UK Electronic Skills Foundation

Application for

Scholar of the Year Award 2013

Scholar name:
Ashley J. Robinson

Contact email:
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Sponsoring Company:
Cambridge Silicon Radio (CSR)

University of registration:
University of Southampton

Degree title:
MEng Electronic Engineering with Artificial Intelligence

Submission date
October 9, 2013

1 Introduction

My name is Ashley, an electronic engineering student studying at the University of Southampton. I have been on course to be a practicing engineer from a very young age. At primary school I took an interest in mechanical and civil engineering when we studied great engineers like Robert Stephenson and Isambard Kingdom Brunel but it wasn't until my early teens, when studying for my GCSEs, that I found electronics. Ever since then I have devoted all my working effort towards honing skills and undertaking projects in the field of electronics. Gathering components and tools to continue my work outside of the classroom became my mission. Finally obtaining my own computer, a library of components and some programming knowledge allowed me to begin working with more complex systems where my interest peaked even more. Today I still find it just as exciting working in the lab only now the kit is faster and much more expensive.

I believe I should be considered for the award because my personal contributions to the sponsoring company and to young people possibly entering the field of electronics is exceptional. Working at CSR now for two summers I have managed to produce some valuable results for which team members are grateful (sections 3.1 and 3.2). Leaving a lasting legacy in the form of wiki pages and documentation has allowed my work to be carried on as I continue in my academic career. To inspire younger people to pursue electronics I have organised lectures aimed at sixth form students. Where I have also participated in their studies and distributed electronics hardware from Southampton University. I also promote the discipline less formally to younger friends and family with intentions of moving on to higher eduction. Always attempting to make myself available to assist with studies or impart any advice.

I am proud to be a UKESF scholar through which I was connected to CSR. I have enjoyed both summer placements and also the workshop event organised in 2012 where we worked on skills not addressed by university. This really emphasises how the scholarship has not only been about connecting with industry but also with other like minded engineers.

2 Supporting information

2.1 Contribution to sponsoring company

I started at CSR in the summer of 2012 and was invited back for a second summer this year. Attached to the digital design team for both summers I managed to leave my mark on their Near Field Communication (NFC) subsystem. For the first summer I ran time based power simulations to generate reports on the efficiency of the NFC design. This was using PrimeTime PX, a power analysis tool from Synopsys and relatively new to the company at the time, I then spent some time documenting my experience of the software to assist other users. The rest of time I spent getting my head around how the company worked; understanding the importance of different tools, their place in ASIC design flow and how people work together efficiently in the industry. Also a crash course in UNIX which has proved most valuable in all my other areas of study. When the second summer arrived I found the job much easier to settle in to as obviously I'd been there before and therefore found myself very busy...

2.1.1 LCD controller

Straight away I was given a task to parametrise a testbench concerned with the driving of LCD glass. An interesting assignment which required competence with mixed signal design to complete. This

project was completed while working with another scholar. I found it easy to work with another engineer at a similar level to me and we managed to complete the task efficiently.

2.1.2 Serial to parallel FPGA design

The requirement was for an interface to test parallel I/O functionality but aimed at the firmware team who use USB to SPI converters to interface with chips. Naturally this called for a block which converts serial traffic to parallel outputs and visa versa. This was manifested as a SPI driven state machine. Frames are sent as pairs of data and address which allows a large parallel interface to be controlled. Controls frames were also used to select read or write operations but the intention was for burst operations to minimise access time. An interesting project which was eventually set for deployment on a Xilinx Spartan-3 FPGA.

2.1.3 NFC verification

This project was assigned to me because of my experience with NFC from my last placement. Turning out to be a big project which consumed around 70% of my time. Emulating the subsystem with a necessary host and analogue front end deployed at PCB level allowed the functionality of the design to be viewed in much the same way as it would on completion. My task was to then write test scripts to run on a leading smart card testing unit. Throughout the course of the project I was able to uncover bugs in the NFC tag state machine. These were corrected and the process iterated until unfortunately the placement came to an end. However before this I managed to setup a testing framework and give a formal presentation on the functionality of the tester to collogues with the intention of carrying on my work.

2.2 Contribution to encouraging younger people to consider science, technology or engineering for further study and careers

On the 5^{th} of February 2013 I organised several lectures at my previous sixth form college. Alton College is in the same county as Southampton University and many students choose it to further their education. During my time at sixth form I studied electronics and the students now studying this subject were the target audience for these lectures. Two AS classes and one A2 class were running on this day which managed to cover all 42 students studying electronics at the college. The lectures took the form of an initial 10-15 minute presentation about my experience studying towards an electronics degree and my previous summer working in industry. Then I participated in their practical work offering my assistance where possible. Throughout the day I remained in the electronics lab running informal question and answer sessions regarding my presentation or any other question they may have about electronics.

