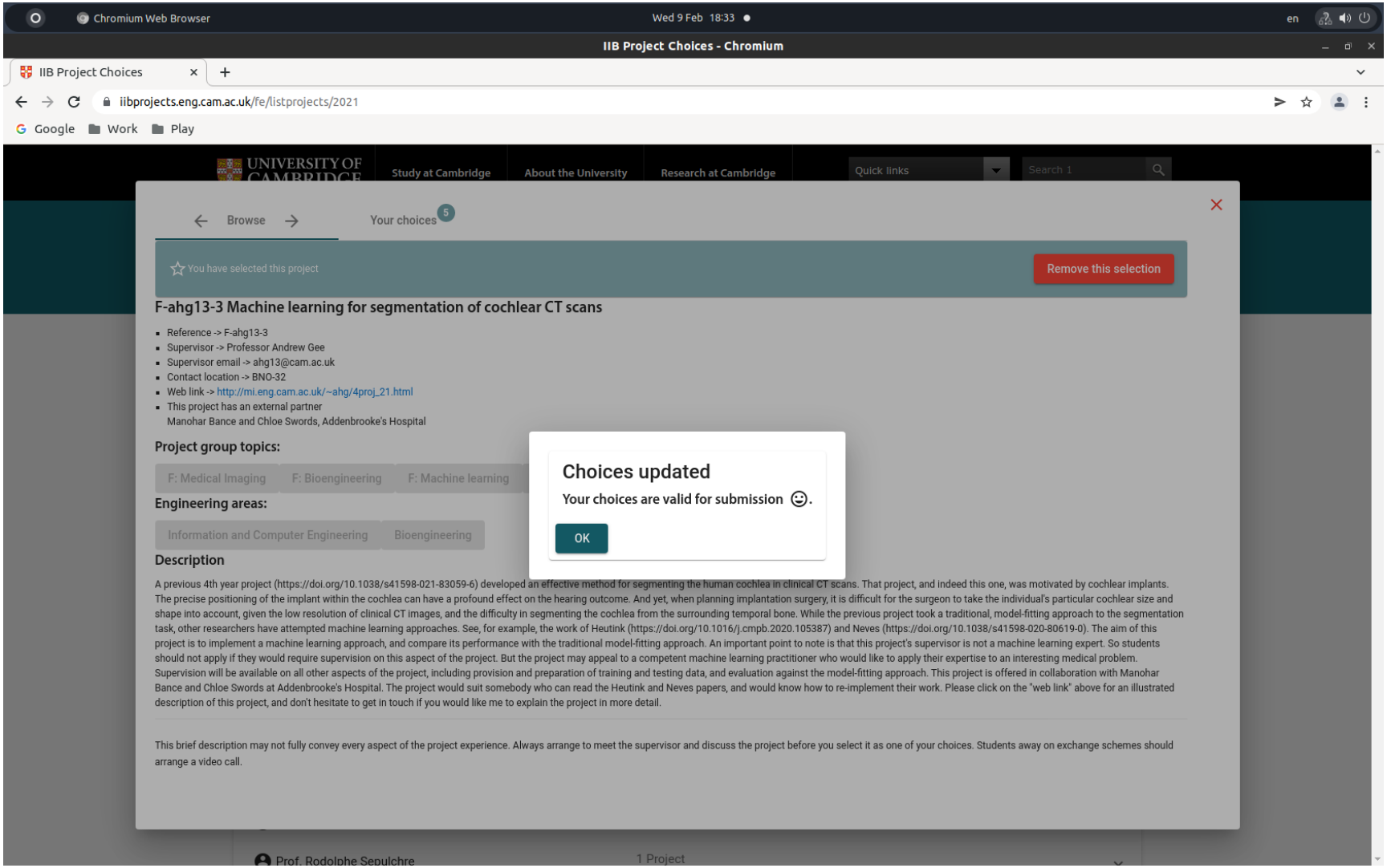
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You have selected this project
Remove this selection
F-ahg13-3 Machine learning for segmentation of cochlear CT scans
Reference -> F-ahg13-3
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Choices updated
Your choices are valid for submission ☺.
OK
Prof. Rodolphe Sepulchre
1 Project

