



*Design
Technology*
NEWSLETTER

Open Day 2021

Achievements, stories &
events of the past year
from the Design
Technology Department

NEWS LETTER



12th October 2021

www.bexleygs.co.uk

INTELLECT, EMPATHY &
COURAGE



DT News ~ Bio-Architecture at the MIT Labs

With the sudden growth of the human population in recent years, scientists and builders alike are struggling to create environmentally sustainable ways to house everyone. The materials we use to build houses (clay, wood, sand, etc.) are, while plentiful, essentially finite resources. One day, we will run out. Scientists in MIT believe they have found a solution - Bio Architecture.



Bio Architecture is described as "The design and construction of buildings in an ecologically-friendly manner ... that reflect structures found in nature." At the top of this field is Neri Oxman, professor at the MIT Media Lab, and a famous architect leading the Mediated Matter Research group. She is known for her skill in integrating opposing subjects such as art, biology, computing, materials engineering and design into her works to create fantastic structures.



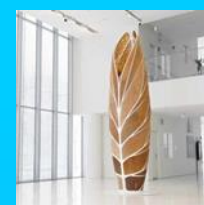
One of her biggest projects is studying how insects, such as silkworms and bees, build their structures and how we can synthesize this natural information and create sustainable materials that we, too, can use to build. Her art installation "The Silk Pavilion" was created to showcase how man and the natural world could work together to create buildings. It is made from three layers - the steel rods providing structure, some fabric upon which the silkworms are placed, and 17,532 silkworms to build the rest of the structure. This project showed the world that a sustainable future in architecture is possible, and that we could actively cultivate the lives of other animals while doing so.



Another major project she has created is known as 'Aguahoja I and II'. She and her team studied molecular compounds found in tree branches, insect exoskeletons and human bones to create a structure and support the completely biodegradable material of cellulose, chitosan and pectin. These materials are some of the most abundant on earth today, and yet are often overlooked and thrown out as waste. The organic matter was printed by a robot, shaped by water, and changes the future for building works forever. With this relatively sustainable material, huge strides can be made towards creating much needed resources.



Her work doesn't stop there. MIT's labs, under the guidance of Neri Oxman, have managed to create architectural marvels from studying the natural world. With projects such as Hybrid Living Fibres, 3D printable glass and houses, Water Based Additive Manufacturing and more, MIT is proving itself to be the forefront of Biological and Sustainable Architecture and are ready to take us into the future of sustainable living.



Sasha Waller, Year 12

Design Technology and The Medical Science of the future

Bioprinting is the biological cousin of 3D printing. It uses a digital file to print an object layer by layer however unlike 3D printing, bioprinting prints out cells and biomaterials to create organ-like structures. To create a digital file, normally a CT scan or a MRI is done to create a biopsy of the cell. After the biopsy, reconstruction is used to split the organ into thin layers. These 2D layers are sent to the bio-printer, where a liquid mixture of cells, matrix and nutrients called bioinks is placed into a cartridge and is deposited due to how the file is, layer by layer. The pre-tissue is then placed into an incubator where it will mature into a tissue. During post-bioprinting, the 3D printed structure is looked after to make sure the integrity and function of the object is not at risk. To maintain the object, physical and chemical processes are used, the processes send signals to cells to help control the growth and remodelling of the tissue.

Bioprinting is the future of medicine as there are hundreds of thousands of people who are in need of an organ transplant, however there aren't enough organ donors, as organ donors only donate if they can and still live a full life or they donate their organs after they die. However, there are many ways for the donation to fail as the organs that are being donated may not be healthy enough or the body may come to reject the organ itself and therefore damage the organ, rendering it useless. With



NEWS LETTER



26th November 2020

www.bexleygs.co.uk

the help of bioprinting, there could be enough organs for every person on the transplant list. Another area where bioprinting can help is when a patient is in need of a skin graft, an area of skin which has been infected from a burn for an example, needs to be replaced by uninfected skin. This can be done from a skin donor, but the skin needs to fit the right categories for it to be accepted by the new host. Normally, skin is taken from one area of the patient and placed on the infected area. However, there are still many problems with this as the skin could be rejected and the process isn't a simple copy and paste. Bioprinting can help as skin is an easier option for bioprinting as it will need fewer layers of a file.

