

ALEX PRITCHETT

CAD PORTFOLIO 2022



WELCOME!



# Contents

- [4] Introduction
- [5] Skills & Contact Details
- [6-9] Banshee Guitar Project
- [10-15] A'Design Competition Project
- [16-17] Interactive WW2 Project
- [18-19] RSA Design Award Project
- [20-21] Protectorch Project
- [22-25] Shooting Club Project
- [26-27] Pocketknife Project
- [28] Other Interests



Interactive Menu



Protectorch Project render (Pages 20-21)



# HI, I'M ALEX



I'm an apprenticeship-trained toolmaker and machinist with a strong set of technical skills, a keen eye for detail, and a genuine passion for Computer-Aided Design

I specialise in technical drawing, product design and product visualisation

It's the perfect amalgamation of art and science that I love about technical design!

In this portfolio you can find a selection of my favourite projects completed during my time studying BSc CAD at the University of Winchester (2019-2022)



# SKILLS

## TOP SOFTWARE SKILLS

-  AUTODESK FUSION 360
-  AUTODESK AUTOCAD
-  GRAPHISOFT ARCHICAD
-  ADOBE PHOTOSHOP
-  KEYSHOT 10

## OTHER SKILLS

MICROSOFT OFFICE  
ADOBE INDESIGN  
DS SOLIDWORKS  
HTML CODING

TECHNICAL DRAWING  
PRECISION GRINDING  
MANUAL MILLING  
MANUAL TURNING  
CALIBRATION

# CONTACT

## TELEPHONE

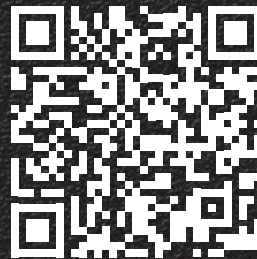
+44 7720832377

## EMAIL

[alexpritchett@hotmail.co.uk](mailto:alexpritchett@hotmail.co.uk)

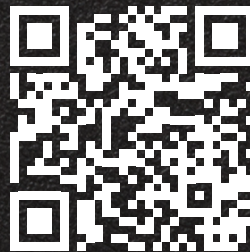
## WEBSITE

[alexpritchett.winchesterdigital.co.uk](http://alexpritchett.winchesterdigital.co.uk)  
(Scan the QR code below)



## INSTAGRAM

[instagram.com/acpconcepts](https://www.instagram.com/acpconcepts)  
(Scan the QR code below)



Year 2 Lamp Project (*Fusion 360* Render)



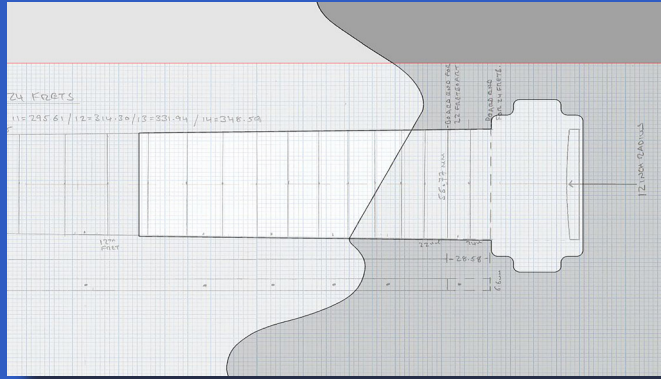
# BANSHEE GUITAR PROJECT



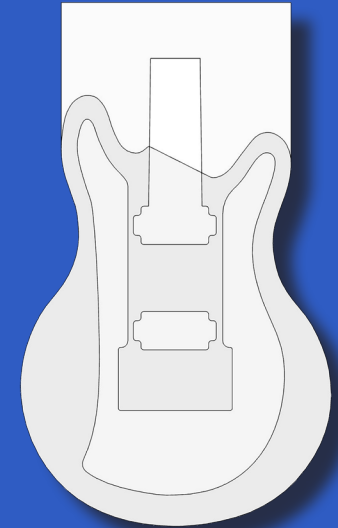


I was introduced to Simon Congdon and Simon Owen in the summer of 2021 by a fellow DMD student who was kind enough to recommend my CAD services. Both guitar enthusiasts and expert craftsmen, the two Simons created the *Banshee* brand in 2019 as a project to explore the possibility of producing custom guitars for professional musicians.

I was tasked with creating both 2D drawings and 3D CAD models based on a series of paper plans that were sent to me at the start of the project. One of the biggest challenges was the process of accurately translating physical drawings (with very few dimensions included) into precise CAD drawings and models. The project ran for approximately 18 weeks, in which time I produced a range of templates and models to aid in the manufacture of the *Banshee* guitars.

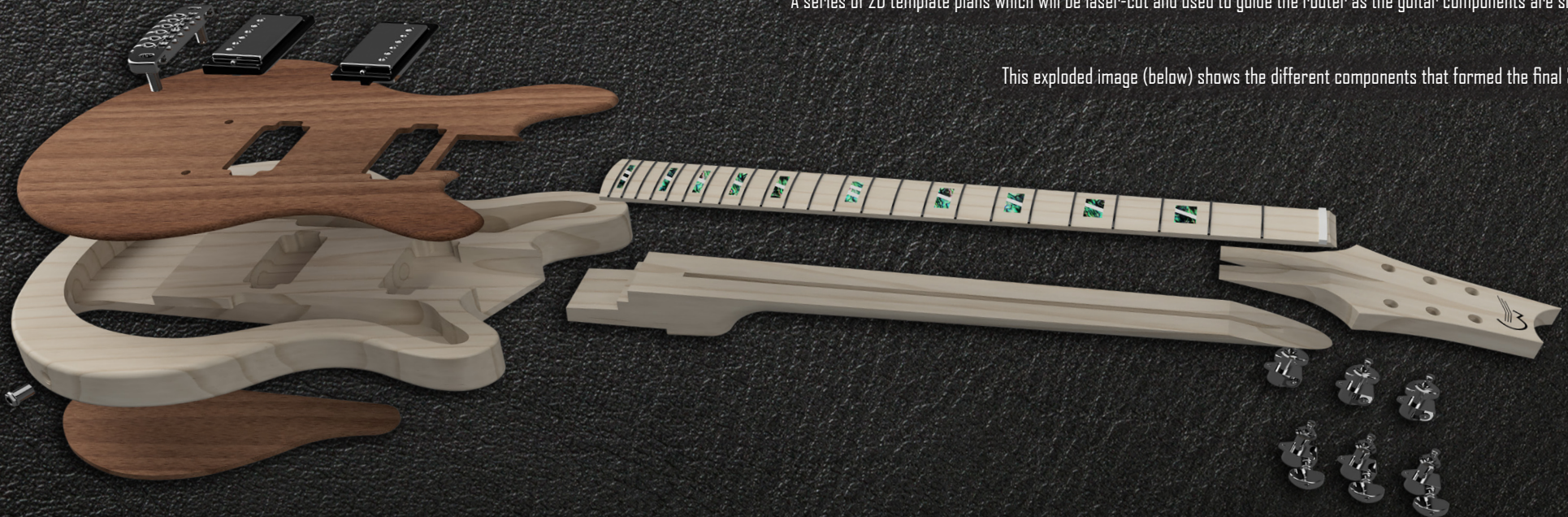


Carefully calibrating the paper plans to my 2D drawings



A series of 2D template plans which will be laser-cut and used to guide the router as the guitar components are shaped (above)

This exploded image (below) shows the different components that formed the final 3D CAD model





*Autodesk Fusion 360* was used for the 3D models, while the 2D templates were created using *Autodesk AutoCAD*. The design progressed through a number of iterations as the client fine-tuned the physical guitar build that was running alongside the CAD project. The 3D models would serve two purposes: product visualisation for the guitar buyer, and to facilitate the CNC machining of certain components that would be difficult to form accurately by hand.