During this time I was heavily involved with my 3^{rd} year project and would meet with my supervisor on a weekly basis. We would spend a lot of the time discussing whatever projects he was currently working on. One such project was a circuit board aimed at distribution to potential students who have visited the university for an interview. The *Chaotic Oscillator*, pictured in figure 1, is an experiment any A-level student should be able to carry out at home with limited tools. The board and all necessary components are provided to the student with directions to online build instructions (Gunn, 2012). Only a soldering iron and solder is required to complete the build. Testing can be done audibly using an in system speaker or because the produced waveform is of low frequency it is possible to use

a sound card oscilloscope connected to the board via a 3.5mm headphone jack (Zeitnitz, 2012). The silkscreen also contains information on the circuit behaviour along with the URL to the University of Southampton's Electronics and Computer Science department undergraduate admissions website. I think this is a great advert for electronics as students will most likely enjoy the build and then find information on an electronics degree starring them in the face! Five of these were handed out at my lectures (the most I could get my hands on) and all the students seemed intrigued by the board.

(a) Populated top

(b) Informative silkscreen on bottom

FIGURE 1: Chaotic oscillator (Gunn, 2012)

3 Details of sponsoring endorsements

3.1 Endorsement I

Name:	Farhsid Nowshadi
Affiliation:	CSR
Position:	Principle Engineer
Email:	Farshid.Nowshadi@csr.com
Comments:	Fash was my mentor for both placements at CSR. He helped me a great deal throughout, imparting not only technical knowledge but also putting aside his own commitments to organise presentations, tutorials and meetings. This is a quote he gave about my work

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We were very pleased when Ashley decided to return to CSR in the summer of 2013.
During his time at CSR Ashley worked on several projects centred on our NFC
development. Ashley not only completed his tasks on time but added his own creative
enhancements and improvement to the original requirements.  As a consequence he has
made a real contribution to our project. Ashley has a keen mind and a dedication to
tackle problems head-on and a relentless determination to resolve issues as they
arise. He remains an affable, enthusiastic and motivated engineer.
We appreciate his contribution.
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3.2 Endorsement II

Name:	Paul Hoayun
Affiliation:	CSR
Position:	Principle Engineer
Email:	Paul.Hoayun@csr.com
Comments:	I worked with Paul for the beginning of my most recent placement. This is a quote he gave about my work.

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When Ashley joined the digital group this summer, the most striking aspect was
how quickly he got up to speed with all aspects of the assigned task, such that
he was able to contribute almost from the very first day. Although he had no
previous experience with LCD controller design and verification, he quickly
understood the principles and requirements, and hence was able to produce a range
of verification test benches with minimal supervision. I would have no hesitation
in recommending Ashley for Scholar of the year
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3.3 Endorsement III

Name:	David Davenport
Affiliation:	Alton College
Position:	Electronics co-ordinator
Email:	Dave.Davenport@altoncollege.ac.uk
Comments:	Dave was my tutor and physics teacher when I studied at Alton college. This is a thank you email he sent to me after my visit.

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Ashley

Thank for your splendid presentation, demonstrations, gifts and general support
and interaction with our students yesterday.  You have fired their interest in
studying electronics (and engineering) beyond these walls and thereby motivating
them to work hard at their A level studies too!

Your evident enthusiasm for Southampton, the University and the Electronics Faculty
that you are working in has certainly inspired several of them to seriously
consider Southampton applications in the coming months!

Once again many thanks for your time and energy spent on this excellent days work!

Best of luck with all your exams and plans!
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3.4 Endorsement IV

Name:	John Stratford
Affiliation:	Alton College
Position:	Director of Learning
Email:	john.stratford@altoncollege.ac.uk
Comments:	This is a thank you email John sent to me after my visit

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Ashley

Can I also take the opportunity to thank you for your recent  visit to the College
and the work you did with our students to stimulate their interest in Electronics
and for that matter in Southampton University! It was much appreciated by all
concerned. Unfortunately, I was out of College on Tuesday and was therefore unable
to pop along to see what was going on.

Thanks again.
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4 Supporting evidence

