

# Cambridge University Synthetic Biology Society 2016 SynBio Fund Application

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<sup>1</sup> Denotes members of the 2015 Cambridge-JIC iGEM Team

<sup>2</sup> As Senior Treasurer, Prof. Haseloff will support the project and sponsor a cost-code to which funds will be allocated.

<sup>3</sup> Denotes members of the 2014 Cambridge-JIC iGEM Team

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## Mission Statement

The Cambridge University Synthetic Biology Society (CUSBS) aims to promote the field of synthetic biology within the student community, and highlight its potential for tackling some of the world's most pressing issues. Speaker events covering the broad range of disciplines involved will be held, and links to external SynBio events and networks will be developed. Educational workshops for local schools relating to the themes of synthetic biology, genetic engineering, open-hardware and electronics will be held and teaching resources made freely-available. Student-led projects, initially based on the 2015 iGEM team's OpenScope project, will be run. This will give members hands-on experience in designing and documenting open-source hardware, and if possible wet-lab based work.

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### 1. Speaker Events and Networks

1.1. Speakers from research fields including bioengineering, biochemistry, genetics, biophysics, mathematics, medicine and computer sciences will be invited to speak to members of the society and guests.

1.2. Speakers from fields relating to the implementation, policy and regulation of SynBio research will also be invited to speak.

1.3. The invitation and accommodation of speakers will be the responsibility of the Publicity Officer, the President and the Secretary.

1.4. Expenses may include travel costs, entertainment, room booking and refreshments. These will be partially covered by membership fees.

1.5. In addition to speaker events, members will be introduced to the small but growing community of synthetic biologists within the university. For students wishing to further their interests in the field, Café Synthétique events and annual iGEM Competitions will be advertised.

1.6. Finally, we aim to get CUSBS affiliated with the European Association of Students and Post-docs in Synthetic Biology (EUSynBioS). This would provide a link with synthetic biologists across Europe with industry, and keep all members up-to-date with recent developments in the field.

### 2. Educational Workshops and Outreach Events

2.1. In order to increase awareness about SynBio and to introduce fundamental techniques involved at an earlier stage of education, local schools will be invited to attend outreach days run by members.

2.2. These will be organised specifically by the Publicity Officer and Project Managers.

2.3. Expenses will include room hire, materials, equipment and refreshment, and costs will be covered by external funding.

2.4. All educational resources produced will be made freely available (documents, source-code, designs and circuit diagrams) and licensed under Copyleft or Permissive licenses.

### 3. Student Led SynBio Projects

3.1. Alongside speaker events, the activities open to members will include student-led projects. Initially these will be hardware and software based, and the further development of the OpenScope project will be taken as a starting point.

3.2. The feasibility of carrying out wet-lab based projects within the university will be investigated, with particular attention given to safety and resources.

3.3. Potential collaborations with the WaterScope and DocuBricks projects will be pursued.

3.3. Costs will include membership/access to the Cambridge Makespace (hardware projects) and materials and equipment, as well as room hire. Costs will be covered by external funding.

3.4. All hardware and software projects will be fully documented, hopefully using the DocuBricks software. All documentation, source-code, designs and circuit diagrams will be licensed under Copyleft licenses and made open-source. They will therefore be freely available to members of the open-source community in keeping with the ethos of SynBio.

3.5. Wet-lab based projects will be well documented should they be found to be feasible.

### 4. Desired Outcomes

5.1. Synthetic biology is a little-known field within the undergraduate community, particularly outside the biological sciences. This is contradictory to its multi-disciplinary nature. CUSBS aims to promote awareness of the field, in the hope that undergraduates will consider SynBio as an area of future research interest.

5.2. No speaker events specifically for SynBio are currently advertised to the undergraduate community. CUSBS, in partnership with organisers, would facilitate the publicising of these events. In addition, the annual iGEM team would directly benefit from increased awareness (this is currently relatively low, particularly within the chemical and physical sciences).