*Banshee* Logo created by Maia McGhee







# A'DESIGN COMPETITION PROJECT (ALUTECH SPACESHIP)



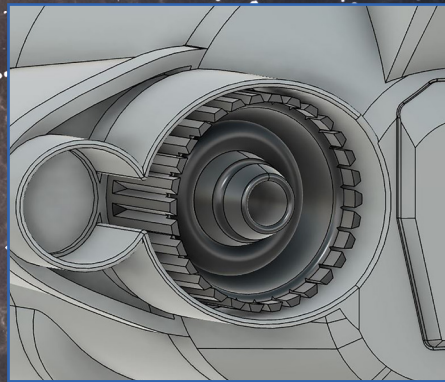
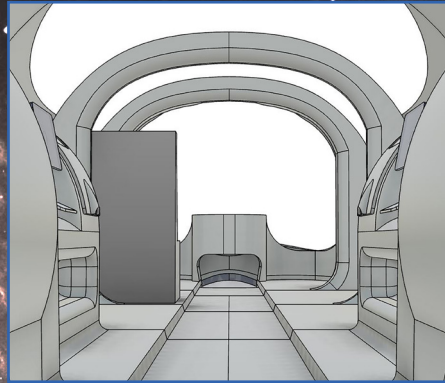
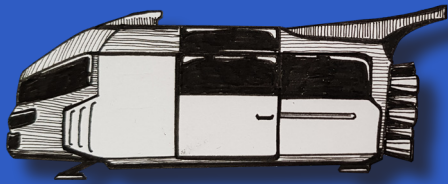
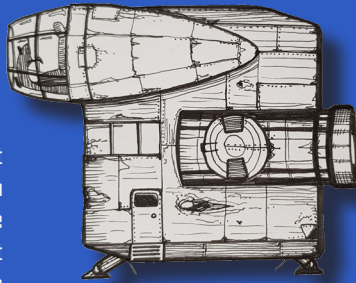


The *A'Design* Competition Project was a collaborative effort with Lucy Hopkins. The *A'Design* competitions are among the most prestigious design awards in the industry, and have been running since 2009 with great success. This made for a very interesting project brief, because instead of working with a client to fulfil a specific need, our goal was to create a competitive entry to the design contest. The specific award category we were given was the Computer Graphics and 3D Model Design Award - perfect for 3D and CAD students!

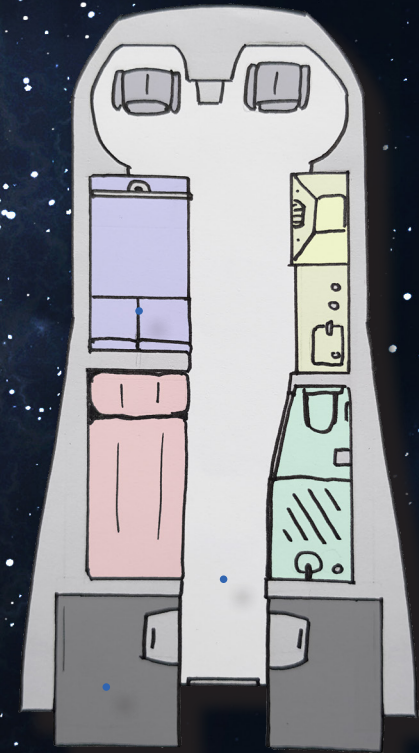
## A'DESIGN AWARD & COMPETITION

When I was a young *Star Wars* fan, I would spend hours on end planning detailed interiors of spaceships. I would enjoy listing the essential facilities a space traveller would need, and then figuring out a way of integrating them into very limited spaces. Based on this, we chose to design and build a futuristic spacecraft that could transport two passengers across the galaxy in comfort. This was a massive undertaking, and certainly the most ambitious project either of us had worked on to date.

Concept drawings of different spaceship designs. I explored a range of shapes and sizes before deciding on a more simple layout with a central galley and single deck.



 **ALUTECH**  
DRIVE SYSTEMS



Development drawing showing the different compartments of the spaceship, including engine bays, bunk bed, kitchen, and flight deck.



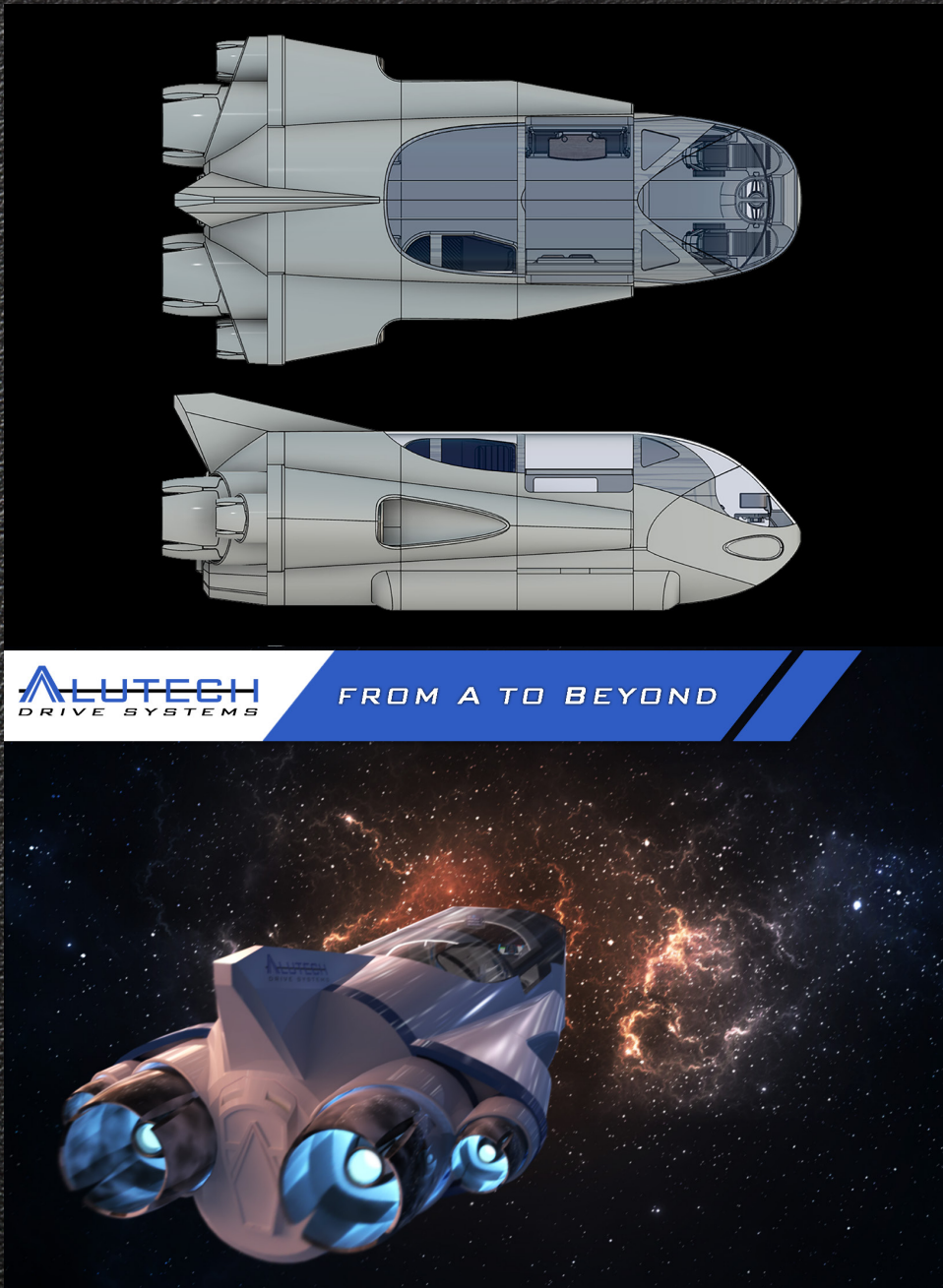


We used *Autodesk Fusion 360* to model the spacecraft. The compartments were designed to be modular, allowing easy reconfiguration of the interior as needed. Lucy created various interior details, while I focussed on the ship's structure. We decided that *Fusion 360*'s rendering suite was not sufficient for the level of quality we were after, so we used *KeyShot 10* rendering software to create the highly-detailed images seen above and on the next 3 pages.