There are still limitations with bioprinting as the printers used for bioprinting need improvements as the resolution and the speed need to be increased. Also they should be compatible with a wide range of biocompatible materials. A higher resolution will allow better interaction and control in the 3D microenvironment. An increase in speed will help reach a commercially acceptable level therefore allowing a scaled up process. There needs to be more biomaterials themselves for the printer to use as we are limited by what we have now. New synthetic materials will be able to provide good mechanical strength and can promote cell attachment, proliferation and differentiation. Another limitation is the need of a vascular system, which helps feed the oxygen and nutrients. We can't use diffusion for every tissue as it only works up to 150-micrometer thickness. Without it the tissue won't develop properly.

On the other hand, bioprinting is already having an impact and can have a bigger impact in the future, we can print out organs and tissue to help with the testing of new drugs more accurately and eliminate the need for testing on animals. What is stopping scientist from adapting organs to help with lives in the future? Possibly in the future, we print tissues with imbedded technology or produce organs which exceed current capability or give us new features like unburn able skin. We could also increase the human life by printing and replacing organs and tissues.

Jack Kenny, Year 12



Skin graft onto an arm



A 3D printed ear



A bioprinter, printing a heart



The Future Design of Cars

Currently we are in the middle of a revolutionary change in the automobile industry. 'There's a century of diesel-burning, hand-on-the-wheel vehicles in our rear-view mirrors, while the road ahead is driven forward by electric, driverless technologies. Somewhere between yesterday and tomorrow, however, is the vehicle that bridges this gap, and its spirit can be seen in the concept cars, TED Talks and patent filings of today'. If you manage to catch a glimpse of the 'future' you might see some trends that are poking their way through each design.



However, concept cars aren't a new idea they have been brewing in designers' minds since the early 1900's, the first being the Buick Osceola in 1938. Its design in this modern age may seem basic but it was ground-breaking at the time. Housing hidden headlamps, integrated fenders, and powered windows all a first of its kind. It had such a positive impact on the industry that it influenced the designs of future Buicks to this date and Cadillac's at the time.



The visual real estate on the interior of the windshield is a prime location to display crucial information for the driver. With HUD (Heads Up Display) Technology a driver can see information about the car and the environment without having to take their eyes off the road as the instruments are all built into the windshield. This would not only increase safety when driving but it would also reduce eyes and neck strain allowing drivers to be even more comfortable in their cars. Alongside with driverless technology and voice-activated car operating system drivers could control their cars with simple voice commands like 'hold speed at 55' and 'lights please' and these could be readily available by next year!



Another common trend that has been seen scattered throughout is the use of panoramic sunroofs which are a feat of engineering. Some may see this roof design as impossible and dangerous, however glass technology has evolved rapidly over the last few years. Due to the ever-growing demand for higher durability smartphone displays, glass and high impact plastics have been altered to have better shock and impact absorption. These panoramic roofs wouldn't only allow for stargazing, but make sightseeing a breeze. Future technology could drive this further through the implementation of solar panels into the glass to allow the car to harness power consistently to reduce its energy consumption and allow us to have endless road trips.





These cars are trying to address environmental issues that cars are known perpetrators for. That's why the future looks to be entirely electric and everything seems to have been planned for. Peugeot and Tesla are integrating negative-ion generators that have the ability to filter out bacteria and stop 90% of pollutants entering the car. Inevitably, these additions would lead to cars eventually becoming self-sustainable and non-damaging to the environment which is the fulfilment of a lifelong dream for any car designer.

Visualisation and drawing skills portrayed in the pictures here are heavily sought after by major car companies including; Mercedes-Benz, Audi, Hyundai and BMW to name a few. They seek people who can provide a unique edge to their designs that break boundaries between reality and the unimaginable. These concepts for a car called 'Link' were designed by a car design student with an eye for futurism and minimalism. If this is the way our cars are heading, I'm all for it.