4.1 Alton college lecture slides

The slide show is also held in the archive *AltonCollegeSlides.pdf*

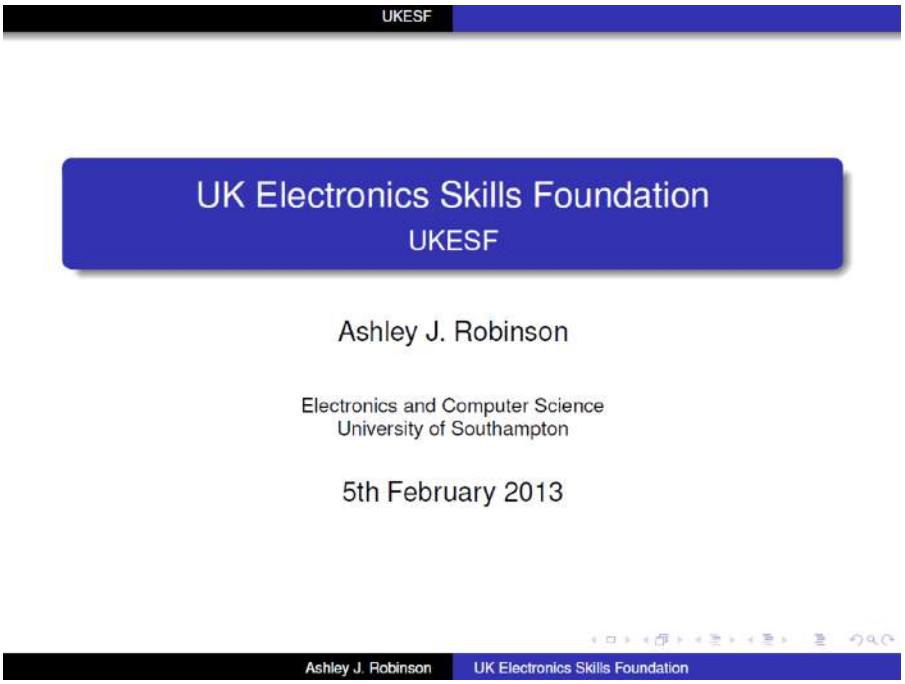


FIGURE 2: Slide 1

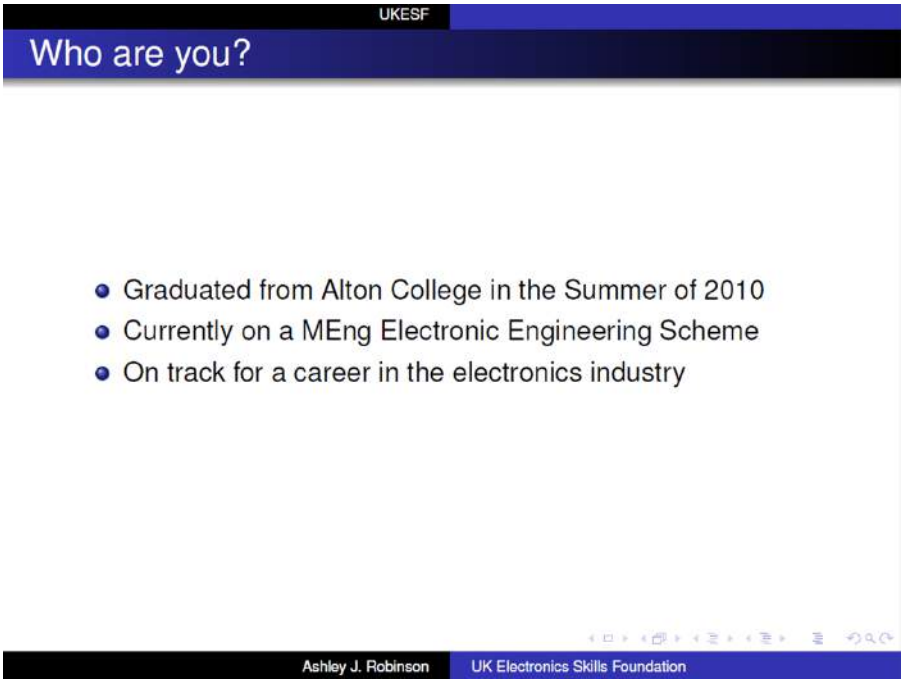
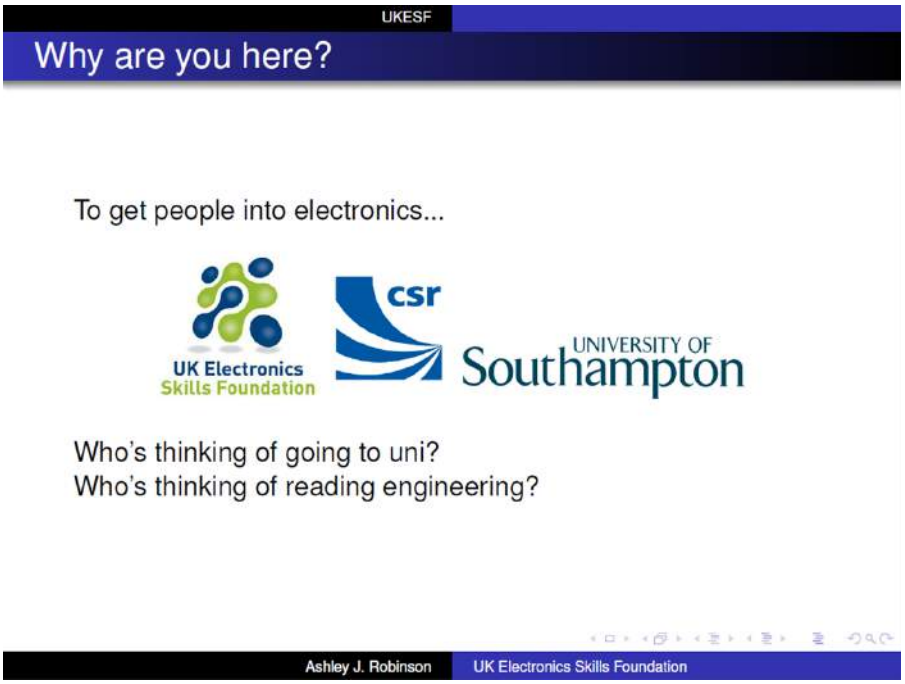


