

This document includes sample answers to some of the questions on the UKESF Scholarship Application. Advice from our current scholars about picking companies and completing the application form is also included towards the end of the document.

Degree

Tell us what aspects of your degree course you have enjoyed most and/or are looking forward to the most. Explain the reasons why and highlight modules of particular interest to you. (150 words max)

"I am enjoying my 'Control and Communications' module. In the control section we have been learning about Laplace Transforms, and I am looking forward to when we get to the stage of applying this theory to actual applications. Through the robotics society RoboSoc, I am part of a group creating a 3D printer. Hopefully I will be able to apply what I learn in this module to ensuring that the printer works correctly.

This year's 'Digital Systems and Signal Processing' module has also been enjoyable, as it builds upon the System Verilog content I covered last year and ties in with the team project I am doing in my EEE Design module.

I am eagerly anticipating my year in industry, which will allow me to make a greater contribution to a project and really grasp what it is like to work full time as an engineer in the Electronics industry."

*

"As someone who has a passion for railways I have thoroughly enjoyed the insight and technical knowledge that my Railway units have provided during this degree. I am particularly enjoying my railway traction unit this year in which we learn about the different types of traction systems in operation around the UK and the world. We are currently studying the methods of power transmission and supply within the rail network, including the conversion between AC and DC to provide more efficient power transfer and switching systems that ensure the safety and efficiency of the network.

I particularly enjoy group project work and am looking forward to this year's Embedded Systems and Railway projects as I feel such group work allows me to practice my core engineering skills and soft people skills, both of which I enjoy expanding on and improving with each situation I encounter."

*

"From the first year of my degree course I thoroughly enjoyed the Digital Systems and Microprocessors module, especially learning about the fundamentals of electronic devices – how the circuits and logic gates make up the all-important microprocessors in our everyday devices. Solid State Devices is another module that I enjoyed due to its focus on stimulating areas of chemistry and quantum physics to understand the design and operation of PNP/NPN transistors, solar cells and MOSFETS.

In my second year I am particularly looking forward to building on previous SystemVerilog knowledge in the Digital Systems and Signal Processing module, and how it can be used to synthesise a simple microprocessor core on an FPGA. I find both FPGAs and microprocessors intriguing, so being able to understand them further is very exciting. Microchip design is another aspect of the course that I am looking forward to studying in later years."

Placement objectives

Tell us what you hope to gain through a work placement with this company. What areas of technology/business are you interested in working in? Highlight particular skills/knowledge you would like to develop. (300 words max)

"Whilst a university course allows you to gain a wealth of knowledge it is only useful if it's put into practice. A placement at STFC will give me a great opportunity to use my skills and technical knowledge in real-world projects that make a difference. Development of systems using CPLDs and FPGAs is an area that I am particularly interested in as it combines my enjoyment of programming and digital circuits.

Specifically, I would like to build on the programming experience that I gained this summer whilst working for Embersoft Consultancy as well as furthering my knowledge of digital system design. I believe STFC would allow me to flourish in these areas.

Apart from technical knowledge, I would benefit from being given the chance to further experience being in a work environment and having increased responsibilities."

*

"I primarily expect to gain technical experience in this placement. In addition to this, I would also like to gain some more experience of working in a team at work to prepare myself for a graduate role. Having seen that AVL Powertrain engineering offered a place on the UKESF program, I was instantly excited, as I have always had a special interest in the automotive industry. I have planned to work as part of the automotive industry since secondary school and am very intrigued by the technology in hybrid and electronic-powered cars in particular, as it is very evident that the automotive industry will have to move away from conventional diesel and petrol engines eventually. This interest was heightened as the benefits of such new technologies became abundantly clear in cars made by Tesla, as well as the latest generation of F1 cars. I would enjoy developing my understanding of the underlying technology and hope to acquire new skills that will set me up for a future career in the automotive industry. During my Summer Research Project, I completed some simulation work using Ansys Icepak and have found it to be very satisfying, so I hope to potentially be able to expand on my knowledge in this area. A placement in an industrial engineering team would be the ideal place to further develop team working skills and provides a great opportunity to actually understand the day to day activities of an engineer working in a project team."