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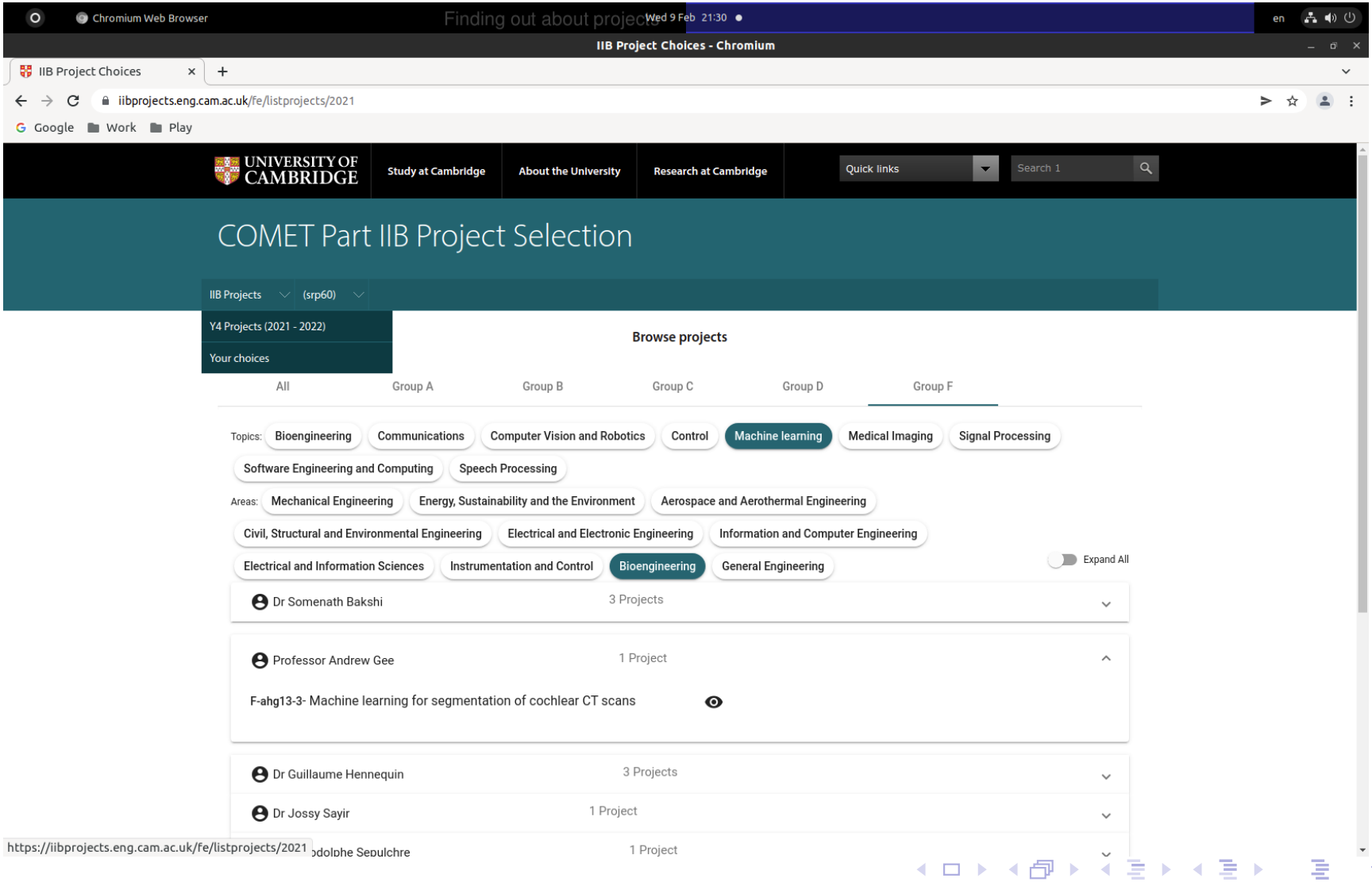
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Topics:
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Communications
Computer Vision and Robotics
Control
Machine learning
Medical Imaging
Signal Processing
Software Engineering and Computing
Speech Processing
Areas:
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Energy, Sustainability and the Environment
Aerospace and Aerothermal Engineering
Civil, Structural and Environmental Engineering
Electrical and Electronic Engineering
Information and Computer Engineering
Electrical and Information Sciences
Instrumentation and Control
Bioengineering
General Engineering
Expand All
Dr Somenath Bakshi
3 Projects
Professor Andrew Gee
1 Project
F-ahg13-3- Machine learning for segmentation of cochlear CT scans
Dr Guillaume Hennequin
3 Projects
Dr Jossy Sayir
1 Project
1 Project
https://iibprojects.eng.cam.ac.uk/fe/listprojects/2021

