



ADVANCED EMBODIMENT DESIGN (AED)
ID 4175

INNOVATING FROM
PRODUCT CONCEPT
TO WORKING VALI-
DATED PROTOTYPE

AED GIVES YOU THE OPPORTUNITY TO HAVE YOUR
INITIAL CONCEPT FOR AN INNOVATIVE AND NEW
PRODUCT DEVELOPED INTO A WORKING VALIDATED
PROTOTYPE.

DESIGN
FOR OUR
FUTURE

ABOUT THE ADVANCED EMBODI- MENT DESIGN

ADVANCED EMBODIMENT DESIGN (AED) IS A MASTERS COURSE FOLLOWED BY THE STUDENTS OF THE INTEGRATED PRODUCT DESIGN (IPD) MASTER PROGRAMME AT THE FACULTY OF INDUSTRIAL DESIGN ENGINEERING AT DELFT UNIVERSITY OF TECHNOLOGY. IN THIS COURSE, THEORETICAL INSIGHTS AND KNOWLEDGE DELIVERED IN THE IPD CURRICULUM ARE APPLIED IN PRACTICE TO PRODUCT DEVELOPMENT.

WAY OF WORKING

A team of students (consisting of four to six students), supervised by our staff members, tackle an embodiment design assignment from a real company. This pertains to development of innovative and new products; depending on the case, this can be a radical or incremental innovation.

BIOCOACH

IMPROVING THE REHABILITATION PROCESS OF PATIENTS

Client: Biomet

Students: Samy Andary, Simon Desnerck, Kiki Kraak, Alec Momont, Mathijs de Schipper and Mick Winters

THE CHALLENGE

In the Advanced Embodiment Design course, the Nuts Design Team focused on total hip replacement patients during their first weeks after leaving the hospital. In this particular phase, patients need to exercise to gain back their hip strength and control. The project aimed to design the underlying system that enables the Biocoach to guide patients who are rehabilitating from a knee or hip replacement while doing their exercises as instructed (remotely) by their physiotherapist.

FINAL DESIGN

A functional prototype of a sensor module and feedback system was constructed. Called the 'BioCoach', the product is worn on a band around the leg to recognise and store both the performance and experienced pain level of rehabilitation exercises on an internal memory. Both the therapist and patient can use this data during consultation sessions, enabling more constructive conversations on progress, pain level and possible obstacles to the rehabilitation process.

The course runs over one academic semester, from the middle of February until July.

The project work starts from a programme of requirements (such as cost, quantity, quality, etc.) and working principles, manifested in a concept, and ends with a validated prototype of a product, which can be physical or virtual as needed. This phase requires the seamless integration of the knowledge of several domains of expertise including theory of embodiment design, ergonomics, product aesthetics and experience, smart systems and technologies, technical concept materialisation, sustainable design engineering and advanced design enablers. Each team focuses on a different assignment which challenges the teams to apply the integrated knowledge gained in the course so far. The teams start to analyse the programme of requirements, benchmark existing products, decide on tools and methods to use in their design process and eventually create prototypes to validate their designs. The results are reported in a standard set of deliverables.

WHAT CAN A COMPANY EXPECT?

Your company is offering an assignment to TU Delft to use as realistic training material for its students in one of its top graduate projects. Under the TU Delft staff guidance and supervision, the students will work towards completing this assignment. This process evolves in two stages:

At a first stage you will be working with our experienced course staff to translate your concept into a starting specification and programme of requirements suitable for the course and pursuant to your vision and development requirements. As a client, you will only be able to influence these requirements and not intermittently the design process itself: it is therefore essential that the assignment is formulated to your satisfaction. This stage also includes the working out of and commitment



to a development budget and/or in-kind support, which your company should be willing to allocate for prototyping.

Next, a team of four to six IPD masters students will work on the assignment spending approximately 1,200 man-hours per group for a period of 19 weeks. Each team will be supervised and coached by a senior design engineer as well as supported by an array of expert specialists, all members of the TU Delft staff. The students will analyse, refine and develop your original concept into a complete materialised embodiment, and will develop and test prototype(s) accordingly and as needed for the purposes of validation. During this time you may be asked to provide information to the coach and students, mainly in the form of information that can help them understand the context that they are designing for, your infrastructure and capabilities, and the state of the art in your field of specialisation.