Non-rendered orthographic view of the spaceship exterior (below)

Exterior views of the spaceship rendered in *KeyShot 10* (below, bottom left and bottom right)

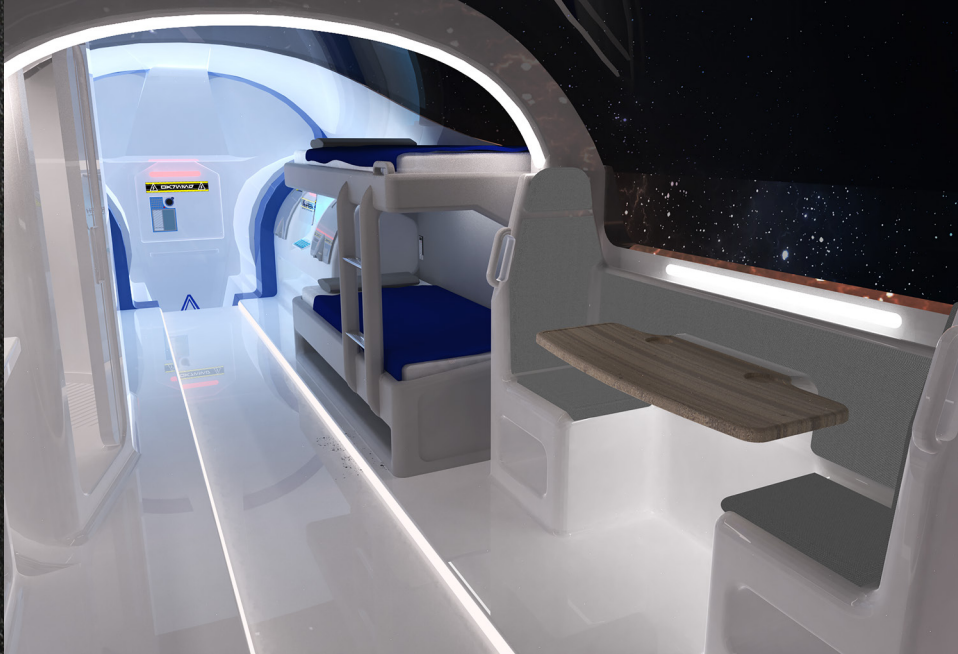




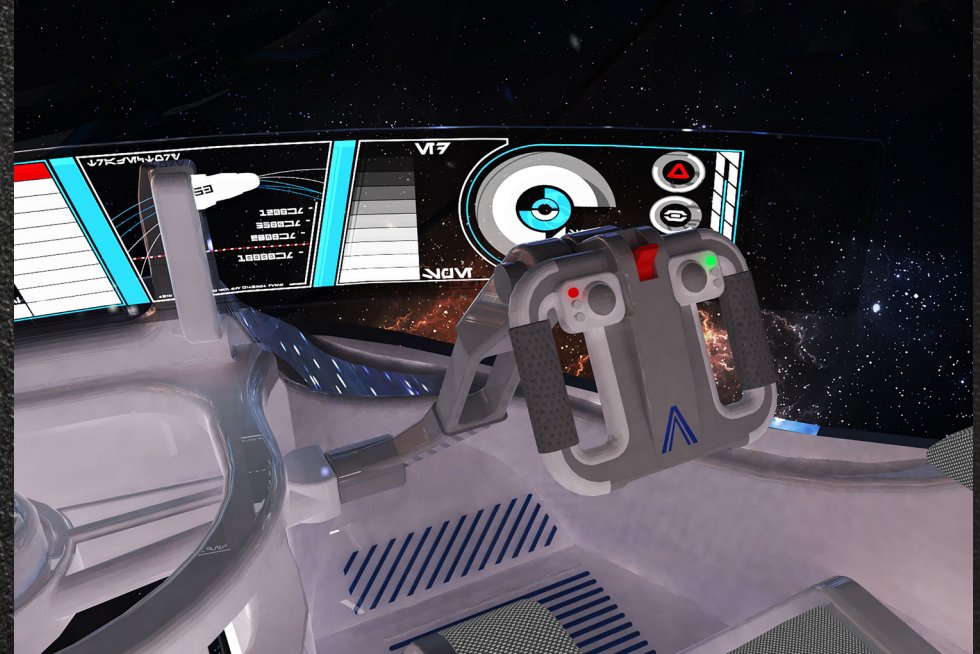
Rendered view of the kitchen area, hygiene cubicle, and starboard engine bay



Rendered view of the living area and flight deck from a mid-ship perspective

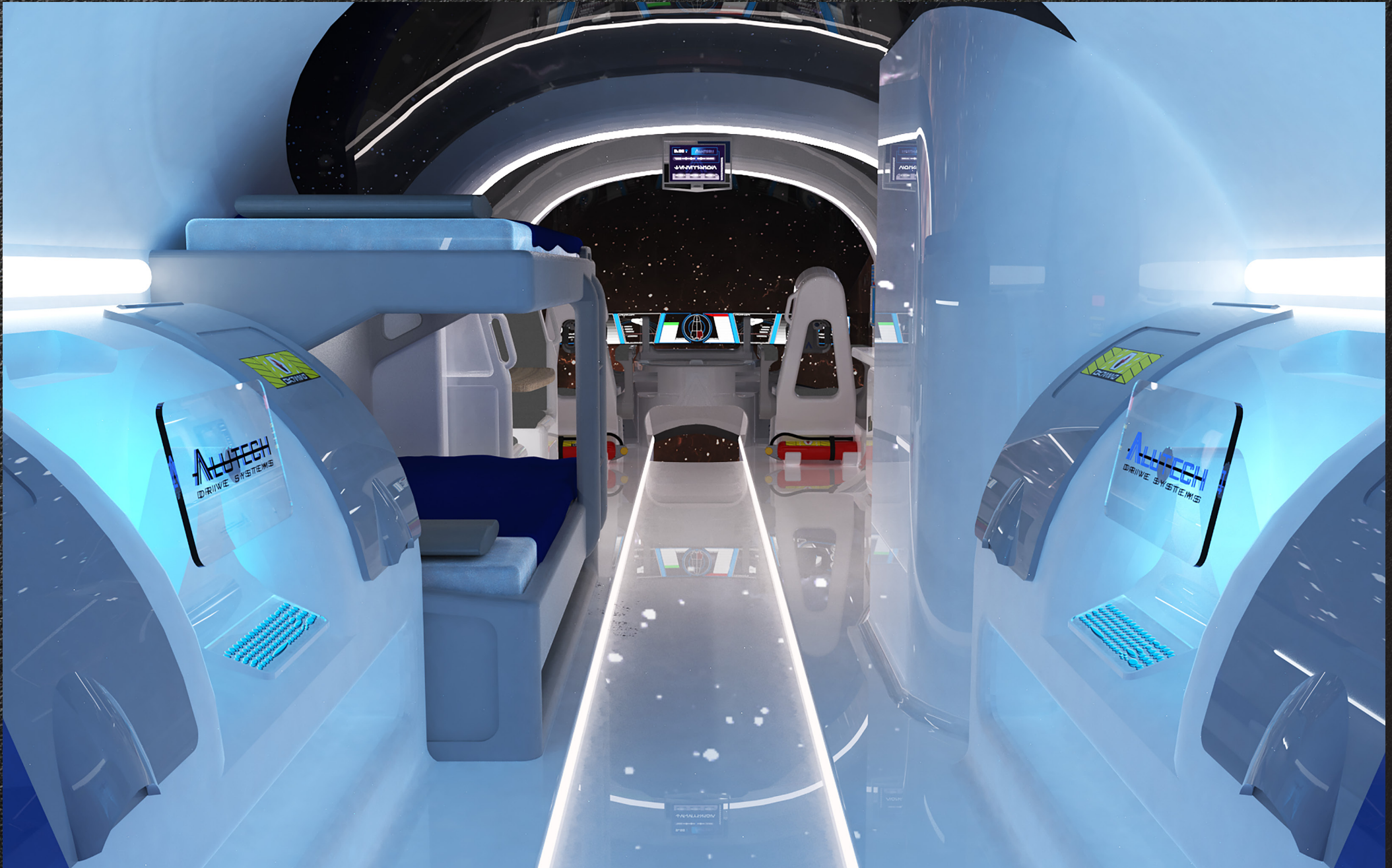


Rendered view of the living area, sleeping quarters, and port engine bay



Rendered close-up of the cockpit, including flight controls and information displays





