IGEM 2021 MINI BENELUX JAMBOREE

PROGRAM BOOKLET

WELCOME

iGEM TU-Eindhoven wants to welcome and thank everyone for being here at the BeNeLux Mini Jamboree. As the Giant Jamboree will be held online this year, we want to give all the BeNeLux Teams the opportunity to present their final product live. After all, we have been working for months on it, and sharing is the best part of it!

On the right side you can find the program of today.

PROGRAM

09.30 Walk-in, Set-up, Coffee/Tea
10.05 Opening
10.20 Presentation: **team iGEM Eindhoven**
10.45 Presentation: **team iGEM Wageningen**
11.10 Presentation: **Ekoy**

BREAK

11.50 Presentation: **team iGEM Groningen**
12.15 Presentation: **team iGEM Delft**
12.40 Presentation: **Promega**

LUNCH

13.30 Presentation: **Pivot Park**
13.45 Presentation: **team iGEM Maastricht**
14.10 Presentation: **team iGEM Leiden**
14.35 Presentation: **CLT**

DRINKS

15.45 **Prize announcements**
16.00 Closing

CONTENT

JUDGES

A short introduction

JUDGES

We proudly introduce the 3 jury members that will score the posters and presentations. They will follow the official iGEM Judging Rubric, slightly adjusted by the TU Eindhoven team to match the BeNeLux Mini Jamboree format.

MATTHEW TURK

European iGEM Ambassardor

Matthew first participated in iGEM in the Exeter 2020 Team. This year, he is the iGEM Ambassador to Europe, supporting teams from the UK, Ireland, Belgium, Switzerland, France, and the Netherlands

PETRA HOGERVORST

Policy advisor the RIVM

She is a biologist with a wide scientific background in the risk analysis of GMOs, Argo-Ecologically and Entomology. Within the RIVM, she is a senior policy advisor for the field of biotechnology within the Netherlands and Europe.

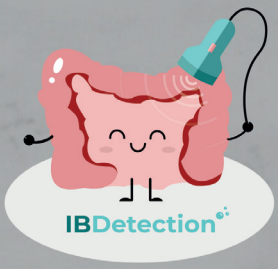
MAARTEN LUBBERS

Supervisor of Team Leiden

Maarten first participated in iGEM in the Leiden 2019 Team. afterwards, he became a supervisor for the (winning) Leiden 2020 Team and the current Leiden 2021 Team

TEAMS

A short introduction



Eindhoven

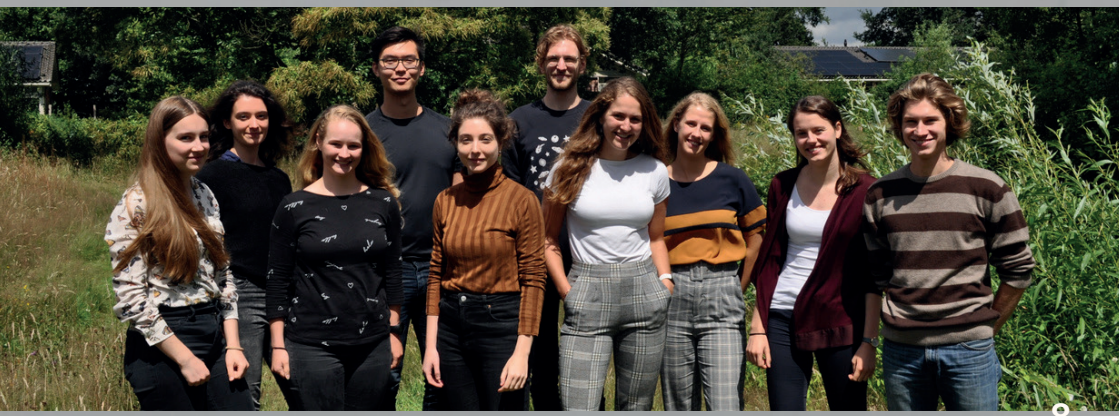
Non-Invasive Monitoring of IBD using Genetically Engineered Bacteria as Living Sensors

Inflammatory Bowel Disease (IBD) is a chronic inflammatory disorder of the intestine. Globally over 6 million people suffer from IBD, and this number keeps rising. The current monitoring procedure for this disease lacks specificity, resulting in unnecessary follow-up examinations that are invasive, expensive, and time-consuming, which calls for an alternative procedure. Our solution, IBDetection, consists of a pill that can be ingested orally by the patient and delivers live, safe, genetically engineered *Escherichia coli BL21(DE3)* to the intestine. These bacteria include a biorthogonal sensing cascade to detect tetrathionate—an inflammation biomarker—with high specificity, and in turn activates translation of acoustic reporter genes, resulting in the formation of gas vesicles in the bacteria. These gas vesicles can then be measured outside of the body using conventional ultrasound equipment. This method provides a cost-effective, easy-to-use solution to prevent unnecessary follow-up examinations in a specific and non-invasive manner using fast imaging methods.

