

Young Experts and Managers in AM

Career Development: An Insight into my Engineering and AM Journey including Top Tips

Dr Adeayo Sotayo, CEng, PhD, AFHEA, MIET

Tuesday 27th April 2021

Outline

- ✓ About me
- ✓ My experience in AM
- ✓ Positive aspects, challenges and opportunities in AM
- ✓ Advice and top tips
- ✓ Questions

About me

- ✓ Mechanical Engineering, University of Liverpool, UK
 - ❖ First Class
 - ❖ Skipped Master's Degree
- ✓ PhD Engineering, Lancaster University, UK
- ✓ Researcher, Academic, Chartered Engineer
 - ❖ University of Liverpool
 - **Materials and Structures**
 - ❖ Brunel University London
 - **Additive Manufacturing**



Brunel University, Uxbridge, West London

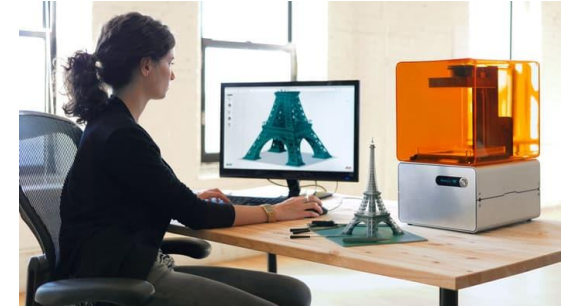
- ✓ Top 400 universities globally
 - ❖ QS World University Rankings 2021
 - ❖ Times Higher Education World University Rankings 2021
- ✓ 9th for Research Intensity in the UK
 - ❖ University League Table 2021



My experience in **AM**

Research Fellow in Additive Manufacturing Skills

- ✓ **Lack of enough skilled AM professionals**
 - ❖ Surveys, workshops, research to identify skills required in AM (now and future)
 - ❖ Data management and reporting of findings
 - ❖ 2021 European AM Strategy Roadmap



Source: 3D Printing industry (2020)

- ✓ **Develop training materials and knowledge transfer in AM**
 - ❖ Pilot courses in AM
 - ❖ Educate and upskill people in AM
 - ❖ International Additive manufacturing Qualification System



My experience in AM

✓ Raise Awareness

- ❖ Review literature
- ❖ Design experiments for materials characterisation and analysis
- ❖ Increased understanding of AM material properties for several applications
- ❖ Academic publications
 - ❖ Over 25 publications in Engineering, Materials & AM



My experience in AM

✓ Raise Awareness

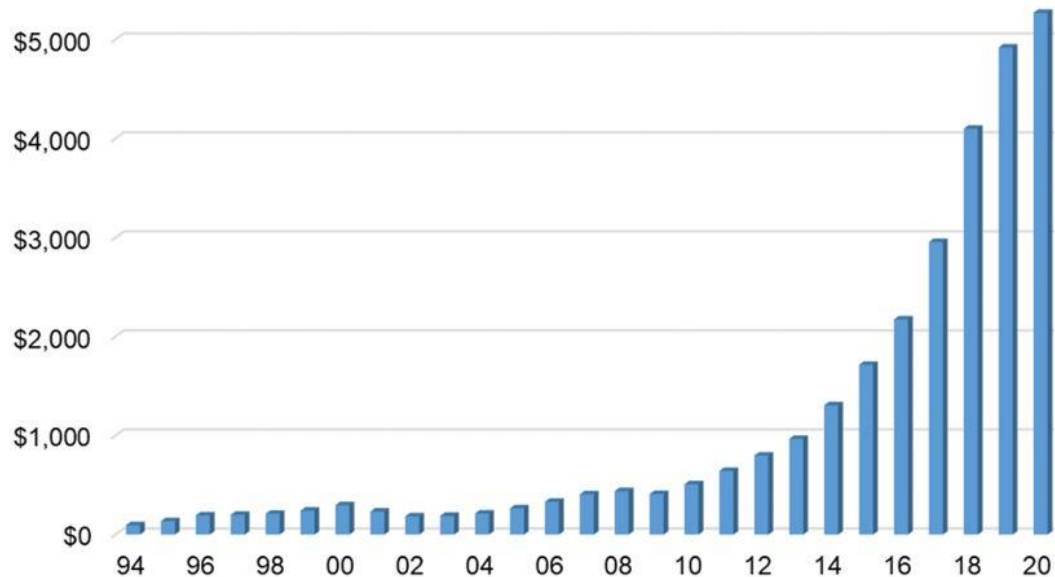
- ❖ AM workshops and presentations to different age groups
 - School children (tech4kids)
 - University students
 - Industry experts
- ❖ Get insights and developments in AM
- ❖ Highlight innovation & problem-solving techniques
- ❖ Environmental considerations & sustainability



