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| edx+cmyk_50mmProject Activity Log | | | | | | | |
| Learner Name | | Ashwin Ahuja | |  | Learner number | 5501 |  |
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| Centre Name | | St Paul’s School | |  | Centre Number | 14627 |  |
|  | |  | | |  | |  |
| Unit Name | | Artefact Extended Project | |  | Unit number | P304 |  |
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| Teacher Assessor | | Dr Tomi Herceg | |  |  | |  |
|  | |  | | |  | |  |
| Proposed project title | | | User Friendly Secure Handheld Password Manager | | | |  |
| This form should be used to record the process of your project and be submitted as evidence with the final piece of work.  You may want to discuss:   * what you have done (eg, from one week to the next) * if you are working in a group, what discussions you have had * any changes that you have or will need to make to your plans * what resources you have found or hope to find * what problems you are encountering and how you are solving them * what you are going to do next | | | | | | | |
| Date | Comments | | | | | | |
| 14th September 2015 | **Activities Undertaken:** I have completed a number of SolidWorks tutorials in order to better my CAD abilities. I learnt about new tools such as Equations and am beginning to learn about Simulation. The tutorials completed were: Lofts, Surfaces, Advanced Design and Equations  I have also been researching a number of possible ideas, understanding how they might fit inside the purview of solving a problem and understanding whether the ideas were feasible to accomplish inside a term and a half. Additionally, in order to help visualise one of my ideas, and to test my SolidWorks abilities, I attempted to design a basic idea for a smart water bottle. My research also included whether other such products existed, and how they worked.  **Problems Encountered:** I realised that a couple of my ideas would be far too time-consuming and thus not a realistic goal for my project.  **Steps Taken to Overcome:** As well as discarding one idea, I began to consider the possibility of finding a smaller part of the other idea, thus making a more focussed project which could still be feasible.  **Plan for Following Week:** I hope to continue the research into my ideas and begin to choose one of them. I also hope to continue my learning on SolidWorks – especially learning to use the simulation features of the application. | | | | | | |
| 21st September 2015 | Activities Undertaken: Using the new tools offered by SolidProfessor, I began to explore the world of SolidWorks Simulation, by watching the first few videos. In addition, as part of homework, I continued to research what existed regarding my ideas, and how they worked, preparing a talk regarding them, learning from Dr Gardam’s presentation about what an effective idea would be. In addition, I attempted to continue to research the possible solutions to my problems, thinking about how I could in fact simplify my ideas, focusing on a specific part of the product, and researching and modelling that part in depth. I also completed a few more tutorials on SolidWorks, such as the animation tutorial, which would easily allow the user to see inside a complex product easily. Finally, I am also beginning to conduct some research on how to use EagleCAD, a ubiquitous software for Electronics Design (and Simulation), since my product would likely contain an element of electronics.  Problems Encountered: I faced a number of computer related issues, including a reinstallation of SolidWorks originally failing, before finally succeeding after a period of pain. Additionally, I struggled to find a good source of information for EagleCAD, which was both upto date and was comprehensive enough for me to gain a good understanding of a tool.  Steps taken to overcome: By following steps online, I was able to remedy the problem that I faced during installation. Additionally, after a period of research I found a Sparkfun tutorial online for EagleCAD which at least appeared to cover the basics effectively.  Plan for following week: Building off opinions of others in my class, and using research for the homework, I hope to reduce the number of possible ideas, finding which is the most feasible, whilst still being interesting for me, and challenging. Additionally, I hope to continue the tutorials for EagleCAD and SolidWorks. | | | | | | |
| **28th September 2015** | **Activities Undertaken**: In the theoretical taught lesson, we received a continuation to the introduction to Fluid Dynamics, and also an introduction to Mechanical Analysis, especially into the elasticity of materials – using Young’s Modulus, and how to find the statistics of different materials – using MathWeb.com. Additionally, I continued to research the existence of my problem, asking a few friends if they encountered similar ideas. I also received an introductory lesson on SolidWorks Simulation, using the SolidWorks Express package, and am currently completing a homework – which would begin to use the skills acquired. Finally, I completed the tutorial on EagleCAD and am currently experimenting, using the skills for CanSat as a preparation for the EP.  **Problems Encountered:** I was unable to access the SolidWorks Simulation tools on the student edition.  **Steps taken to overcome:** I was able to use the SolidWorks that exists on the computers in school to do my simulation homework, and experimenting with the tools.  Plan for the following week: I hope to continue the tutorials for Simulation in SolidWorks. | | | | | | |