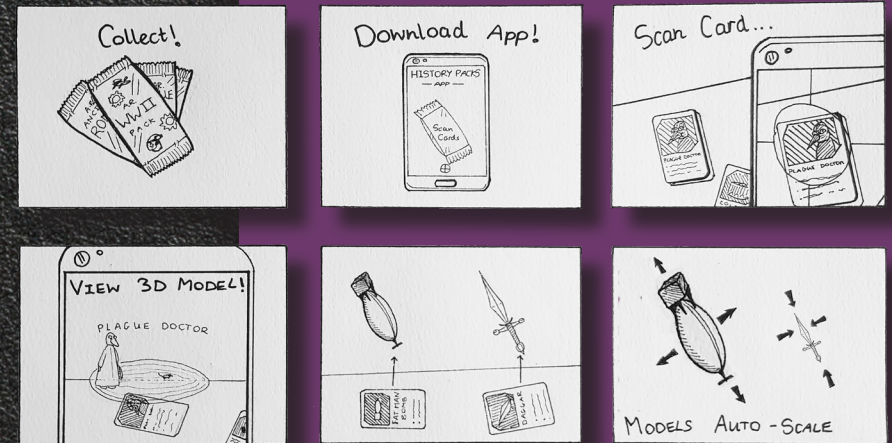
Rendered view down the galley from the rear of the spacecraft. Note the excellent lighting effects that were made possible with the *KeyShot 10* professional rendering software.



# INTERACTIVE WWII PROJECT



The Interactive Project was my final first-year group project. We were tasked with designing an interactive exhibit to offer visitors an engaging and educational experience. We decided to design an educational augmented-reality game that would display historical 3D models through a smartphone or tablet. Each team member chose a different period of history to create models for - I selected the First and Second World Wars. My WWI model was a *Webley .455 Service Revolver* (left), which would have been carried by officers. My Second World War model was a *V-1 Flying Bomb*, and a *Victoria Cross medal* bridged the two eras. Below is a storyboard of how the mobile app would work.



All of the models were created using *Autodesk Fusion 360*, which was a completely new program to me at the time. I was very impressed by the ease at which detailed models could be created with precision - *Fusion 360* would become my default 3D modelling software during the rest of my time at university.



The German V-1 Flying Bomb, nicknamed the 'doodlebug' or 'buzz bomb' due to the distinctive sound created by its pulsejet engine, was an early type of cruise missile utilised during WW2. This *Fusion 360* model was created by tracing around original V-1 blueprints, and is therefore 1:1 scale.



I created a Victoria Cross medal to go alongside the revolver and bomb. I hoped that including a medal would remind the viewer/player of the bravery and sacrifice made during these terrible conflicts, rather than glorifying the fighting as some might feel the revolver and bomb might. I worked from a picture and spent many hours replicating the minute details. I wanted these models to be perfect digital representations of real-life artefacts.



# RSA DESIGN AWARD PROJECT

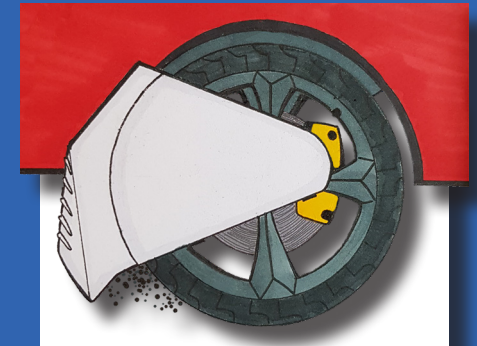
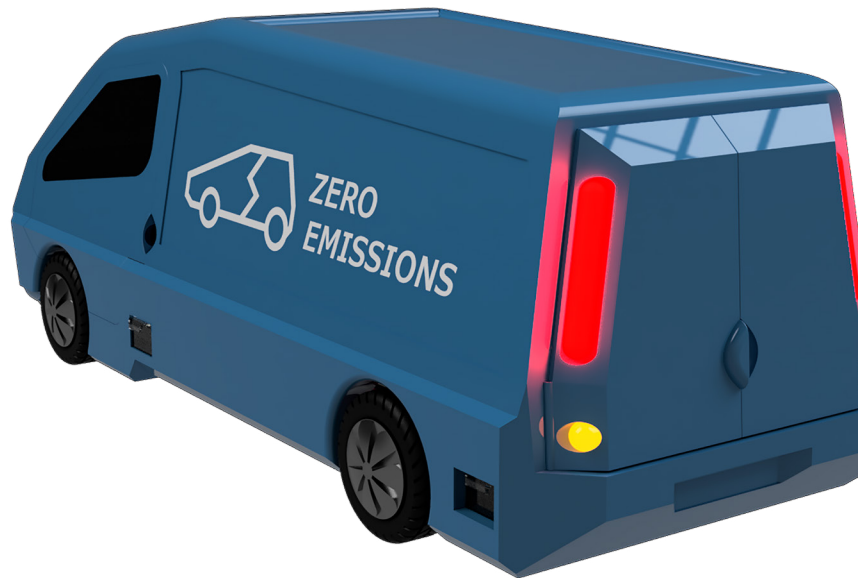
Every year, the *RSA* publish a series of briefs as part of their *Student Design Awards*. These briefs are diverse and cover a range of current world issues, from climate change to human rights. I chose the *RSA* brief 'The Right to Breathe' which posed the question:

**'How might we ensure that everyone living in areas with poor air quality is guaranteed their right to clean air?'**

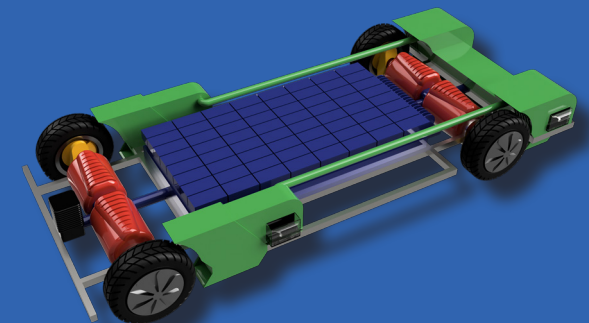
I built up a case study around the idea of reducing non-exhaust emissions from vehicles, such as the harmful PM2.5 particulates that are caused by tyre and brake pad wear. My design solution was a device that would collect these harmful emissions direct from the source (below).