Ethan Pereira, Year 12





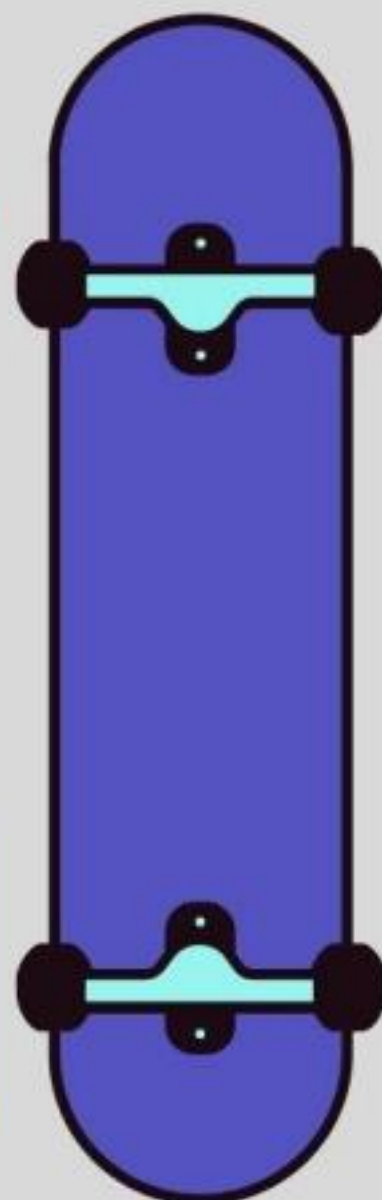
HAPPY OLLIE DAYS!

Coming soon

make. create. paint. skate

In 2021 DT are launching The BGS Skateboard Club. Making the decks from scratch, steam bending to shape and then painting...

Open to Year 8 and 9 initially.
Register your interest with Mia Millen and Lucy Avis-Clarke in Year 8



Design is used to raise awareness

Never would I have thought that pupils aged 12 and 13 (Year 8) would be so engaged in local charity issues.

In Design and Technology we are experiencing a new kind of beautiful, how our pupil's relationship with charitable organisations are changing and how they are promoting their chosen charities with an unstoppable energy.

Each pupil has designed a Mood Light in Ms. Chan's Electronics Class based on a charity of their choice and then created/ or will be completing an electronic circuit attached to a power source, look at these...

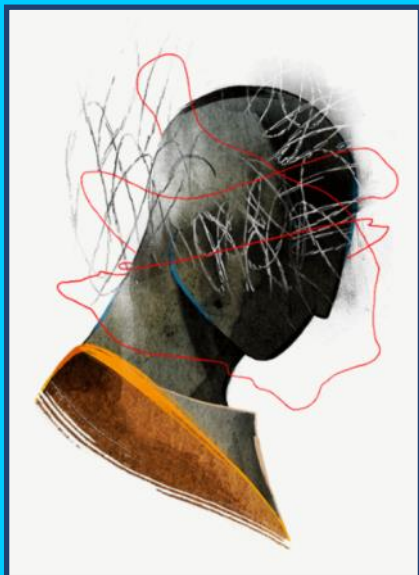
From moodboards, initial concepts to final prototypes. An absolute joy...
The charities vary from Muslim Aid, The RSPCA, WWF, English Heritage, Wateraid to Mind.

An extract from the work of Billy Roxburgh

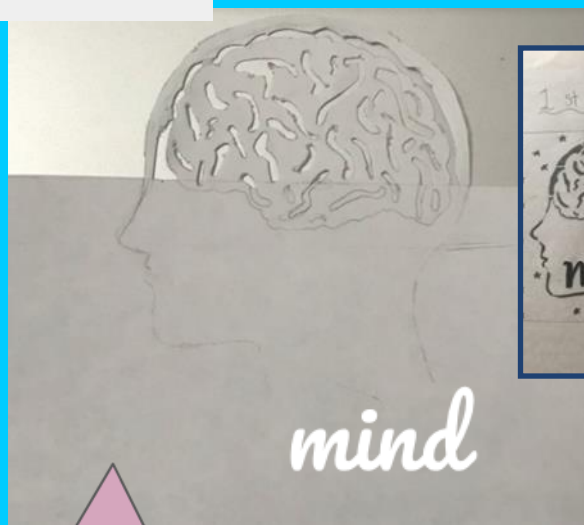
NHS charities together: is a charity that supports key workers working hard through these tough times. Every day, they give 1 million pounds to hospitals to focus on helping them do more. This helps people stay well for longer and get better faster.