FIGURE 3: Slide 2



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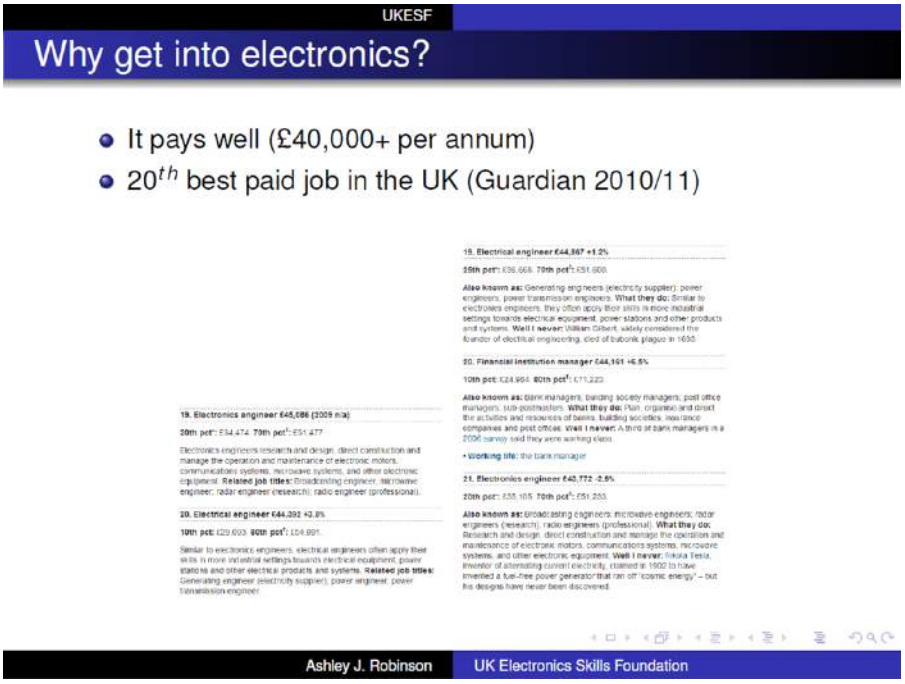