| 5th October | **Activities Undertaken:** I had taught lessons regarding the Harvard Referencing scheme which will be used throughout the product, including practising how it could be used in Word, the tool which will inevitably be used for the project write-up, being a ubiquitous tool for word processing. Also, we received an introduction to the project proposal form, and how we should fill it. Additionally, I using my research and decision matrices decided to choose my password management problem to further develop throughout the project, thus write my project proposal form on it.  **Problems Encountered**: I spent a period of time unsure which of my few problems was the best one to continue to do for the EP.  **Steps taken to overcome:** Through some more research into the uniqueness of my solutions, and reviewing and updating my decision matrices, adding a number of more (and better) criteria, decided on the project I wanted to do.  **Plan for the following week**: Produce the Project Proposal Form for my chosen problem. | | | | | | |
| 12th October | **Activities Undertaken:** Completed my Project Proposal Form filling in all the necessary details, including why I chose the project, and my plan. After completing a first draft, I reviewed old examples, investigating the successes and failures of their PPFs (both in class, and outside), thus using them to better evaluate my own, and thus improve it. Additionally, once this was completed, I began some more research into other products in the same sector, and thus how my solution could be more effective.  **Problems Encountered**: None  **Steps taken to overcome**: N/A  **Plan for the following week:** Attempt to gain a global understanding of my problem, during a trip to Japan. | | | | | | |
| 19th October | **Activities Undertaken**: I was in Japan for an exchange, attempting to integrate into society. It also allowed me an opportunity to get first hand evidence to find out that my problem is true around the world, thus, the product could be aimed at places where English is not a first language, in fact causing a great issue where the romantic script is not necessary common (such as in Japan and China). Additionally, I was able to see some innovative technologies to attempt to solve this problem, including an attachment to a computer with a biometric sensor, which when plugged into the computer will auto-fill passwords.  **Problems Encountered**: There was the issue raised that passwords and instructions could need to be in other languages, thus maybe making use of letters that do not appear in a normal English keyboard.  **Steps taken to overcome**: Some brief thought was carried out about whether this would affect the system, and concluded, that as long as the data entry mechanism was thus made, it would not.  **Plan for the following week**: Begin research of my target market. | | | | | | |
| 26th October | Activities Undertaken: I began to look at the target market for which my product was aimed, especially the elderly, who might especially struggle to remember the large number of passwords that many have. I did this through both online research into the the numerous commentaries of the challenges of encouraging the elderly to become more accustomed to the internet, and also by asking my multiple neighbours. I found that my problem definitely existed, with many neighbours especially terming the problem as something which alienated them from using the internet. However, I quickly found that my product has a broad target market, as having mentioned my idea to wide variety of people, many mentioned their personal interest in having a solution to the problem, since they also shared it.  Problems Encountered: I struggled to identify a specific target market, an important feature of my project.  Steps taken to overcome: I concluded that though I could identify a sector of users such as the elderly as a specific concern, given their needs are more specific, the product could also be used for a far wider range of people, given my research into who suffered from the problem  Plan for the following week: I plan to continue my research into the target market, as well as beginning my research into solutions (however flawed) to the problem, that already exist. | | | | | | |
| 2nd November | Activities Undertaken: As well as continuing to ask a number of people about their experiences using a number of people (further finding more and more that the problem has a large target market), I began research into the existing solutions that people use. I found that the solutions were easy to divide into two, the low tech solutions, such as a notebook, and the high-tech, though in my opinion flawed, solutions, such as modern password manager software. Additionally, in taught lessons, I was assigned my tutor assessor, and was briefed on project planning, and instructed to produce a project plan, with Gantt and PERT charts.  Problems Encountered: Struggled to exactly identify the priorities of my research and indeed project, whether it was Mechanics, Software or Electronics, thus being unsure how to dedicate time to each in my project plan.  Steps taken to overcome: Through reviewing my own interest and complexity of each part of the project, I have producing a weighting of the project towards the software and electronics of the product, however, left myself the ability to later change the focus if I so desire.  Plan for the following week: Begin research into the history of encryption (and thus hacking – cryptography) and complete a project plan and Gantt Chart. | | | | | | |