## CARGO VAN CONFIGURATION

Payload: 1500KG  
Combined Power: 160PS  
Combined Torque: 350NM  
Estimated Range: 400KM  
Empty Weight: 2800KG  
Battery Capacity: 80kWh  
Motor Power (Each): 30kW  
RRP (Base Model, GBP): 39,995

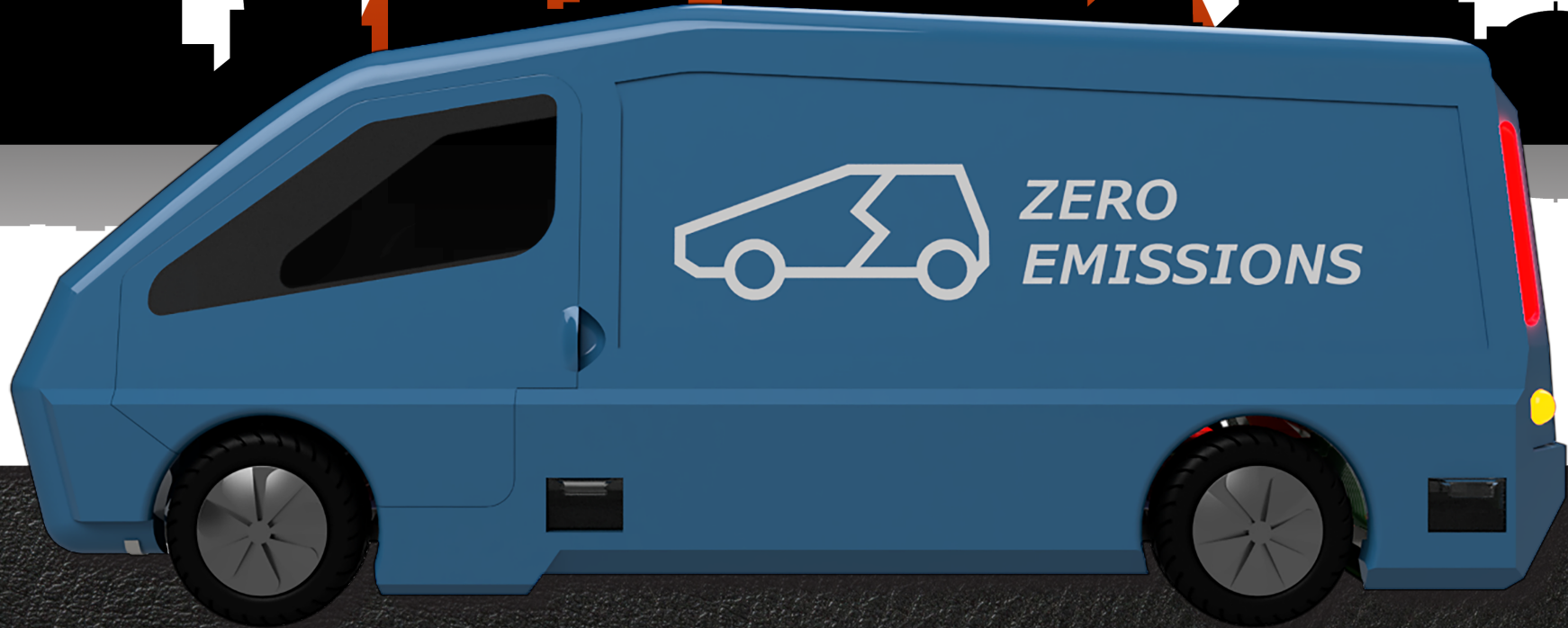


This design evolved into a complete battery-powered light commercial vehicle (van) which would - in theory - reduce all particulate emissions to near zero. I used *Fusion 360* to create the chassis and drivetrain for this vehicle, which can be seen below. It features collection trays behind each wheel which catch non-exhaust emissions before they are emitted into the air.





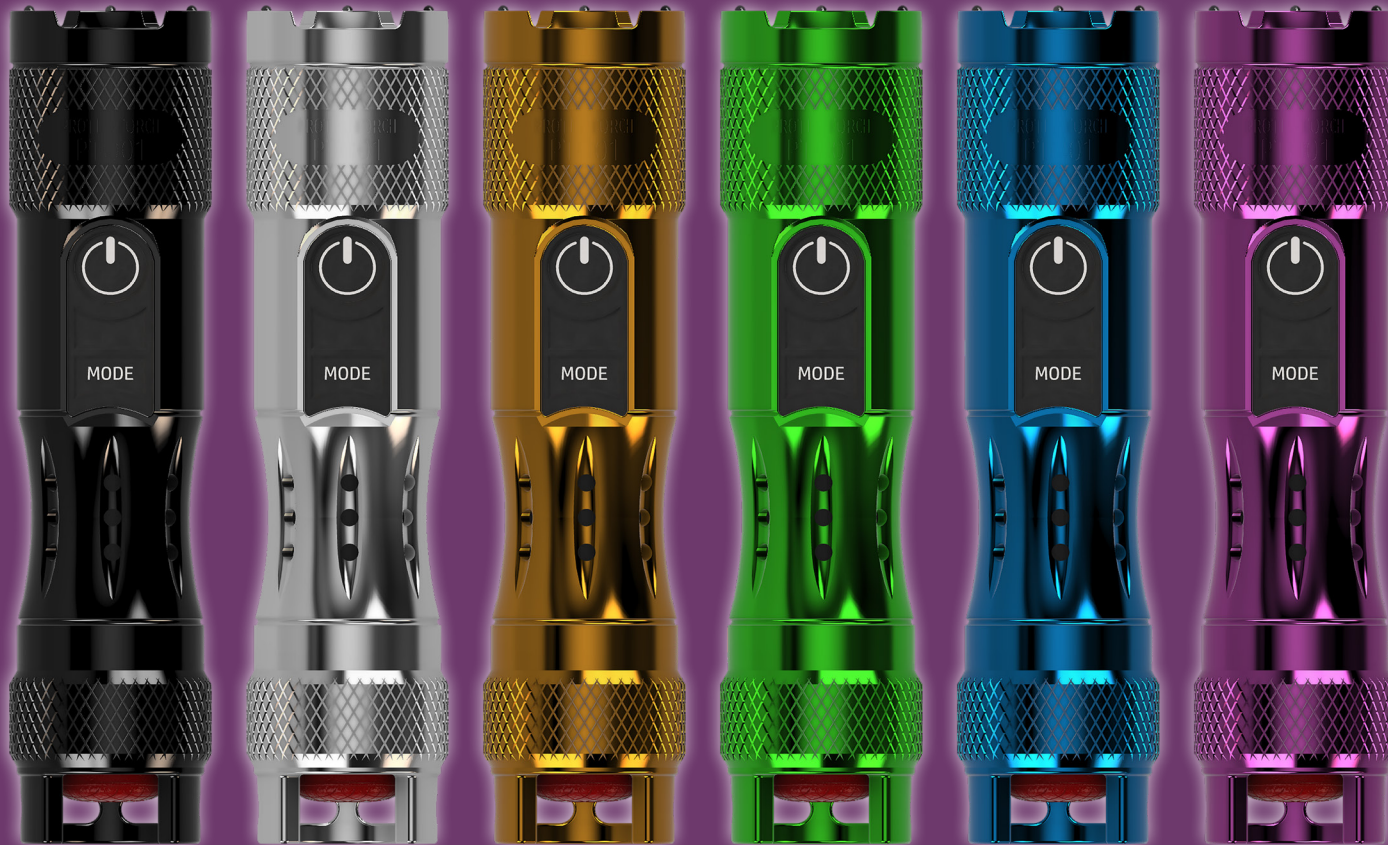
TRUE ZERO EMISSIONS:



A Light Commercial Vehicle for the Modern City



# PROTECTORCH PROJECT



The *Protectorch* is a world-legal personal safety device.

Personal safety in the UK is a controversial topic. As a nation, we do not have the culture of self-defence and personal responsibility for safety that some countries do, and it's illegal to carry any dangerous item for protection. *Protectorch* - as its name implies - is primarily a torch. This means that it is legal to carry just about anywhere, and is in no way intended to be used as a weapon. Instead, the device has a number of clever features to keep the owner safe when out and about. I designed the *Protectorch* as part of my business plan module.



