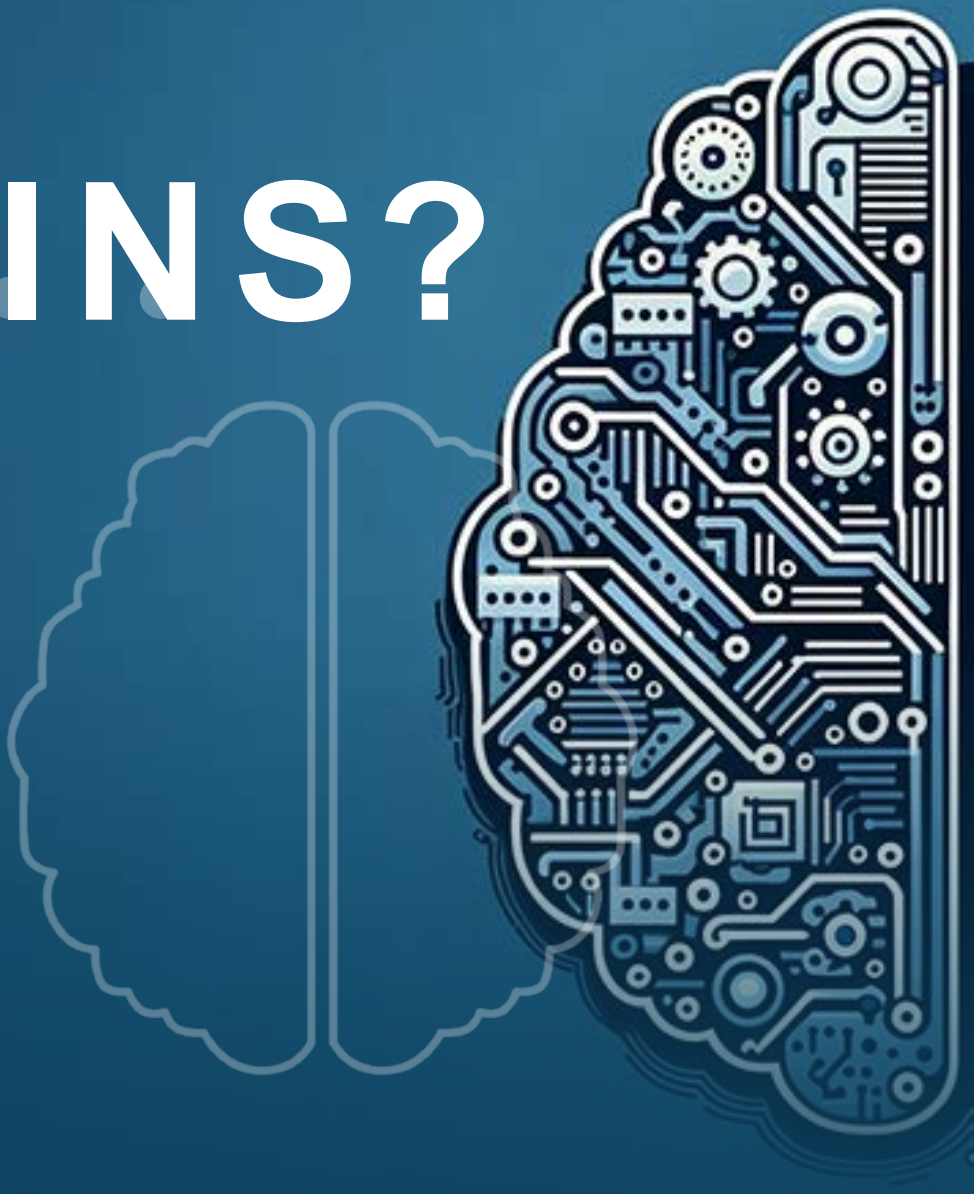
WHAT IS BRAINS?



In an era where technological advancements drive competitive edges, the manufacturing industry stands at the forefront of innovation, yet AI implementation remains underutilised. Building on the results of PRISMA (ERDF project, October 2019 – April 2022), the BRAINS project represents a significant leap forward in the integration of AI technologies within manufacturing processes. With a consortium comprising AWL, Tembo, Bond3D, Zuidberg, Perron038, Windesheim, and FIP-AM@UT, the project is aimed at revolutionising manufacturing through the strategic application of Artificial Intelligence (AI) solutions.

One of the key objectives of BRAINS is to address the existing gap between the vast amount of data generated in manufacturing and its utilisation for optimising production processes. By harnessing AI algorithms and machine learning techniques, the project aims to extract actionable insights from this data, enabling companies to make more informed decisions and drive efficiency gains.

Through a series of use cases focused on automation, quality control, and process optimisation, BRAINS seeks to demonstrate the tangible benefits of AI integration in manufacturing. Collaborating with industry leaders and leveraging their expertise, the project aims to develop scalable solutions that can be easily implemented across a wide range of manufacturing environments. One of the participants of BRAINS is BOND3D which specialises in gapless 3D printing of a high-performance polymer (PEEK). They have two use cases aimed at improving production quality and speed.

The first use case investigating the flow control during 3D printing. Currently, they rely on a simplified model based on classical physics to estimate the flow rate. This has limitations in accuracy because of the high level of complexity present in the underlying real physical system. The BRAINS project aims to significantly improve this accuracy by

BRAINS is made possible in part by a contribution from the European Fund for Regional Development of the European Union.

Medegefinancierd door de Europese Unie

EFROoost Programma Oost-Nederland 2021-2027 Europees Fonds voor Regionale Ontwikkeling

> **Through a series of use cases focused on automation, quality control, and process optimisation, BRAINS seeks to demonstrate the tangible benefits of AI integration in manufacturing.**

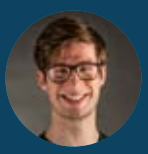
replacing the existing model with a machine learning model which is able to also take this complexity into account. Because an accurate estimation of flow rate is at the basis of good flow rate control performance, the new model will allow for more precise and consistent printing of PEEK material, ultimately enhancing product quality and manufacturing efficiency.

The second use case tackles the challenge of optimising the print path to increase speed. In 3D printing, after a model is divided into layers, the printer must determine the most efficient route to deposit each layer. Traditional strategies often simplify this task by dividing complex shapes into easier segments and applying straightforward patterns, which doesn't fully account for the printer's physical dynamics, like the need to slow down at sharp turns. By leveraging AI, the project seeks to refine this path planning, reducing abrupt stops and sharp angles that necessitate speed changes, thereby streamlining the printing process. This smarter approach to navigating each layer aims to cut down printing time significantly.

At its core, the BRAINS project enables the research and development of new AI applications, serving as the foundation for the development of a generic data learning platform. Moreover, recognising the importance of lifelong learning and skill development, the project provides opportunity through knowledge-sharing initiatives aimed at empowering industry professionals with the necessary expertise to effectively utilise AI technologies in their roles. As the project progresses, it is poised to reshape the manufacturing landscape, ushering in a more efficient and digitally-driven future. ■

Authors:

Reinier Stribos
Research Engineer,
FIP-AM@UT



Tjeerd Bakker
MSc Student Robotics,
University of Twente

BRAINS is made possible in part by a contribution from the European Fund for Regional Development of the European Union.

Medegefinancierd door de Europese Unie

EFROoost
Programma Oost-Nederland 2021-2027
Europees Fonds voor Regionale Ontwikkeling