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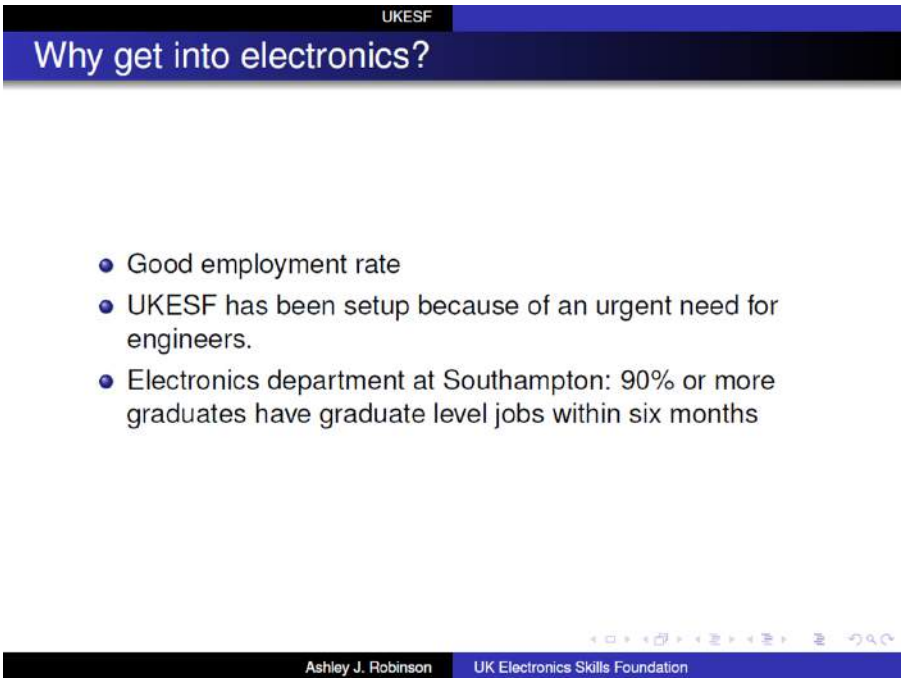
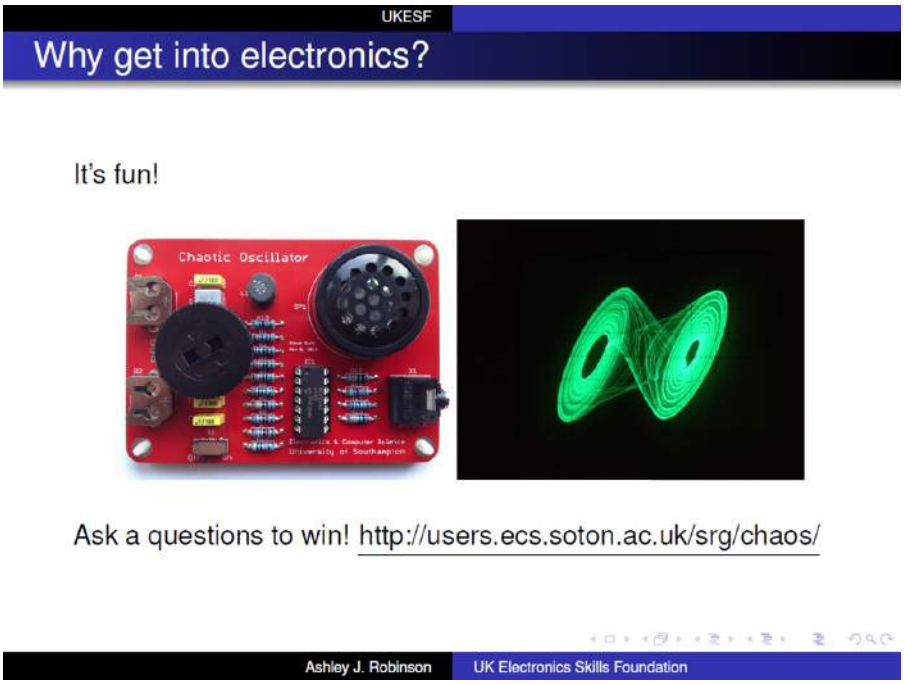


FIGURE 6: Slide 5

FIGURE 7: Slide 6



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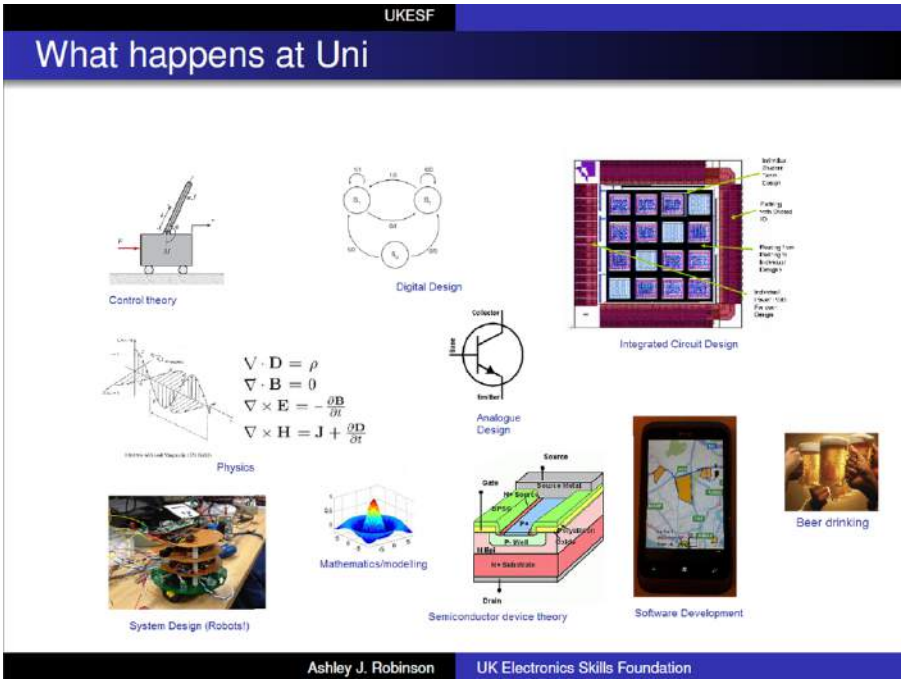