Positive aspects, challenges and opportunities in AM

Additive Manufacturing Industry

- ✓ Continuous growth
- ✓ **7.5% growth** to **\$12.8 billion** in 2020 (despite COVID-19 Pandemic)
- ✓ Growth was down compared to average growth of **27%** in previous 10 years



Production of AM parts from independent service providers
(in millions of dollars). Source: Wohlers Report 2021

Additive Manufacturing across different sectors

Construction



Source: m-tec (2020)

Food



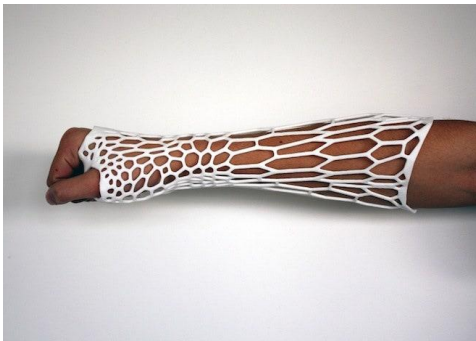
Source: Fabbaloo (2018)

Aerospace/Automotive

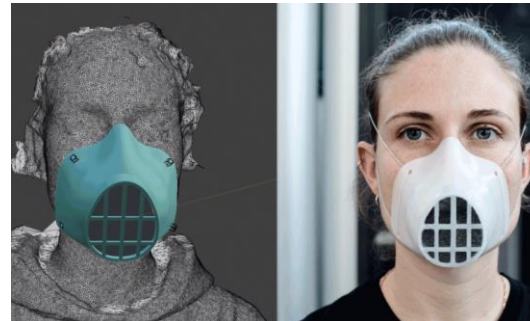


Source: AMFG.ai (2019)

Health & Biomedical



Source: Pixabay (2020)



Source: 3D Printing Media Network (2020)



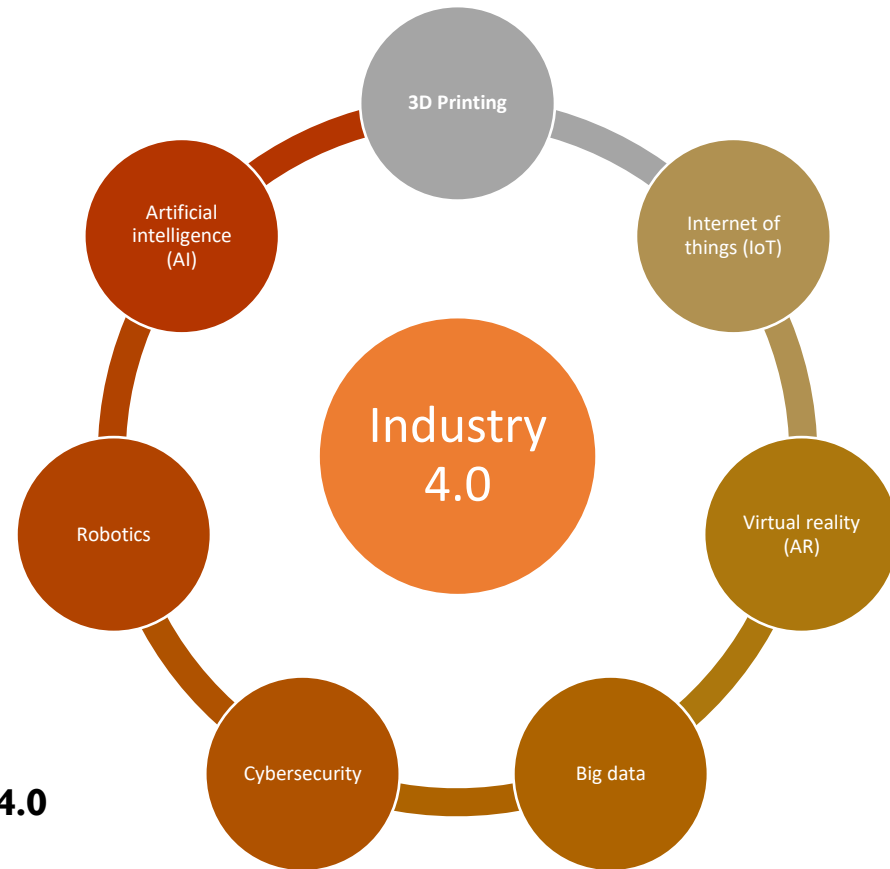
Source: Shutterstock (2020)

