Chapter of the Year Competition Report

University College Dublin

30th May 2022
Section A: Programs and Projects Description

1. Design Project

Dark Adaptation Project
This year we aimed to tackle the problem of vitamin A deficiency in LMICs by creating a low-cost, portable adaptometer with no disposables which can be used in the potential screening for vitamin A deficiency in children over five and pregnant women. Nyctalopia, the abnormal inability to see well at night or in dim light is an indication of vitamin A deficiency as vitamin A is a precursor to rhodopsin, which is a photopigment found in the rod cells which are essential for vision at night and in low lighting conditions.

Current methods of vitamin A deficiency diagnosis include blood tests, electroretinograms, electro-oculography and a clinical assessment of the eye. These methods have associated issues of needlestick injuries, excessive disposables, expensive equipment or invasive procedures. Hence there is a gap in the market and a need for a low cost, non-invasive screening tool for vitamin A deficiency.

Our device allows an operator to perform a standard test protocol to assess a subject’s ability to dark adapt. This will be done by the subject placing their head upon an adjustable chin and head rest to stabilise the position of the eye relative to our device. Corrective lenses can then be applied to correct vision defects to enable a focused view of the test and fixation lights. The subject will then be bleached to photoconvert at least 70% of the rhodopsin in a single eye. The subject is then asked to look directly at a red fixation light to allow for the testing of a specific region of the eye. A test light then flashes at varying intensities as per the test protocol explained. This test protocol provides the operator with a series of values, of time and log intensity of the test light, which are plotted and a rod intercept time. These values can then be used to assess the subject’s ability to dark adapt which can be used as an indicator of vitamin A deficiency. CAD drawings of the design, a flow diagram of the test protocol and photos of our current prototype can be found in Appendix A.

2. Kit Builds and Equipment Repaired

This year we hosted a number of soldering workshops for our members and engineering students who were interested in joining the chapter. Three sessions were held, and the kits provided by EWH were used. Heart rate monitor, pressure calibration and ECG simulator kits were built. Everyone really enjoyed the hands-on experience, and it was a good way of attracting new members to the chapter. Pictures of these workshops can be seen in Appendix B.

Next year we also plan to set up and learn about our new 3D printer and conduct some 3D printing workshops for our members.

This year, one of our members, Sarah Mehigan, has travelled to Rwanda with EWH on the Summer Institute program where she will be repairing medical equipment in various hospitals. At the time of writing this report, she has landed in Rwanda, started Kinyarwanda language classes, and begun lectures and labs in Rwanda.

3. STEM Activities

This year the outreach committee visited a youth centre which creates a safe place for children and teenagers to go after school to do sports, study, learn, and have fun. Our visit entailed a fun
engineering design challenge with primary school aged students. The challenge was to build the tallest tower possible that could hold a tin of beans. The children could use 15 sheets of paper and some sellotape. The challenge got the children thinking about what shape would create the sturdiest base for the tower.

This was the second of two challenges we did with the youth centre. The first was to build a catapult out of pencils, pens, rubber bands and anything else they could find in the classroom.

Alongside the youth centre we made plans to visit two secondary schools to carry out similar challenges and do a presentation on engineering and the opportunities it creates. These visits have been scheduled for September as the outreach committee were undergoing exams by the time we had confirmed the workshops with the schools.

Pictures from our STEM Activities can be seen in Appendix C.

4. Future Activities and Next Year’s Goals

Our future plans and activities include collaboration between us and other societies like the UCD Medical Society and Electrical Engineering Society to get our name out there and to alleviate and reduce time spent on projects or events.

This includes an engineering ball in collaboration with all the separate engineering societies.

One project we have already planned on collaborating on is a weekly robotics project on neural engineering with the Electrical Engineering Society. We plan to send our members to work on the project and also help with the costs of the project.

We have also planned to expand our social media presence by starting a discord server making communication between the committee and the members or people interested in our charter better.

Our Outreach Program will continue to expand next year, and our engineering challenges will be brought to even more schools in Ireland with the aim to educate and inspire more students to consider studying engineering.
Section B: Organizational Activities

1. Chapter Structure and Statistics

Our EWH Chapter Committee consists of 11 members - a President, two Vice Presidents and Treasurer which make up the Executive Committee, as well as the Outreach, Events, Sponsorship, IEEE EMBS, and Social Media Officers. During the middle of semester two, a fresher’s rep from 1st and 2nd year were also elected. These 11 Committee members meet weekly to oversee all EWH UCD Chapter business, to update each other on funding, events, the outreach program, general administration, and to plan for the coming weeks and any major events.