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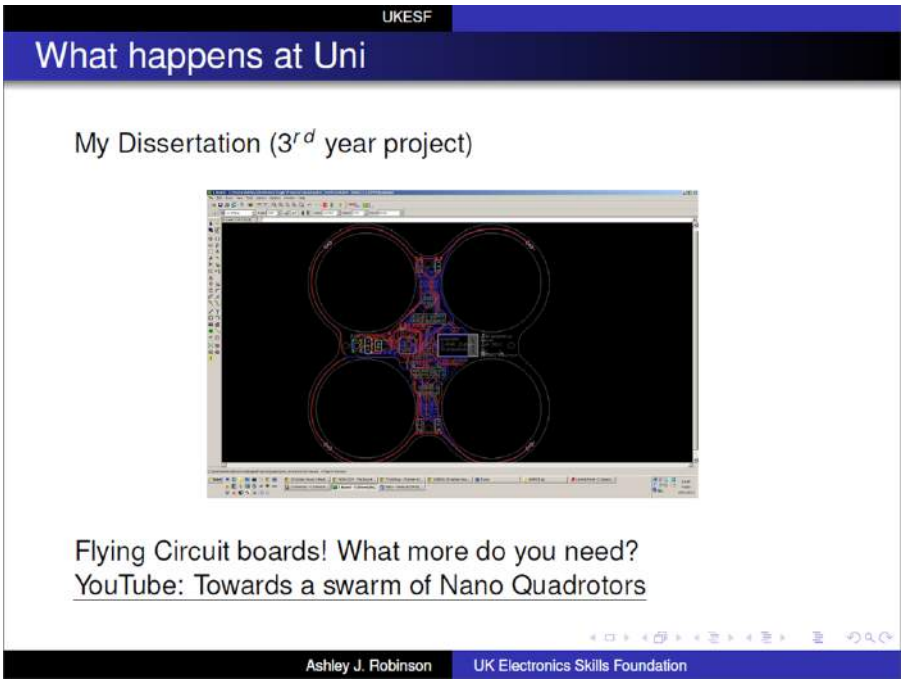

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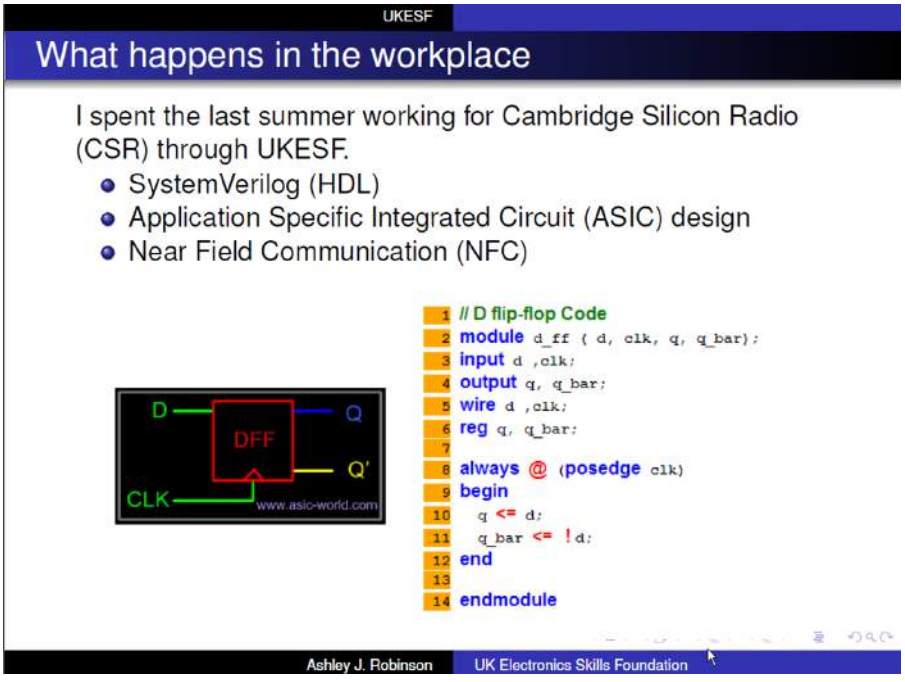