Wageningen

Cattlelyst - Reducing the ecological hoofprint of cattle

Our planet suffers from a large excess of reactive nitrogen, impacting local and global ecosystems. In the Netherlands, almost 50% of total nitrogen emissions originate from the cattle industry, mainly in the form of ammonia. Additionally, cattle naturally emit the potent greenhouse gas methane, contributing to global warming. Experts informed us that currently, no combined solution exists to both threats. Therefore we have developed Cattlelyst, a biofilter for cattle stalls targeting ammonia and methane emissions. Cattlelyst relies upon a synthetic co-culture of two non-pathogenic bacterial species that remove these harmful gasses. We modelled and established ammonia conversion in Pseudomonas putida alongside engineering Escherichia coli to consume methane. Containment of the bacteria in the biofilter is ensured by a combination of auxotrophy and two safety circuits. Thanks to these features, Cattlelyst provides a biological, animal-friendly and biosafe solution to reduce the ecological hoofprint of the livestock sector.



Groningen

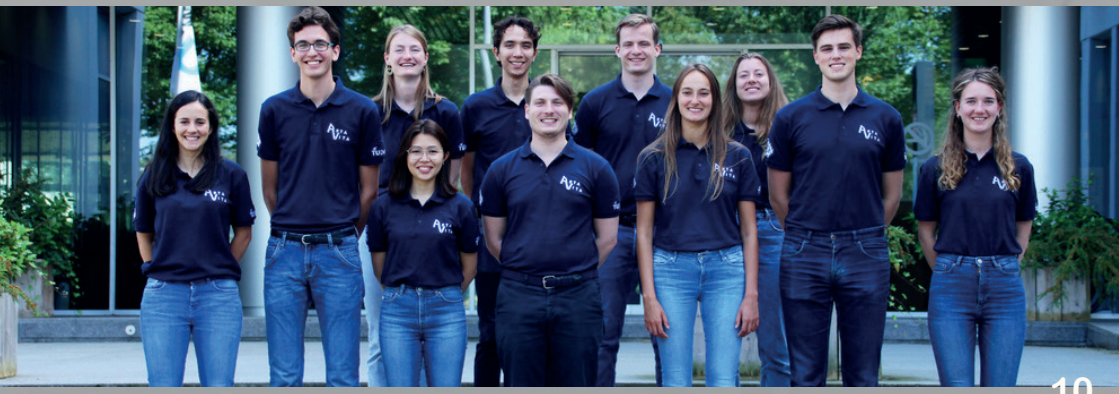
Bye-Monia, tackling Dutch nitrogen crisis: Reduction of Nitrogen emissions by alpha-amylase production in Saccharomyces spp.

The Netherlands is producing excess nitrogen, which is harmful to nature and biodiversity. One of the main culprits for this so-called nitrogen crisis is animal agriculture, a vital income source for the Dutch economy. Our project targets ammonia emissions contributing to the crisis and aims to convert them into a beneficial feed additive. Thus, we have engineered Saccharomyces spp. to synthesize alpha-amylase, an enzyme that optimizes cattles' digestion. This way, their milk production and growth will be enhanced while ammonia emissions will be reduced simultaneously. Residual ammonia will be captured by a state-of-the-art filter device, a Metal-Organic Framework (MOF), and fed back to our GMO. Furthermore, insights from artificial intelligence will be employed to optimize the engineering process. Overall, we have designed a closed sustainable circle in which waste - excess ammonia, is converted into worth - a feed additive for cattle.

Delft

AptaVita: A novel and modular aptamer-based rapid diagnostic test for vitamin deficiencies

Hidden hunger, synonymous with micronutrient deficiencies, is estimated to impact the health and life-quality of one in three people, especially in sub-Saharan Africa and South Asia. Current monitoring policies are insufficient, as more data on hidden hunger is required to implement solutions effectively. However, existing detection techniques remain inaccessible for most people. Here, we present AptaVita: a modular, quantitative, and accessible paper-based rapid diagnostic test for vitamin deficiencies available at the point-of-care. Aptazymes (ligand-regulated self-cleaving ribozymes) engineered through in vitro evolution for binding the vitamins of interest are fused with the lacZ reporter gene. Vitamin-responsive translation activation is enabled in the PURE cell-free expression system on paper support. The colorimetric output is quantified by a portable, 3D-printed, dedicated hardware, allowing us to assess the level of targeted vitamins. We envision AptaVita making hidden hunger visible and addressable, thereby contributing to monitoring and tackling vitamin deficiencies together with those involved.