In semester 1, all committee and weekly meetings were held in person in UCD, as were all workshops and events. In semester 2, a significant portion of the committee and EWH’s members were based outside of Dublin on internship/study abroad programs. This led to all the committee meetings being held on zoom and for the weekly meetings to be split into an in-person meeting and a zoom meeting. The online team decided to work on a project for submission to the EWH Design Competition while the in-person meeting worked on ideation and potential ideas for next year’s team. Pictures from meetings can be seen in Appendix D.

The Outreach Officer runs a sub-committee of 7 members who spearhead our Outreach Program. This involves creating STEM themed challenges for schools and youth clubs, running these challenges, and giving talks on engineering to pre-college students.

Our EWH UCD Design Competition Team meets weekly to work on their entry. The team is composed of 6 masters students (5 studying biomedical engineering and 1 studying energy engineering).

Our Chapter has 33 regular members in total. When hosting larger scale events with corporate sponsorship and collaborations with other university societies, attendance has been significantly higher, with 133 attendees at our EWH Ball this year.

We use email and group chats to keep in contact with our active members. We use several social media platforms to update all of our followers including:

- LinkTree (https://linktr.ee/ewhucd),
- Instagram - 420 followers (@ewh_ucd)
- LinkedIn - 290 followers (https://www.linkedin.com/company/engineering-world-health-ucd)
- Twitter - 25 (@EwhUcd).
- Mailchimp - 221 members

Our social media posts include committee member announcements, medical professional talks, a pub quiz, workshops, outreach, EWH Ball, Pizza Ideations, and recruitment. See Appendix E for examples of what we post on our social media platforms.
2. Fundraising Approaches

We kept up relationships with our sponsors from last year, Resmed and Stryker, who both decided to renew their sponsorship contract with the chapter. Example slides from our sponsorship deck can be seen in Appendix F.

The MidazoClamp Team’s 2nd place winnings were used to pay for the Chapter fees and the remaining sum was reinvested back into the chapter.

<table>
<thead>
<tr>
<th>Funding Source</th>
<th>Amount</th>
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<tr>
<td>Stryker Sponsorship</td>
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<td>MidazoClamp Winnings</td>
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<td>Nova UCD Winnings</td>
<td>€750</td>
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<td>Resmed Sponsorship</td>
<td>€500</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>€3250</strong></td>
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3. Events

EWH Ball
We hosted a formal ball this year as a large social event to help advertise the chapter and as a fun event for the current members. The theme was “A Starry Night” and it was a big success with 124 tickets sold. See Appendix G.

Guest Speakers
As part of the ideation process, we reached out to some medical professionals from low income countries to hear their opinion on what problems they see in their own hospitals. This year we had two guest speakers. The first was Dr. Pierre Goussard from South Africa and the second was Nurse Stevie Kanyama from Zambia. These talks help us narrow the focus on what we want to look into for the design competition.

Sponsorship Workshops
We had two big sponsors that we worked with this year, Resmed and Stryker. Both of which are large medical device companies. For each sponsor we hosted a workshop where one or two employees would explain product development from an industry perspective. These workshops were held virtually for ease of access for both the sponsors and the attendees.

Collaboration
This year we hosted a pub quiz in collaboration with the UCD World Aid Society in aid of the Helen Keller Foundation. More than 170€ was raised for the charity.
**New Kit**
This year the chapter members also invested in EWH fleeces. It is our hope that this will help in advertising the chapter and gaining more members in the coming years.

**Recruitment Campaign and Information Evening**
At the start of semester 1 we hosted an information evening about EWH UCD and what we had planned to do for the year. We gained several new members from this and also got some new ideas about what people would be interested in seeing from EWH UCD in 2021 and 2022. See Appendix H for pictures from this event.

**Trips to View Adaptometers**
The Design Competition team reached out to the Research Foundation in the Royal Victoria Eye and Ear Hospital in Dublin and the Wellcome Trust-Wolfson Northern Ireland Clinical Research Facility in Belfast and they were kind enough to facilitate visits for our members to see and experience adaptometers in a research setting. These visits were invaluable to the team and helped with their understanding of the inner workings of adaptometers. The comparison of the entirely manual Goldmann-Weekers device created in the 1950s to the fully automatic AdaptDX launched in 2014 proved incredibly useful as the team tried to balance the cost effectiveness and effectiveness of their own prototype. Photos of these trips can be seen in Appendix I.

**Assisting Virginia Tech EWH Chapter in their Set-Up**
Justin Laiti from the EWH Virginia Tech Chapter reached out to us on Instagram while they were starting up their chapter. We shared our chapter of the year report with them and were available to offer any advice needed. We hope to collaborate with them virtually next year.