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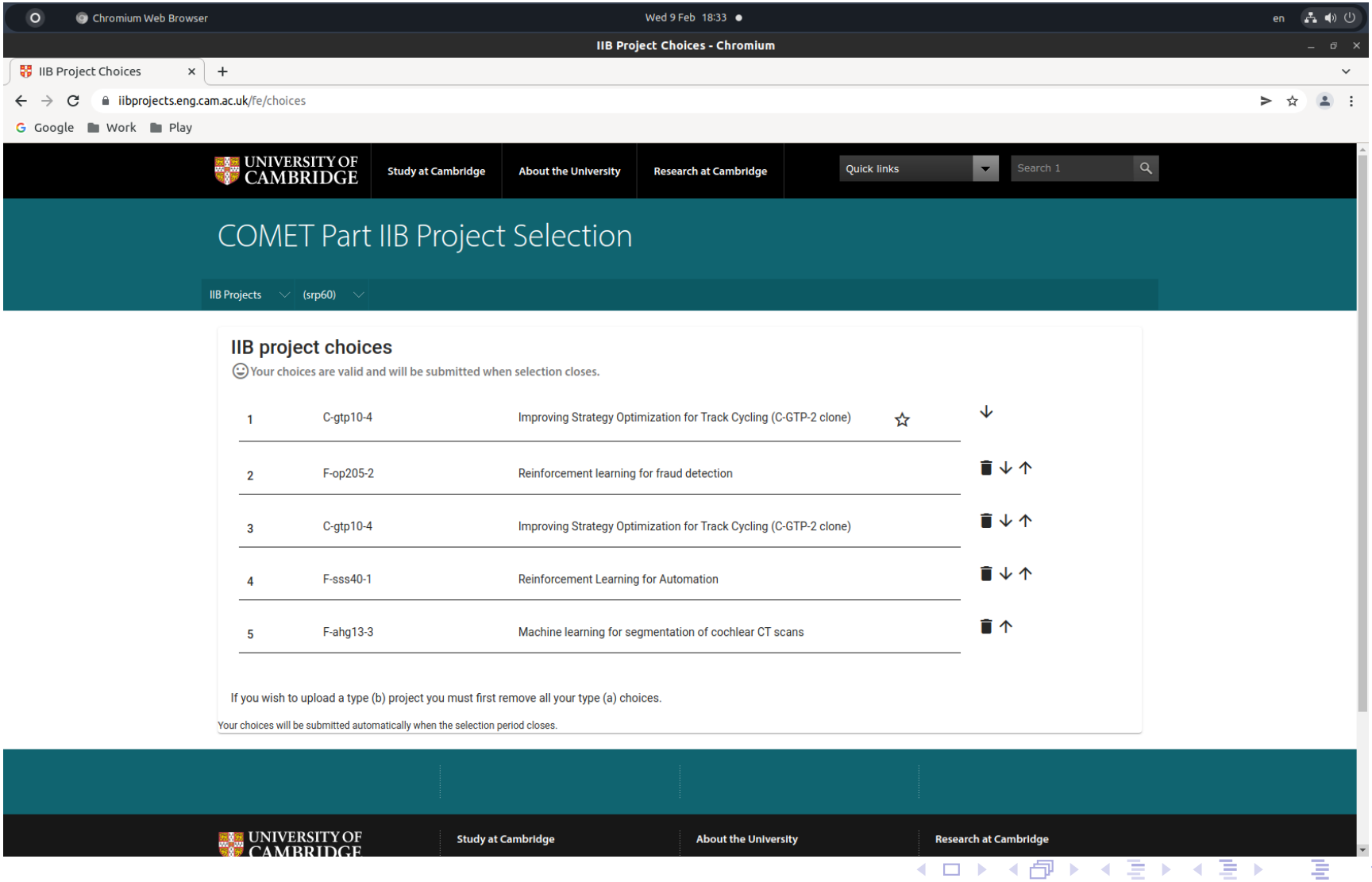
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IIB Projects
(srp60)
IIB project choices
Your choices are valid and will be submitted when selection closes.
1 C-gtp10-4 Improving Strategy Optimization for Track Cycling (C-GTP-2 clone)
2 F-op205-2 Reinforcement learning for fraud detection
3 C-gtp10-4 Improving Strategy Optimization for Track Cycling (C-GTP-2 clone)
4 F-sss40-1 Reinforcement Learning for Automation
5 F-ahg13-3 Machine learning for segmentation of cochlear CT scans
If you wish to upload a type (b) project you must first remove all your type (a) choices.
Your choices will be submitted automatically when the selection period closes.
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Expressing your preferences

Nominate *between three and five* projects, from at least *three* different supervisors, in order of preference, between 26 April and 20 May.

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Nominate *between three and five* projects, from at least *three* different supervisors, in order of preference, between 26 April and 20 May.

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You must spread your choices between at least *three different supervisors*.

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Let supervisors know if you are willing to take on any of their other projects.

Allocation

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A *first allocation* list will be posted online on Friday 3 June.

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So you may not get your first choice if this would mean somebody else not getting any of their choices.

A *first allocation* list will be posted online on Friday 3 June.

If you have been unlucky or did not make strategic choices, you should contact the coordinator of the group that is of most interest to you. They will assist you in finding a project.

Take-home points

Apply to *three different supervisors*.

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Check you have compatible working habits.

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Any questions?