Open Innovation Challenge (OInC)

I propose a **project course** in which students tackle real-world problems in the form of **open hardware development**. The central goal is to provide a wicked learning environment to prepare students to develop new engineering solutions within a realistic setting. OInC offers students the chance to experience interest-driven learning and teaches them how to **collaborate across disciplines**. Results of the challenge are published in the form of a scientific paper in an **open access, peer-reviewed journal** such as HardwareX and **prototypes** will be presented at the "TUM Open Hardware Conference".

Many engineering education programs today focus on one particular type of problem and teach students existing solutions to existing problems. Therefore, graduates are poorly prepared to develop new engineering solutions to problems they will encounter in their later careers. In order to mitigate the gap between education and real-world engineering, more **authentic learning experiences** are necessary. Some of the leading academic institutions world-wide have adapted this concept in a variety of educational formats (e.g. MIT's NEET program), but it has not yet been widely and successfully established at TUM. The envisioned project course would be unique in the combination of providing **real-world problems**, strengthening **scientific skills, increasing employability,** and contributing **openly accessible documentation** of the solutions to the world-wide body of engineering knowledge. The combination of developing prototypes and communicating the results in a scientific format prepares students for their future careers, regardless if they want to become makers or inventors. Moreover, the thrill of tackling a challenge without the security of finding a 'good' solution will jumpstart their **entrepreneurial spirit**. Solutions developed within the course can lead to new start-ups built on the economic value of open hardware, thus strengthening TUM's world-wide position as **the entrepreneurial university.** Examples of products from the open hardware community that have been developed either fully or partially by students include an EEG, an optical stimulator for the Drosophila eye and a USV water quality monitoring platform.

Specific problems may either be provided by TUM research groups, companies, students, themselves or be taken from an open innovation platform (e.g. Innocentive). Students from different majors would form groups to develop or improve a certain (scientific) hardware under a defined set of restrictions. Students will draw from a variety of learning resources covering **engineering tools** (e.g. FPGA, microcontrollers, CAD, additive manufacturing, measurement methods, software engineering) as well as **methods of teamwork organization** (e.g. KANBAN, SCRUM), **documentation** (e.g. writing a wiki, scientific writing, presentation design) and **creative problem solving** (e.g. design thinking, TRIZ/ARIZ, CPS). They will have access to university resources enabling them to create and validate prototypes (Makerspace, ZEIT-lab, workshops).

The OInC as a modern, interdisciplinary project course that combines applied problem-solving with scientific methods to tackle non-trivial challenges by finding cutting-edge solutions will not only contribute to TUM's portfolio of innovative teaching methods, but also strengthen the university's entrepreneurial spirit as well as its ties to industry.