Above: Concept *Protectorch* drawing in pencil and fineline pen

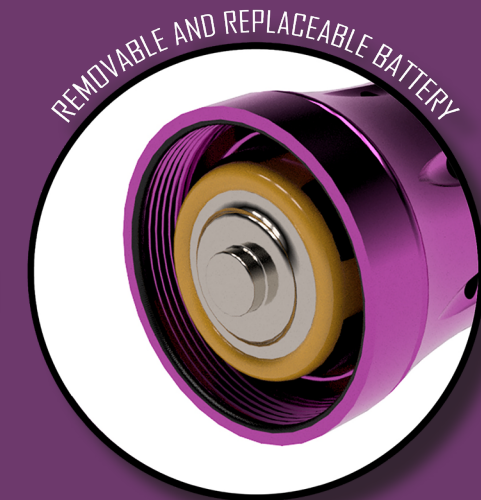
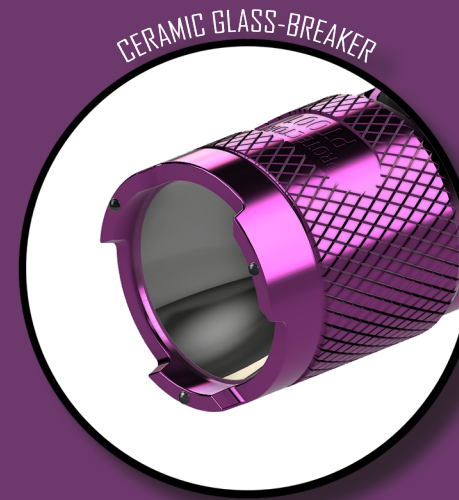
Left: *Fusion 360* renders showing the range of attractive anodised aluminium finishes available



# EMERGENCY PROCEDURE

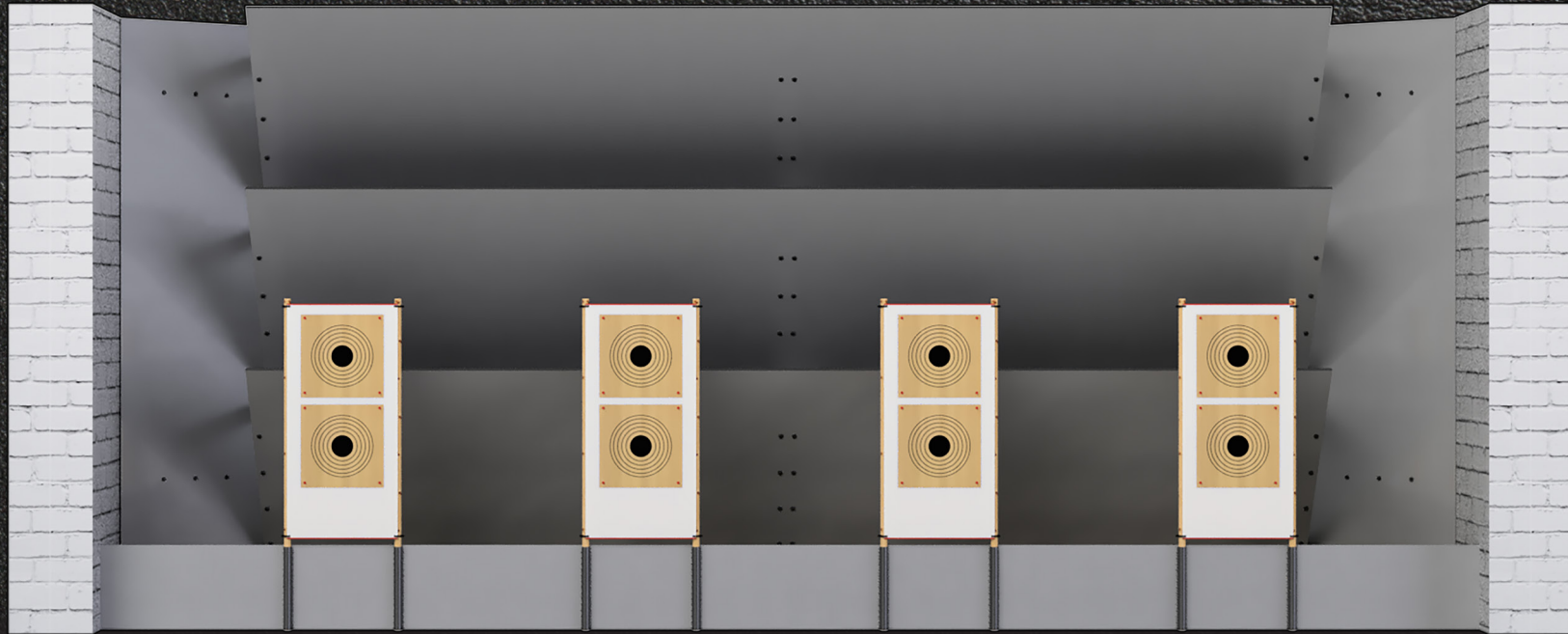
There is no other product on the market with the same combination of features as the *Protectorch*.

The device can be used as a regular torch under normal circumstances, but one press of the alarm button brings a host of other features into immediate action to help keep the user safe in an emergency.



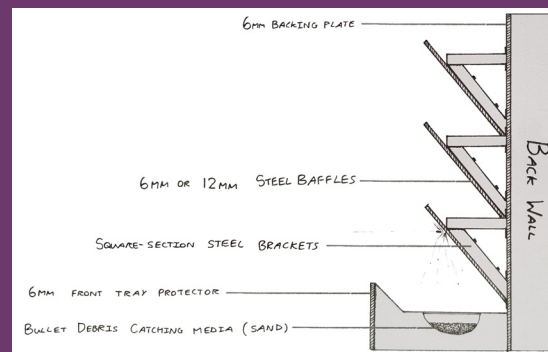


# GUN CLUB PROJECT



During my second year, I was lucky enough to work on a project with a target shooting club. This was exciting since I'm a keen shooter myself, and because the project brief was mostly architectural in nature – this wasn't something I had any experience with, but it was an area of CAD that I was very interested in exploring. It also fit in well with our *ArchiCAD* lectures.

The brief was extensive - the team and I had to design a building extension for the clubhouse (including a new interior with accessible toilet and kitchen area), redesign the range backstop, and work out how to incorporate wheelchair access to the range and fire escape.