In recent years, this charity has funded major capital projects such as pioneering research and medical equipment, helping patients access the best possible care when they need it most. They also play a key role in mobilising volunteers to support NHS staff, brightening wards and waiting areas with colourful and engaging art and building an important link between our hospitals and our communities.

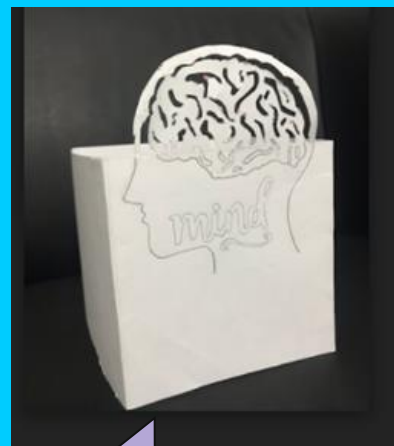
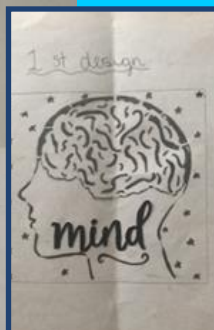
Other NHS charities support mental health trusts, community health trust and ambulance funds. These vital funds and services are above and beyond what the NHS alone can provide, touching lives and making a huge difference to millions of people when they are at their most vulnerable.



Alisha Ahmed



shaped without
the use of a laser
cutter



a scale model was constructed this week during lockdown



This is why I'm supporting the act against climate change because it could literally mean: The difference between life and death because I want a future for the kids and grandkids that our generation has because if we don't fix it we may have less than a century left on the earth. If we don't stop this issue the temperature will rise by about 5 degrees which will make about half of the earth uninhabitable (not counting places that already were not habitable like the Russian forests). We may not be able to stop the temperature from rising, but we may be able to reduce the amount it rises by. Scientists say we need to reduce it by 2 degrees at least if we want to survive at all let alone live through it.

Countries that contribute most to global warming are: China, U.S, India, Russia and Japan. The UK is in the top 20, but is nothing near as bad as what China produces. (We are no. 17 on the list and China is no.1). In 2016, China had contributed roughly a quarter of the world's global emissions, this can be excused slightly as they do have over 1 billion people living in the country.

Ethan Christie





Design is used to reduce inequality

Year 9 - Introduction

In Year 9, we have been looking at real world design issues. Some of us have very little. We need to work to develop a fairer world where everyone has access to the things they need to survive.

The Problem

We are learning about how extreme weather and natural disasters can kill or injure millions each year, but not everybody can afford the products designed to protect us from them.

People in wealthier nations have access to clothing, shelter and warning systems, but often people in developing countries do not. This inequality means people in developing countries are much more likely to suffer.

Year 9 have been creating a prototype protective suit. This suit will use only everyday materials and improvised building techniques.

Students learn which properties various materials have to ensure the suit can withstand cuts, cold, impact or sinking.

The suit can be made for little or no cost, regardless of where the user lives. Students learn that through smart design and use of everyday materials, cost and distribution cease to become a barrier to fair access to lifesaving design.

Ms Chan, Head of Design Technology



Tornado



Earthquake



Wild Fire

Year 9 Solutions



Nathaniel Kuhn
Extreme



Evie Nguyen
Earthquake



Adam Mawdsley
Tsunami



Robert Humphreys
Hurricanes



How has the design of skateboards changed over time?