AM and Industry 4.0

✓ Industry 4.0

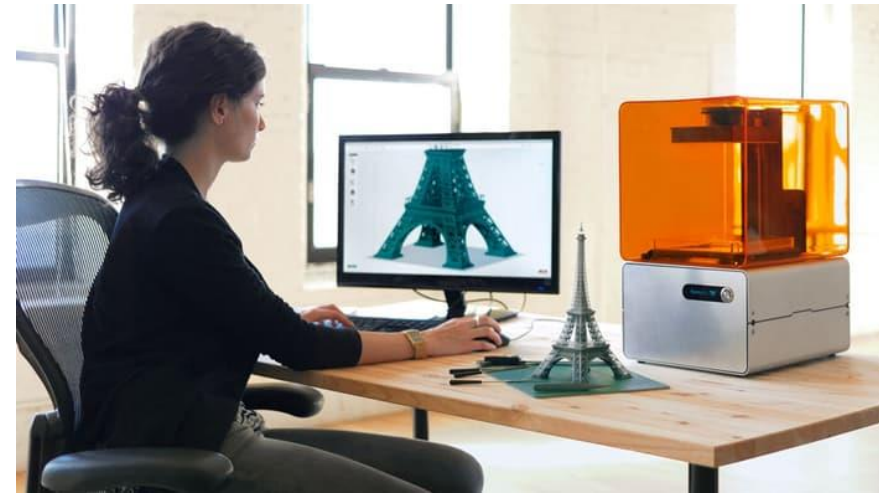
- ❖ New phase of Industrial Revolution
- ❖ Digital transformation of manufacturing
- ❖ Interconnectivity and automation
- ❖ Increased productivity and efficiency

✓ **AM** vital digital manufacturing technology driving **Industry 4.0**



With AM, you can become an...

- ✓ AM Designer
- ✓ AM Process Engineer
- ✓ AM Inspector
- ✓ AM Supervisor
- ✓ AM Coordinator
- ✓ AM Operator and Technician
- ✓ AM Researcher and Scientist and **more.....**



Source: 3D Printing industry (2020)

***List is not exhaustive**

Challenges in AM

- ✓ Shortage of skilled AM professionals with a **multidisciplinary** and **comprehensive** skillset
 - ❖ **AM Design and Modelling** (e.g. CAD design, Topology Optimisation)
 - ❖ **AM Materials** (e.g. Metals and Alloys, Polymers, Composites, Concrete)
 - ❖ **AM Processes** (e.g. Material Extrusion, Powder Bed Fusion, Directed Energy Deposition)
 - ❖ **AM Equipment and Software** (e.g. Additive Manufacturing systems)
 - ❖ **AM Inspection and Standards** (e.g. Quality Assurance, Non-Destructive Testing, Mechanical Characterization)
 - ❖ **AM End-of-Life Processing** (e.g. Recycling Process, Life-Cycle Analysis, Sustainability)
- ✓ Understand the relationship between the above factors
 - ❖ Greater innovation, optimisation and application of AM

Challenges in AM

- ✓ Shortage and lack of standardisation of AM processes
 - ❖ Affects the consistency and properties of materials or products
- ✓ High initial cost (e.g. AM machines, materials)
- ✓ Manufacturing time and speed (i.e. efficiency)

Almost there....



Advice and top tips

Advice and top tips



- ✓ Connect and follow AM projects, organisations or people
 - ❖ Keeps you informed of current developments & opportunities in AM
- ✓ Be pro-active and take opportunities
- ✓ Think of the **challenges discussed earlier** and ways to solve or improve them
 - ❖ Multidisciplinary skillset (AM Materials, AM Design, AM Processes & Post-processing)
- ✓ Rapid growth and constant development of AM
 - ❖ **Continuous** training, learning and professional development
 - ❖ Be open to creativity and innovation
 - ❖ Be prepared to adapt

Good luck

Any Questions?