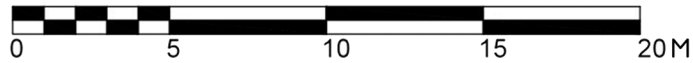
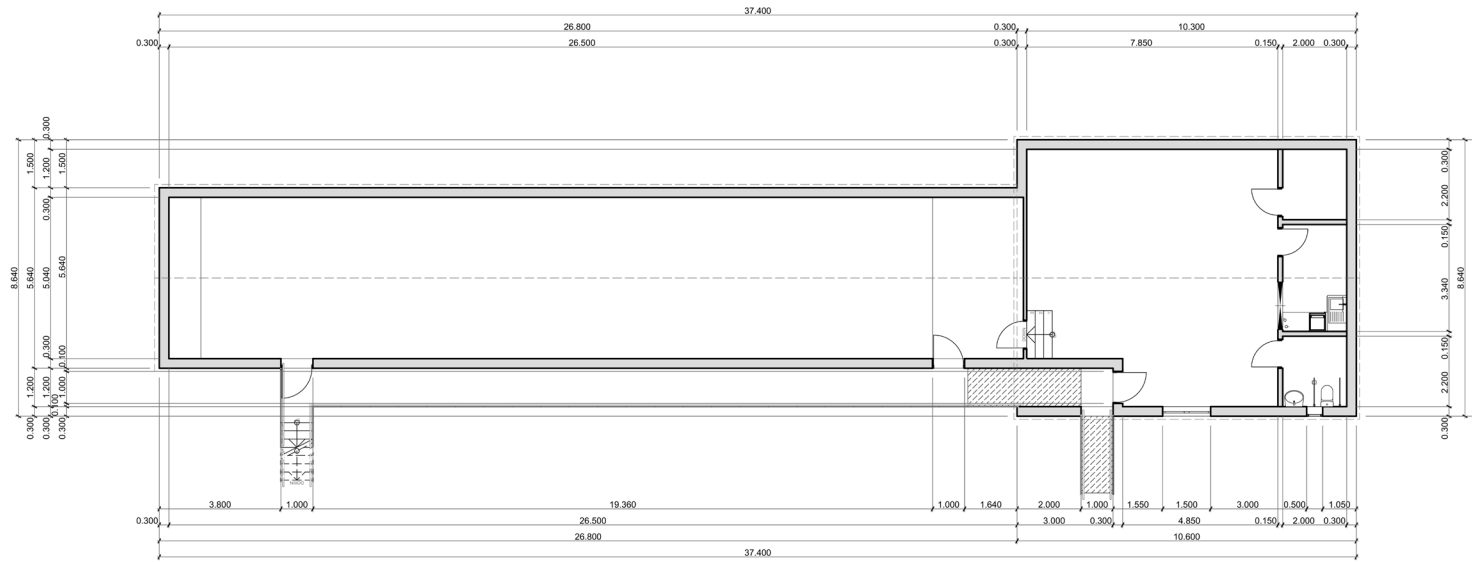


Concept drawing for the redesigned backstop

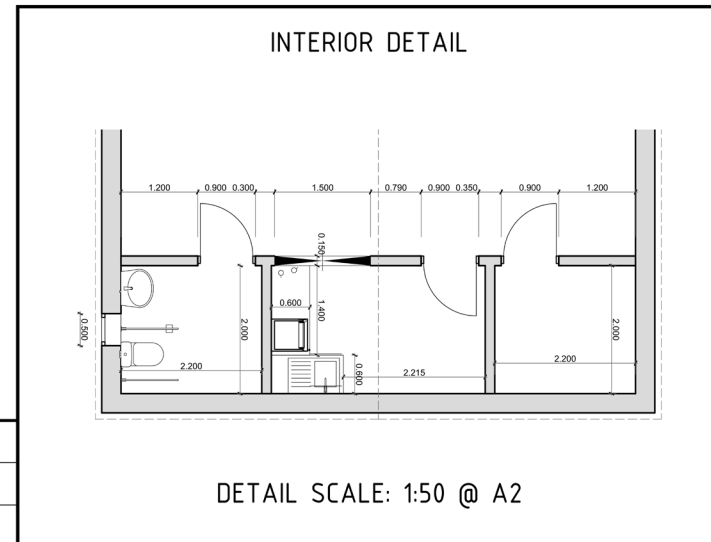
My first task was to redesign the shooting backstop. I researched the construction of various steel bullet-stops and visited another gun club for inspiration. The design I created was composed of three stacks of angled steel baffles. I made 3D models of the design in *Fusion 360* - a final render can be seen above.

The much larger task was designing the building extension. I used *ArchiCAD* to draw up the building in its current state, before experimenting with various clubroom configurations that I showed to the clients for approval. My design was chosen, so I produced a set of architectural plans, one of which can be seen on the right.





SCALE BAR 1:100



TITLE: GUN CLUB PLAN  
 AUTHOR: A.C.PRITCHETT  
 ALEXPRITCHETT@WINCHESTERDIGITAL.CO.UK  
 UNIVERSITY OF WINCHESTER

VIEW: GROUND FLOOR PLAN

DATE: 18/02/2021

CLIENT: CLASSIFIED

UNITS: METRE

SCALE: 1:100 @ A2

EDUCATIONAL USE ONLY

I created a series of architectural plans for the client using *ArchiCAD* and *Photoshop*. The client intended to use these plans to help obtain a grant from *Sports England*.

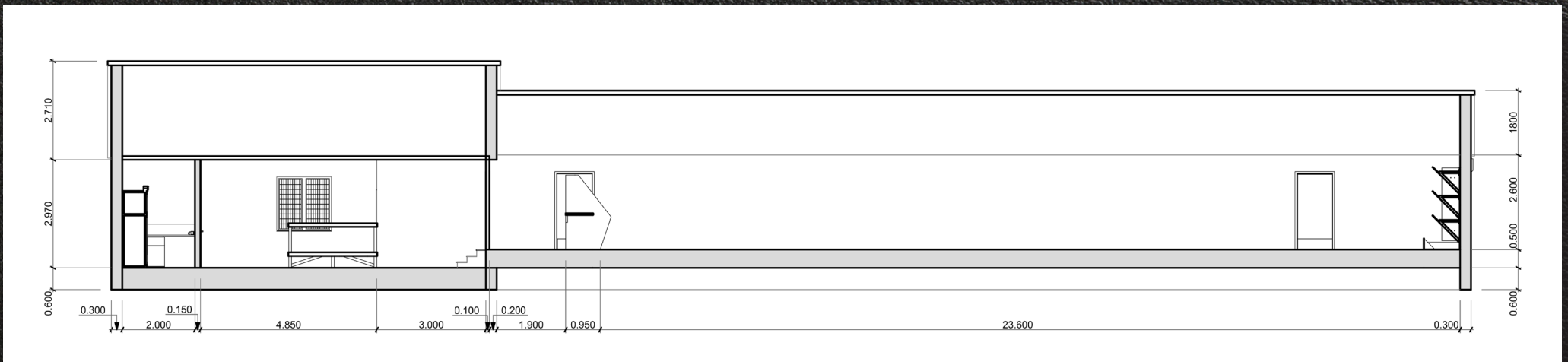




Rendered view of the refreshed clubroom, showing kitchen area and accessible toilet

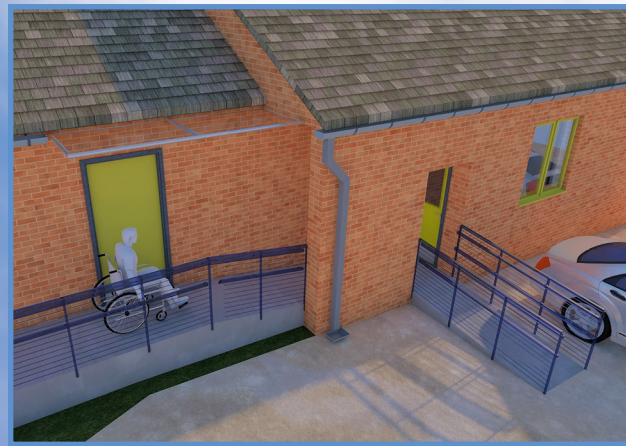
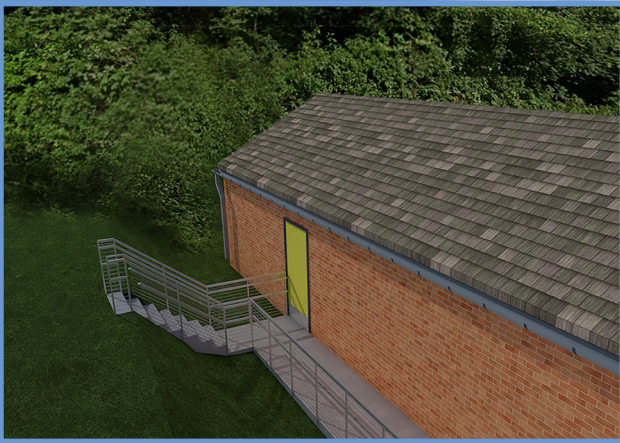


Render of the new clubroom - the range can be seen through the door at the far side of the room



Side elevation in section view. Note the difference in floor height between the clubroom (left side) and shooting range (right side) - this was very challenging to measure and draw accurately.