First Skateboards

The first official use of a skateboard came about in the 1940s, however some sources claim skateboards first came about in the 1880s. The first skateboards that came about in the 1940's looked more like a scooter with four wheels than anything else. They had a handlebar, and were made of wood planks. The wheels were similar to that used by horse-drawn carts. It looked like this:



These were mainly used for transportation, as they weren't very manoeuvrable, as a modern day skateboard has to be able to perform a variety of tricks, which requires manoeuvrability.

1940-1950's skateboards

The first "modern" skateboards that we would recognise came in the late 1940's, and were improved on and iterated all the way to the modern day. They were known as DIY skateboards as all they first came about as simply roller skates crudely screwed by children onto planks of wood, sometimes from a fence! They were made by children, to share with their friends a fun, cheap outdoor activity, which was hard to find straight after World War II. They were crude and were not particularly manoeuvrable, however, they paved the way for pioneers to change the design into something incredibly popular nowadays by introducing everyone to the new sport.

In 1959, DIY skateboards became so popular that the first mass produced skateboard, called the Roller Derby Skateboard was manufactured in La Mirada, California.



This is a child making a DIY skateboard from some old roller skate wheels, and a 2X4

1960's Skateboards

In the 1960's, Skateboards started to become very popular, especially in California, hugely helped by the Roller Derby Skateboard seen above. It started as a branch off of surfing culture, which makes sense as skateboarding is very similar to surfing, just on land instead of the sea. The first skateboards in the 1960's were known as a cambered deck, as they had the ends drooped down lower than the rest of the deck, similar to penny boards of today. Due to the popularity of these new boards, skateboarding became so big and popular that skateboarding competitions started being broadcasted on national television, starting the formation of skate teams, skate brands were being born, and even skate shops started popping up, especially in California. These skate competitions consisted of mainly swerving through cones, and doing tricks on the board such as handstands, rather than tricks with the board as seen today. The fast growing popularity massively aided skateboarding popularity and got more people into it.



In 1969, Larry Stevens created the first modern skateboard, and from that moment on skateboarding was reinvented forever. His invention was the kicktail, and virtually all skateboards now have a kicktail, due to the massive amount of manoeuvrability it gives the skater.

1970's skateboarding

In the 1970's, with help from Larry Stevens kicktail invention, a man called Frank Natsworthy invented the polyurethane wheels, which helped skateboards become even better. Due to these incredible iterations by the innovators, new types of skateboarding came about, giving it the boost the sport needs to stay forever. From then boards started becoming made from plastic instead of wood, making them lighter and more durable, these were called the banana board. More iterations in the 1970's included a wider nose, however due to a lack of iterations the popularity started to dip in the late 1970's as you can only do so much with a board with one kicktail, as you will find out soon!



1980s skateboarding

In the 1980s, people started to customise boards. They started to use grip tape, and this had patterns on it. The boards were also changing in shape, common designs included looking like a fish or a coffin, which looked great, but didn't do much for functionality! Some boards also had a huge kicktail on them, which did help with some tricks, unlike the other customisation options!

1990s skateboarding

In the early 1990's, a new board design entered the world of skateboarding. It was called the Popsicle stick shape. This is the modern design, and has withstood the test of time. It has a twin tail and nose shape, rounded at each end, and being of a concave shape. Now that the board has a nose and tail it allows for a huge variety of tricks to be performed by skaters, and has paved the way for skateboarding and pioneered the sport into what it is today!



In just over 50 years skateboarding has turned from a DIY board made from a fence, or a 2X4 plank of wood, with some old roller skating wheels on them, into a carefully engineered, plastic board with sturdy, manoeuvrable trucks purpose built, and is recognised all over the world. Board sizes have also varied, from 7" to a whopping 9".

Thank you for reading my article on how skateboarding has been pioneered into what it is today. I suggest everyone try skateboarding, it's great fun! If you're interested in engineering your own skateboard, please email Chan_A@bexleygs.co.uk. Skateboard Club, takes place Wednesdays after school in September, hope to see you all there soon!



George Bishop, Year 12