At the end of the project each team will deliver the following: a) a technical data package, b) a validated prototype (physical or virtual) and c) a research and development technical report/scientific paper, which includes scientific reflection on their design process as well as questions for further research and development.

In a framework covered by a non-disclosure agreement and in accordance to the learning objectives of the course, they will present their solutions to their peers, and to you, answer questions and receive feedback. Your company will receive the rights to the designs described in deliverables (a) and (b), including the right to file for patent(s). TU Delft retains the rights to publish information described in (a), (b) and (c) for the purpose of scientific studies or as part of a portfolio for the promotion of the course AED, with due acknowledgement to your company. To allow for patenting, TU Delft commits itself to an embargo of one year with regard to the public release of any such information.

To partly offset the special educational expenses of the course (assignment formulation assistance, expert input), TU Delft requires an entrance contribution of 3,000 (excl. prototyping costs) payable upon selection of the assignment and before the course starts.

WHAT IS EXPECTED FROM THE COMPANY?

To start with:

- › a draft assignment for development of a concept (a template which will be provided)
- › your commitment to the entrance contribution
- › commitment to a development budget and/or in-kind support, which your company is willing to allocate for prototyping

During the project:

- › meetings and discussions with coach and students (if required and on appointment)
- › participate in midterm and final presentations and provide your critical remarks

WHO CAN APPLY FOR THIS COURSE?

Participating companies should be able to offer a challenging assignment that focuses on the materialisation of a concept containing advanced technology. TU Delft will determine whether the offered assignment is suitable for the learning goals and objectives of the course. Suitable assignments focus on concept embodiment.

[IO.TUDELFT.NL/AED](https://io.tudelft.nl/aed)



CHILD VENTILATION MASK A VENTILATION MASK FOR LITTLE CHILDREN THAT WAS DESIGNED TO FIT

Client: TU Delft, Erasmus MC Sophia Children's hospital

Students: Linde Heijmerink, Marjolein Deun, Romee Noorman, Emilie Verbanck, Mark Leendertse, Sahil Wadhwa

THE CHALLENGE

Some children aged zero to six in the Netherlands suffer from sleep apnea. At night, they have to wear a full-face ventilation mask, covering both nose and mouth. As there are no full-face ventilation masks designed for children, they are forced to wear adult nose masks, which are big enough to function as a full-face mask. However, the improper fit of these masks causes many problems, such as skin irritation. This project sought to design a full-face ventilation mask that would fit properly.

FINAL DESIGN

3DME is a 3D printed full-face ventilation mask that fits perfectly. A 3D scan is made of the child's face and used to digitally model the mask. Soft silicon cushioning is added to all parts of the 3D printed mask that are in contact with the skin. With the tailor-made 3DME, children no longer have to wear nose masks for adults.

COLLABORATION DETAILS

- › Advanced Embodiment Design starts in February.
- › Participation fee is € 3,000 (excl. VAT).
- › Additional project-related costs may be incurred. Decisions about budget for prototyping costs and/or in-kind support will be agreed on before the start of the project.
- › The expected results are a validated physical (or virtual) prototype and a research and development technical report or scientific paper.
- › The results will be used for educational purposes by presenting them at a final presentation to all students involved in the course.
- › Industrial property rights will be transferred to your company.

The General Provisions for co-operation in education at the faculty of Industrial Design Engineering apply to this course in combination with the collaboration details above. The General Provisions can be found at:

www.io.tudelft.nl/en/cooperation/contracts/.

CONTACT

For information on the Advanced Embodiment Design course and possibilities to participate, please contact:

Dr Elvin Karana or Dr Bas Flipsen

Course coordinators

Ms. Marijke Idema

Project acquirer

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For information on other opportunities for collaboration with the faculty of Industrial Design Engineering, please send an e-mail to: collaboration-io@tudelft.nl.

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