FIGURE 11: Slide 10

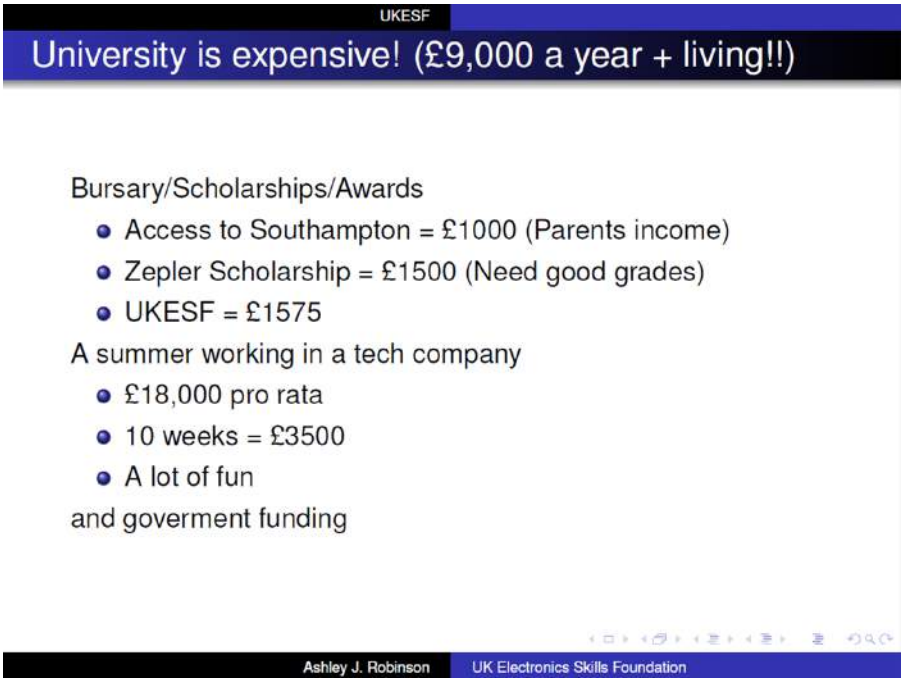


FIGURE 12: Slide 11

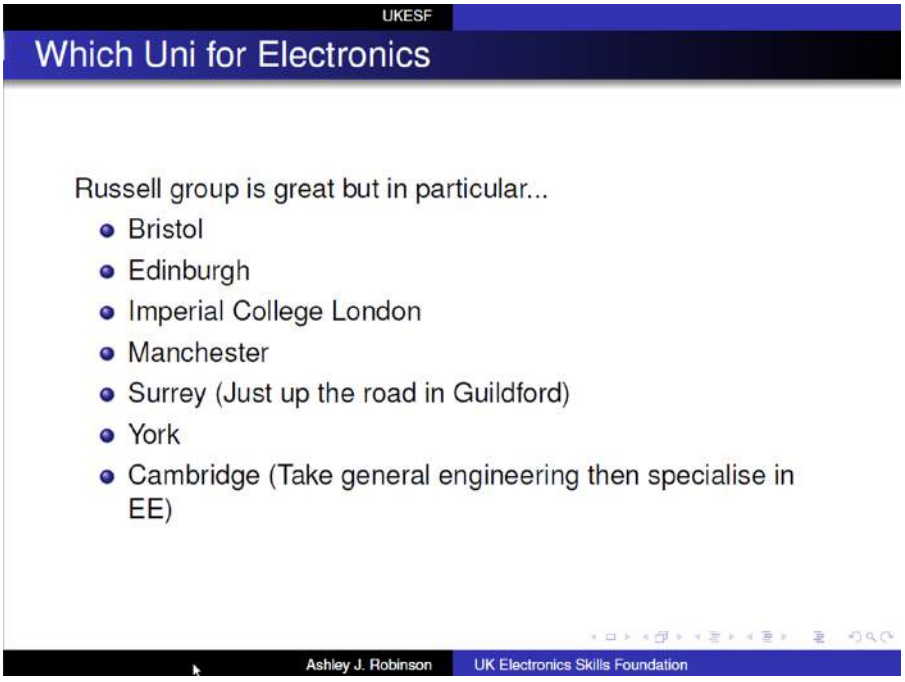
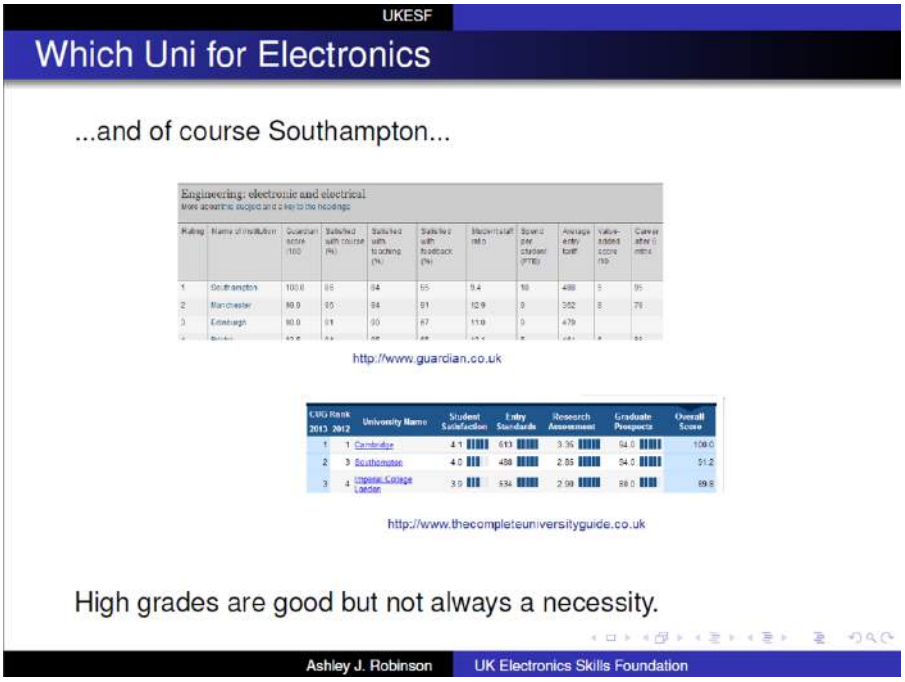