Maastricht

MethaGone

Methane emissions from ruminants are a serious problem that advance climate change dramatically. This project aims to reduce those emissions from ruminants by using synthetic biology. Feeding red seaweed to cows, for instance, is a great way of reducing their methane emissions, as a halogenated compound inside the seaweed, called bromoform, inhibits the methanogenesis within the cows rumen. Yet the amount of seaweed that can be produced would by far not cover the entire ruminant population of the earth. Therefore, our project uses the genetic underlying of the red seaweed's ability to produce bromoform, and transfers it into bacteria. These bacteria can then be given to ruminants using a capsule, and within their rumen, they can colonize and reduce methanogenesis over the entirety of a cows lifetime. The advantage of this bacterial feed additive is that it can be scaled for worldwide use.

Leiden

DOPL LOCK - unlock the potential of GMOs

A major challenge in synthetic biology is the containment of genetically modified organisms (GMOs) outside of the laboratory. This includes restraining the physical spread of the organism and transfer of synthetic genes, via horizontal gene transfer (HGT). This challenge remains as regulatory bodies require sound evidence on the safety of GMOs which is difficult due to the lack of knowledge upon release. Additionally, the absence of risks is not necessarily a definitive proof of safety. Therefore, industry is unwilling to invest and scientists only rarely get permission to gather large-scale data. Here, DOPL LOCK can make the difference: we propose a mutually dependent double plasmid lock which will minimize HGT and the spread of GMOs. Our goal is to provide an open-source, standardised, modular and widely applicable Safe-by-Design biocontainment system of GMOs in non-contained applications. With DOPL LOCK, we aim to drive bio-safety innovations, accelerating the field of synthetic biology.

WIKI
overview

Eindhoven

Wageningen

Groningen

Delft

Maastricht

Leiden

SPONSORS

A short introduction

EKOY

INVESTMENT PARTNERS

Founded in 2015, Ekoy Investment Partners specializes in realizing value - or the potential for value - where others do not. We create value by providing talented entrepreneurs with the resources and tools to achieve success in transforming intellectual capital and scientific knowledge into successful companies. We take an active role in the strategic processes and partner with innovative bio & medical technology companies in Europe, the USA, and Asia. Our core expertise is in Seed-Capital, M&A, Co-Development Partnerships, and Private Placements. We focus on life sciences companies including Drug-Devices-Diagnostics & Digital Health. As business angels, we are result-oriented, also in our remuneration.

Promega

Promega Corporation is a leader in providing innovative solutions and technical support to the life sciences industry. The company's portfolio of over 4,000 products supports a range of life science work across areas such as cell biology; DNA, RNA and protein analysis; drug development; human identification and molecular diagnostics. For over 40 years these tools and technologies have grown in their application and are used today by scientists and technicians in labs for academic and government research, forensics, pharmaceuticals, clinical diagnostics, and agricultural and environmental testing. Promega is headquartered in Madison, WI, USA with branches in 16 countries and over 50 global distributors. Since 1987 Promega has an office in Leiden, and co-workers spread over Belgium and The Netherlands to support scientists in the Benelux.

pivotpark

Pivot Park was founded in 2012 to provide the optimal European location for innovative pharmaceutical companies worldwide. From early-phase entrepreneurs through fast-growth scale-ups to mature global leaders, Pivot Park helps each of them to take their next steps. Supporting 650 highly qualified people at over 60 companies, we make sure they have what they need to succeed. This includes customized facilities, routes to specialist finance, shared gateways to knowledge, and access to outstanding scientific and entrepreneurial expertise. As a result, Pivot Park is now the hotspot for pharmaceutical innovation in Europe. Learn more at www.pivotpark.com

CENTRE FOR LIVING TECHNOLOGIES

Bio-based engineering for human and environmental health

Centre for Living Technologies (CLT) is a part of EWUU – a strategic alliance between Eindhoven University of Technology, Wageningen University & Research, Utrecht University and University Medical Centre Utrecht. CLT functions as a platform that stimulates breakthrough in the field of synthetic biology and aims to establish a long-term research collaboration focused on the engineering of biology across scales (from microbes to human cells) using both rational and data-driven approaches. With the goal of developing and exploiting next-gen approaches to guide (multi-) cellular behavior for improving human and planetary health, CLT focuses on the following three strategic actions: 1) Organize platform activities to connect research, researchers, and society 2) Establish and reinforce mission-driven research groups in the field of living technologies 3) Develop accessible infrastructure for integrated molecular, cellular, and tissue engineering.

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