*

"A summer placement at Thales UK would be an exceptional opportunity to apply my technical knowledge and skills to real life projects relating to defence, security and aerospace. Having served in the RAF Combined Cadet Force for several years reaching the rank of Corporal, I had the opportunity to visit RAF bases such as RAF Brize Norton and RAF Northolt. This fostered my interest in the aerospace and defence sector. As a non-commissioned officer, I delivered presentations and taught lessons to new recruits about airmanship, aerodynamics and engines. This allowed me to truly engage with the topic as well as improve my communication skills.

I visited the Airbus aircraft manufacturing facility and discussed technical challenges with flight engineers and staff. During this visit I saw the different building stages of the A400M Atlas as well as witnessed several of the flight systems tests and inspections. Conducting tests and analysis on systems

is an area which I would be very interested in working in as it would give a deeper understanding into the component level or sub-system operation of a larger system.

In the summer I attended the Farnborough International Air show 2016 where I met industry experts and discussed technical aspects of aircraft. A guided tour inside the A380 gave me a valuable insight into the vast number of flight systems there are which each play specific roles whilst working in sync to contribute to the operation of the aircraft. A jet aircraft such as the F-35 incorporates various electronic measures for communications, situational awareness and targeting for example an active electronically scanned array is used to transmit data whilst retaining stealth. This is an area of electronics which interests me and I would be keen to work on."

Project Experience

Tell us about an engineering, technical or scientific project you have worked on in school, university or your own time. Describe the reason for the project (i.e. what were you trying to make, investigate or solve). Summarise what it involved. Give an overview of the work you did highlighting any practical/lab work. If you have not been involved in a project, then tell us about a practical lab in school or university that you found particularly interesting. (200 words max)

"At university I was involved in a project to use an embedded system to create an all-in-one gamepad programmed with a game of our creation. Initially I had to design the circuit board with prerequisite components such as a Nokia 5110 screen. We used a PCB CAD software called Eagle, the boards were then manufactured and returned to us for final component assembly.

The main bulk of the project was to design, code, test and debug a program we created, while working within the limitations of the microcontroller given to us. This involved the creation and implementation of several libraries. One limitation of the board we were given was low memory, this meant that my program had to be as efficient as possible. It became a significant issue when it came to programming sprites for the game, as they were being rendered onto the screen. In order to overcome this several techniques were implemented, the easier of which was shifting the storage of the matrix that made up the sprite from the RAM to the flash memory, but also utilising programming techniques such as interrupts in order to minimise the amount of calculations being done within a single clock cycle."

*

"I am part of a team completing a chip design project. The work consists of designing the schematic and layout of a chip containing four circuits, ensuring that our design meets the given specification. It involves us applying our knowledge of digital systems and learning how to use specialist schematic capture and layout software. I am finding it very rewarding to see a circuit through from initial sketches, truth tables and state charts, through to a circuit schematic and eventually a physical gate layout. I am also making use of my System Verilog knowledge by creating test benches and using them to simulate Verilog versions of the circuit schematics.

We delegated tasks evenly amongst the team members. My role includes designing the schematic and layouts of the main section of the stopwatch circuit and a small sub circuit that turns the asynchronous

input from the user into a synchronous input. I am also in charge of taking the completed circuit layouts from the other team members and assembling them on a single chip.

I am looking forward to receiving our fabricated chip next semester and running tests on it, as well as our 'Smart Meter' team project next semester."

*

"At college I designed and constructed a fully functioning guitar amplifier, with volume control, distortion and a bipolar power supply for the amplifier. Most of my time was spent designing the amplifier stages in SPICE software, but I also created technical drawings and 3D renderings of the amplifier case.