FIGURE 13: Slide 12



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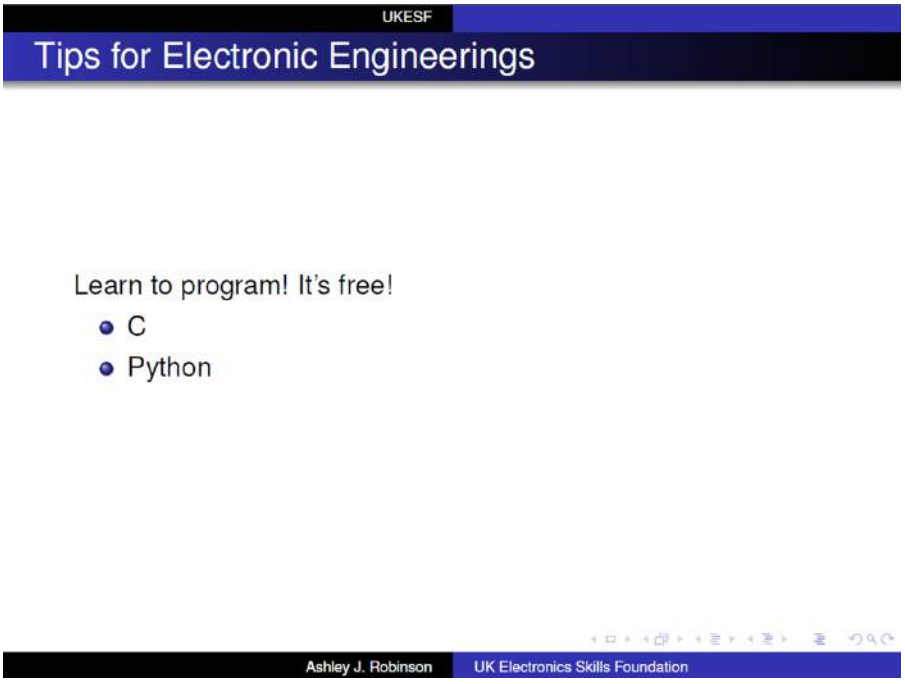

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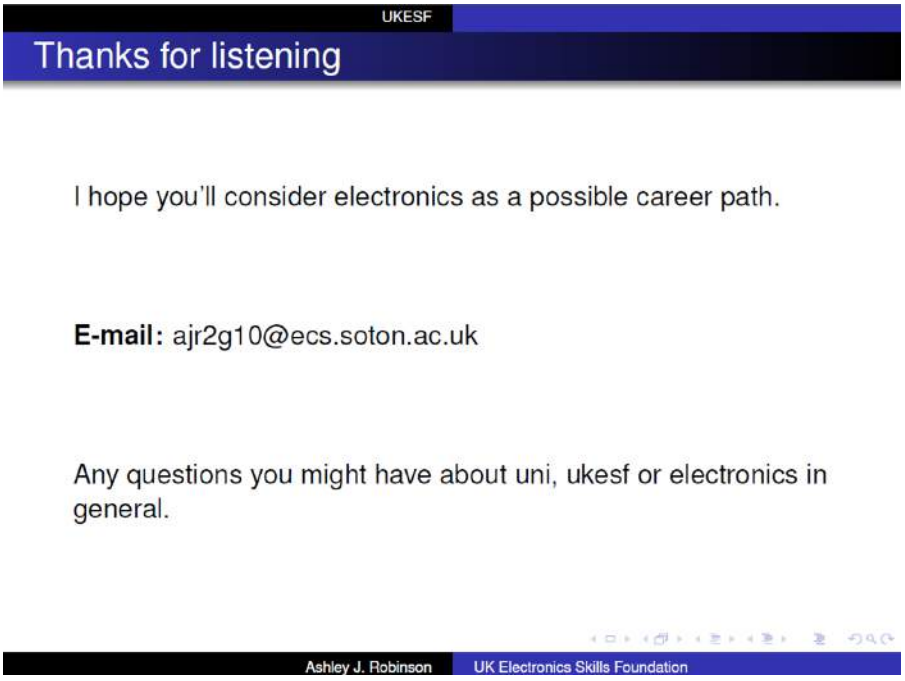

FIGURE 16: Slide 15

References

Steve R. Gunn. The chaotic oscillator, December 2012. Southampton University. http://users.ecs.soton.ac.uk/srg/chaos/.

Christian Zeitnitz. Soundcard oscilloscope, 2012. http://www.zeitnitz.de/Christian/scope_en.