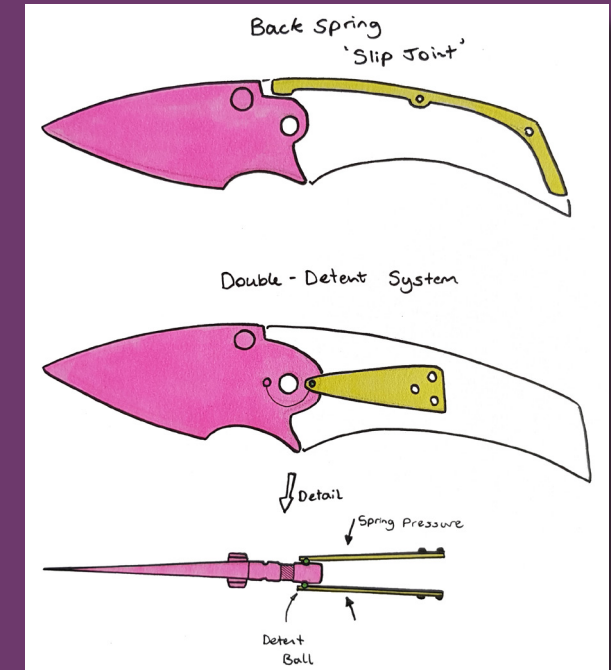
The final part of the project (completed in February 2021) was to design a series of ramps and walkways that would allow wheelchair access to the clubroom, range, and fire escapes while retaining parking spaces outside. The renders above were created using *ArchiCAD*, and were produced so that the client could display their plans to the club members and committee.



# POCKETKNIFE PROJECT



This was my final third-year project, and came about through my own interest in general-purpose pocketknives, which I use and collect. I tasked myself with designing a 'UK friendly' pocketknife, which means it must be a folding, non-locking knife with a cutting edge of 3" or shorter. There are countless UK-friendly knives available from a range of international manufacturers, many of which I already own, but I felt that many of them lacked adequate safety features to help prevent the blade closing during use, the key downside to a non-locking design. The drawing below shows two common non-locking mechanisms.



A 'double-detent' mechanism was chosen since it allows for a smooth and 'fidget friendly' action while remaining non-locking. The model was built in *Fusion 360*, and features 20 accurately-modelled components.

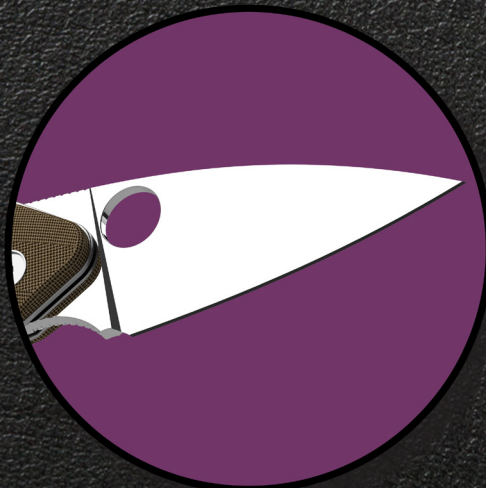
Left: Concept drawings of various knife designs. Note the rounded 'choil' cut on the blades which form part of the grip area. This prevents the blade from closing when in use, and was included in the final design.



The renders below show two of the many possible material and finish combinations. The top knife has natural canvas micarta scales, and a sleek satin finish to the blade and hardware. The bottom knife has stealthy DLC (diamond-like coating) treated blade and hardware, combined with purple grippy G10 scales.



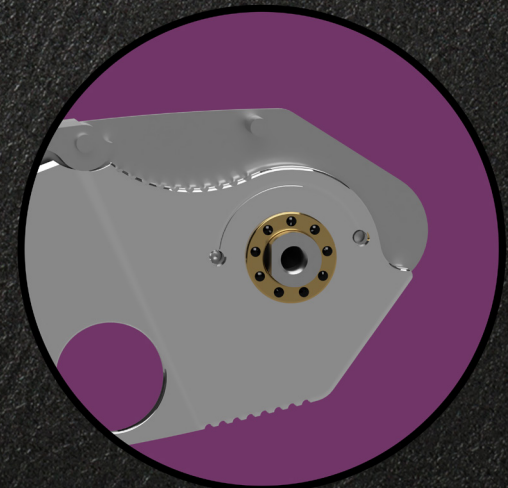
Bottle Opener, Lanyard Hole  
& Deep-Carry Pocket Clip



*Bohler M390*  
Stainless Steel



Slim carry profile

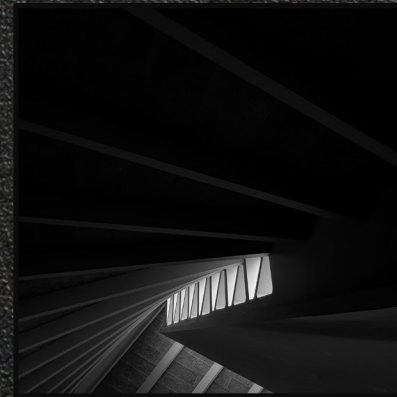
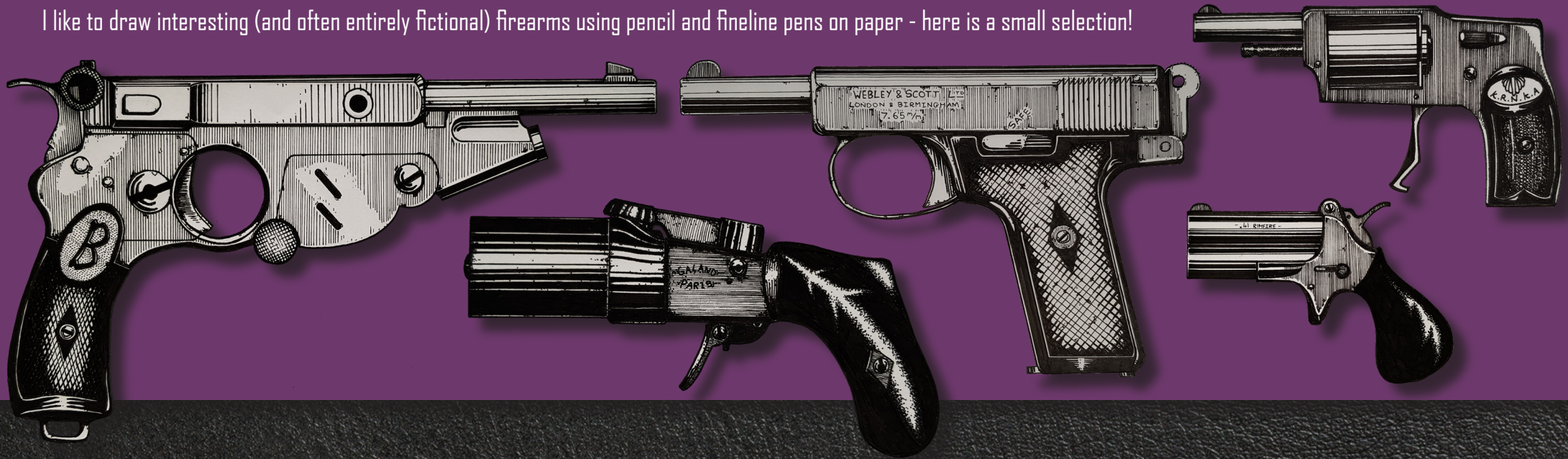


Caged Ceramic Ball-Bearing  
Pivot Assembly



# OTHER INTERESTS

I like to draw interesting (and often entirely fictional) firearms using pencil and fineline pens on paper - here is a small selection!



I also enjoy taking photos of buildings when I'm out and about - I especially love sharp angles standing boldly against the sky



THANKS FOR READING!



ALEX PRITCHETT 2022