**Nova UCD Student Enterprise 2021 Summer Competition:**
This is a competition that assists students in refining their start-up ideas through various structured workshops, taught content from industry experts, interactive workshops, pitching sessions and mentoring. A team representing EWH came in 2nd place in developing their ‘Broncophone’ project and won €2000 in prize money to develop their project further. The Broncophone is a device which allows the adaptation of out-of-date fiberoptic bronchoscopes into low-cost video bronchoscopes by combining the fiberoptic bronchoscope with a smartphone camera using an attachment comprising of a series of lenses.

**Section C: EWH Chapter Feedback**
As a chapter based in Ireland, something we would like to see would be more events or collaboration projects that European chapters can get involved with.
Section D: Appendix

Appendix A: Adaptometry Design Competition Entry
Appendix B: Soldering Workshops
Appendix C: Outreach Programme

Pictures from the Youth Club Catapult Build
Catapult Challenge

Into this

Accuracy

Each team has 5 chances to hit the target. They can choose what to aim for and this will be added to their total. Larger hits are worth 2 and smaller hits worth 1.

Distance

The further you can hit the ball, the higher score you get.

Scoring Table

<table>
<thead>
<tr>
<th>Best Distance</th>
<th>Distance (m) x 2</th>
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<tbody>
<tr>
<td>Large Target Hits x 1</td>
<td>2.3 x 2</td>
<td>4.6</td>
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<tr>
<td>Small Target Hits x 1</td>
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<td>3.0</td>
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Example

Slide Deck Presented to the Schools/Youth Groups for Catapult Challenge
Appendix D: Pictures from Meetings
Appendix E: Social Media Graphics

Guest Speaker
Dr Stevie Kanyama
(Chipata Hospital, Zambia)
Talk on challenges faced in low-resource hospitals
Monday 24th & 5pm

First Meeting 2021/22
Join us in ENG 204 at 5pm
Guest Speaker
Dr Pierre Goussard, Paediatric Pulmonologist

PUB QUIZ
Engineering World Health & World Aid UCD
Old Punch Bowl
Thursday 14th 7 pm
Teams of 4
€2 per person
Proceeds to Charity
Sponsor Talk

Stryker

Wednesday 6th @ 1.30pm
Eng Building, Room 204
(or online)

Welcome Back!

First Meeting Wednesday @ 7pm
(ZOOM)

EWH UCD

Semester Two

EWH Kit Building Workshop
Thursday 21st @ 5pm

FOR SAFETY EVERYONE NEEDS GOGGLES AND A LAB COAT
meeting as usual in 204
due lab will be in 012

Everyone is welcome :) no experience needed

EWH Pizza Ideation

Wednesday @ 1pm
Eng Building

Committee Elections 2022/23

President
Vice President
Treasurer
Events
Outreach
Socials

Join us for Free Pizza

Apply now in our bio!
Appendix F: Sponsorship Deck – Resmed & Stryker Relationship Continuation Proposal
**Plans and Aims for 2021/22**

- Host 2x EWH Hackathons
- Grow our Innovation Programme to include more schools
- Host practical workshops
- Purchase 3D Printers and host 3D printing workshops to help engineer designs
- Host guest speakers, workshops and career talks in collaboration with Stryker

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**EWH UCD Estimated Expenditure**

Total Budget: €6500

- **Materials**
  - Prototyping materials
  - 3D Printers
  - Filaments
  - Tools
  - Safety Equipment
- **Software**
  - Design software
  - Excel for data analysis
- **Salaries**
  - Programme Co-ordinator
  - Technical Support
- **Other**
  - Event organisation and Marketing
  - Technology Support

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**Stryker Deck**

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**Engineering World Health**

Resmed Meeting

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What does **EWH UCD** do?
EWH Design Competition

Other Competitions
- UCD iD3t Start-Up Accelerator – 1st
- Eric Global Problem Solver Challenge – Semi-Final
- UCD New Student Entrepreneur Competition – 2nd

What have we done?

Outreach Programme
- Secondary Schools programme for TY students
- Direct provision centres
- After-school groups

Plans and Aims for 2021/22

Thank You for Your Support!
Appendix G: EWH Ball Graphics and Photos

Committee at the EWH “Starry Night” Ball

Social Media Graphics for EWH Ball
Appendix H: Recruitment Campaign and Info Evening

Info Evening and Recruitment Posters
Appendix I: Design Team Visits to Royal Victoria Eye and Ear Hospital & Northern Ireland Clinical Research Facility

Northern Ireland Clinical Research Facility’s AdaptDX Machine

Royal Victoria Eye and Ear Hospital’s Goldmann-Weekers Machine