I decided to use operational amplifiers, which required a bipolar supply, so I incorporated the design of this into my project. I wrote a specification for this power supply, designed it, simulated it to ensure it worked, then constructed a prototype on a breadboard.

The process for the amplifier was similar. I separated it into stages, specified and designed each stage, formalised those ideas in simulation software, then proceeded to build this on a breadboard.

Many problems were encountered during the course of the project, which meant I had to decide whether to drop that stage of the amplifier or try to develop a workaround, and given the project timescale it was often a difficult decision.

At the end of the project I was required to write a technical report and give a presentation to convey the project to my peers and tutor. Both of these were well received."

Personal Achievements

Describe a) your greatest achievement to date, b) a particular problem or challenge that you had to overcome in making that achievement and c) the approach you took in solving the problem/challenge. This does not have to relate to a technical challenge but could relate to some other aspect of your life. (150 words max)

"One of my greatest achievements was organising a fundraising event for a small charity with friends during sixth form. It began as a passing thought – we planned to invite a 'local celebrity' to dinner, and sell tickets to students, sixth form students, tutors and parents. The idea expanded to a 'lunch-time food sale' and 'sporting activities'.

Problems I faced included items not arriving, which had knock on effects. Although the team morale did fall, I calmly thought of alternatives that would enable us to generate more funds and boost team morale. After speaking with some members of staff, I arranged for a 'non-uniform' day at the school. All in all, we managed to raise close to £7000! This was major achievement especially considering we were only hopeful of £1000!"

*

"My greatest life achievement to date is attaining five A-levels at sixth form, despite coming from a single-parent low-income family. I obtained a full bursary, aged eleven, to gain admission into the Manchester Grammar School, which I am also particularly proud of.

The sixth form only allowed pupils to take four A-levels for my year but a small group of four pupils, me included, convinced the high master to allow us to study five. I chose to study five subjects as I felt passionate about each of the five subjects so did not want to have to drop any of them. Studying for five A-levels during sixth form meant that I had to organise my time very well in order to keep up with the work for each subject and I feel like I did this well, whilst also keeping time for other activities academically and non-academically related."

*

"My greatest achievement has been the completion of my summer internship, and solving the practicalities that come with it. I had to relocate and, never having lived independently outside of university, this was a significant challenge. The process of researching accommodation and train links to and from my workplace without the support of others was very valuable

Once I arrived, I had to quickly adjust to a new city and get into new routines. Despite the hour-long commute to and from work, I was able to maintain a good work-life balance by planning out my tasks ahead of time. This meant I had time to explore the city and attend various events.

Overall, it was a really enjoyable summer where I developed my technical skills, had the chance to live in a new city, and gained a valuable addition to my CV."

Teamwork

Describe an occasion when you worked as part of a team, your role and the positive contributions that you made. (150 words max)

"I was the team leader during my silver Duke of Edinburgh as voted by my previous team from my bronze award. My role as team leader was to co-ordinate the team. Before the expedition this involved delegating different tasks such as the route card, calculating distances and transposing the route onto maps to members of the team to be completed during lunchtime workshops and our own time. Once on the expedition this role required me to take a democratic and reasonable stand during conflicts and disagreements within the group. I reduced the frictions within the group by promoting compromises between those who were less willing to do so and encouraging everyone in the group to voice their opinion and take a democratic approach. As a result of effective navigation, well-managed breaks and a generally motivated team we completed our expedition and arrived to all of our checkpoints on time.

*

"I participated in Engineering You're Hired (EYH), a multidisciplinary exercise at university as part of a team looking at using electric motors in aeroplanes. I saw how engineers from various disciplines approach problems and I improved my team working, adaptability and communication skills.

Each member of the team took on the role as team manager one day of the week and prepared a short daily presentation, outlining the work completed and discussing the feasibility of the ideas shown. In a final presentation the concept was presented to a panel of experts and the other groups. I was responsible for coming up with energy storage ideas and running feasibility calculations regarding the amount of energy that could reasonably be provided to the plane for a variety of concepts, and was part of a sub-team coming up with possible plans should the motor fail, which could lead to catastrophic consequences.”