5.3. The success of the outreach day carried out in September 2015 by the iGEM team highlighted the interest of teachers and students in having increased focus on SynBio outside the curriculum. Team members were invited to speak at schools on topics including genetic engineering, programming and electronics. By continuing these efforts and organising hands-on experience for school children, hopefully interest amongst students in SynBio disciplines will increase.

5.4. A library of freely-available educational material suitable for schools and similar societies will be compiled and developed over time.

5.4. In the short term, the student led projects aim to improve the designs of OpenScope and move on the stretch goals as outlined by the iGEM team. Documentation of the microscope and software using DocuBricks is also envisaged. Collaboration with the WaterScope project may also provide a project for members to work on.

5.5. Documentation will be improved and made more accessibly, such that members of the SynBio community can implement OpenScope designs and software for research and educational purposes.

5.6. In the long term, given sufficient interest and resources, new projects may be started and run in parallel. These may be based on, but not limited to, other previous iGEM projects. If wet-lab projects are deemed feasible then these may result in the synthesis and sharing of useful DNA parts or vectors.

## 5. Budget Estimates

Overall Budget				
Item	Cost per unit	No. of units	Sub-total	Notes
Speaker visit	£50.00	3	£150.00	Includes refreshment, travel and formal
Makespace membership	£396.00	3	£1,188.00	Full term membership only, 10 people
Hardware materials	£1,000.00	1	£1,000.00	Based on iGEM budget
Social refreshments	£20.00	3	£60.00	Outreach events
Room booking	£20.00	6	£120.00	Two per term
<b>Total</b>			<b>£2,518.00</b>	<b>Per Annum</b>

Hardware Budget				
Item	Cost per unit	No. of units	Sub-total	Notes
3D Printer Filament	£20.00	3	£60.00	
Arduino Duo	£15.00	5	£75.00	For prototypes
Raspberry Pi B	£25.00	3	£75.00	For prototypes
LEDs	£0.50	50	£25.00	Assorted
Resistors	£0.20	30	£6.00	Assorted
Mirrors	£20.00	5	£100.00	For prototypes and improving fluorescence
Lenses	£20.00	5	£100.00	For prototypes
Motors	£40.00	4	£160.00	Stepper motors for CNC
Open Beams	£100.00	1	£100.00	For starter pack
Miscellaneous			£150.00	For nuts, bolts, tools, wiring etc.
<b>Total</b>			<b>£851.00</b>	<b>Per Annum</b>
<b>Remaining</b>			<b>£149.00</b>	<b>For unforeseen costs</b>

Funding Body	Amount applied for	Amount received
Cambridge SynBio Fund	£4,000.00	
Department of Engineering		
Department of Chemistry		
Unilever		
Astra-Zeneca		
Pfizer		
Twist Bioscience		
DNA 2.0		
CambridgeSoft		
P&G		
Novartis		
Sigma-Aldrich		
Illumina		
BP		
GSK		
Open IO Labs		
Alcmene		
<b>Total</b>	£4,000.00	0

Reference information:

1. Annual travel costs for speakers at Pembroke College Stokes Society total £325, for one speaker per week (roughly £17 per speaker). Addition of overnight stay costs.
2. Membership for Makespace is £33/month for 3 elected members
3. A deal negotiated to provide membership during full-term only. One guest allowed per member at any one time.
4. Hardware budget information based on iGEM budget.

## 6. Interested parties

6.1. DocuBricks – This is being considered as a means to document all software/hardware developed by the society

6.2. WaterScope – After meeting with representatives from the WaterScope project, the huge potential for collaboration was discussed. In particular, they were interested in having student members of CUSBS work on improving aspects of the microscope they're using such as resolution and chassis robustness.

6.3. Dr Nichola Cooper, Royal Society of Haematology – Interest in using a 3D printed microscope for use in malaria diagnosis across Africa. Currently discussing possibility with tropical haematologists. Preliminary invite to present microscope in London in the new year.

6.4. EUSynBioS – Currently investigating affiliation.