*

"I assembled and led a team that took part in Motorola Diversity 2013 robotics competition, which had to contain at least 50% girls. I encouraged my friends to take part and introduced them to the field of robotics. It took enthusiasm and resilience to get everyone involved.

We managed to qualify for the finals, which meant we assembled the robot and modified it according to our idea. Logistics turned out to be quite tricky, and we had to spend considerable amount of time trying to reach a consensus.

The finals took place in a different city so we had to travel and stay at the hostel with the other teams. As usual, some problems appeared at the end; they had to be fixed overnight. Our team managed to advance to the quarterfinals to lose to eventual champions. Everyone enjoyed the experience and all of the members now pursue engineering-related degrees.

Additional Information

Please add any other information here that you feel is relevant to your application. (100 words max)

“I have been asked to be a leader on the International Astronomical Youth Camp so unfortunately I will be away for approximately 25 days in late July/August (precise dates TBA yet).”

*

"In 2008 I moved to Toulouse (France) due to a family relocation. I attended French secondary school and was immersed into the French culture. I became fluent in French before returning to the UK in 2011 to complete my GCSE's and A-Levels whilst keeping up my level of French.

I return frequently to France in the holidays where I do voluntary work as a teaching assistant in a French school. This experience has developed my ability to adapt to new environments as well as improved my interpersonal skills."

*

“As a student member of the IEEE, I participated in this year's IEEEExtreme event. It is a 24-hour programming competition where teams across the world code solutions to a series of problems. The competition consisted of new problems being released throughout the 24 hours; we took it in turns to rest so that there was at least one person at all times solving the questions. Despite it being very challenging, it was a great opportunity for us to refresh and develop our knowledge of C/C++, and the decision process that takes place when solving a programming problem.”

Advice from UKESF Scholars

What advice would you give to students picking which UKESF Scholarship sponsoring companies to apply to?

- Look into all the companies relevant to you, even if you haven't heard of them before – the largest and most well-known companies tend to receive the most applications, lessening your chances of being awarded scholarship with them.
- Create a spreadsheet with the pros and cons of each company you're interested in to help you decide where to apply.
- Find out what the companies you're interested in actually do, and remember it sometimes varies between offices.
- A larger company may be able to offer a broader range of training, but you will potentially be given greater responsibility and more flexibility at a smaller company – what's more important to you?
- Don't limit yourself geographically – you should be able to find a place to stay for the duration of your placement.
- If you have a particular area of interest, email the UKESF to find out which companies might be able to offer you relevant experience.

What advice would you give to students completing the scholarship application form?

- Try to tailor your application with personal experiences or interests relevant to each company.
- Consider what excites you about your subject area and communicate this enthusiasm – employers will appreciate this as much as experience.
- Go beyond just listing your skills and achievements – explain how you developed that skill, or how you applied it to solve a problem.
- Be specific about the aspects of your degree you've particularly enjoyed and any technical experience – this will make it easier to get a company's interest, especially if it's in an area relevant to them.
- Don't just think about your current skills; think about the skills you wish you had – this is your chance to develop into the engineer you want to be.
- Demonstrate a willingness to contribute and work in a team.
- Emphasise your interest in Electronics and show how you have gone out of your way to work on a particular personal project or hobby.
- Highlight your non-academic experiences as well to show you're a well-rounded candidate, i.e. volunteering, societies, hobbies, travel.
- Include personal stories and experiences to make yourself stand out as an individual.
- Demonstrate a willingness to learn, as most companies will provide training.
- Make sure you answer the actual question and don't get too side-tracked – conveying the correct information is important.
- Save your application/s as a draft and go back to it after a few days with a fresh perspective – proofread it and see how it could be improved (or get someone else to read it for you).