| 9th November | Activities Undertaken: Produced a Project Plan, deciding to use Gantt Project, a free piece of software available for Mac and PC[[1]](#footnote-1). Additionally, I have begun to research the history of encryption, as I understood the necessity of building up in complexity of encryption methods, starting with simple encryption, like Caesar Ciphers, all the way to DES, a standard for encryption brought in in the advent of the 21st century. This ensured that the reader would not be thrown into the newest technologies. Additionally, it would create an interesting introduction. In order to research this, I have been looking at a number of sources, from the library, and online books, to university courses. I have found that alongside the history of encryption, it would be worthwhile to investigate the development of cryptography, effectively a form of hacking, which has led to the furthermost and betterment of encryption techniques.  Problems Encountered: I initially struggled to find effective academic sources which would rigorously show how certain encryption methods were flawed.  Steps taken to overcome: Using tools learned in previous taught lessons, I used tools Google provided to specifically isolate useful sources.  Plan for the following week: Produce a presentation for Dr Herceg of my research since the beginning of the half-term, specifically on the history of encryption. Additionally, I hope to proceed, as according to my plan to look at various other elements such as modern encryption techniques, such as the popular RSA algorithm and DES standards, especially looking at the variations that different people use. | | | | | | |
| 16th November | Activities Undertaken: I have produced a presentation for Dr Herceg about the history of encryption methods to be presented during the week, which allowed me to get much of my research out onto paper, thus ensuring that I would not later forget it. Additionally, I started my initial research on modern encryption techniques.  Problems Encountered: I encountered a query regarding the licensing that I should use with my project, as I aimed to put my project on GitHub, making use of the insight created by others attempting parts of my project, and sharing my own research with those who might be interested in the technical aspects of the project. Additionally, I got the issue that I was not sure how much detail I should go into on old encryption techniques, which though providing a basis into how the modern encryption techniques work, may not be specifically relevant to my project.  Steps taken to overcome: I have identified, that though a problem that I would need to resolve in the future, that it is not very pressing, not challenging the deadline of the project, thus hope to resolve it in the future. I have attempted to draw a balance between the detail and breadth, while spending more time on ciphers which have developed over time to create the most significant modern encryption techniques.  Plan for the following week: Continue research on modern encryption techniques, including emphasis on how they could be applied to my product, including file encryption using the Advanced Encryption Standard specifically, given that according to most sources, the encryption standard allows the system to be completely unhackable. | | | | | | |
| 23rd November | Activities Undertaken: Began to research modern ciphers, beginning with the Diffie-Helman Key Exchange and then RSA, before progressing to AES. Additionally, began to produce my preliminary research report, firstly deciding the structure of my research, separating it into discrete sections of research, so it would be understandable for a reader. Additionally, in preparation for the report, I am starting research into Biometrics and other parts of the research that I am yet to tackle.  Problems Encountered:   1. I found that my writing style promoted waffle, thus producing lots of unnecessary text, which will have no impact or purpose in the scale of my product. 2. I am also running late compared to my Gantt Chart as I was overly optimistic, especially with the time taken to understand modern encryption.   Steps taken to overcome / effect on plan:   1. I will attempt to read over my work at the end, and then remove or reword unnecessary parts to ensure all the information provided is directly relevant to the product. 2. I have adjusted my Gantt Chart to keep it up to date. Additionally, I will attempt to speed up the research, reducing the amount of time researching things which are ultimately irrelevant to how I envision my final product.   Plan for the following week: I hope to complete my research on Modern Encryption Techniques, and hope to finish my Preliminary Research Report before the deadline on the 4th December. | | | | | | |
| 30th November | Activities Undertaken: I completed research on Modern Encryption Techniques, before commencing and completing writing of the Preliminary Research Report, which summarises the majority of research completed to date.  Problems Encountered: I found that the Preliminary Research Report took much longer to write than I had envisaged, hence preventing me from completing any research into Biometrics or Hacking Techniques.  Steps taken to overcome / effect on plan: For the week, I decided to concentrate on the research report, and then complete the rest of the research after the deadline, before producing a supplementary document which would summarise the rest of my research not covered in the preliminary report. Thus, I have adjusted my plan and Gantt Chart to show this.  Plan for the following week: Complete research into Biometrics, and Hacking Techniques, before beginning research into specific possibilities for the control system, which would govern the feasibilities of various elements of the software and encryption. Additionally, I hope to begin the process of producing a design specification, which would lay out exactly what the product must accomplish. | | | | | | |
| 7th November | Activities Undertaken: Research was completed into different forms of biometric security including the specific advantages of biometric security over other forms of security such as a password. Forms which were investigated included fingerprint identification, palm recognition, voice authentication and facial recognition. In each the success rate and security of the form was assessed to ensure it would be hard to forge and then the feasibility of building it into the system was investigated. For example, what specific hardware would be required to allow the process to be used in the actual product. Finally, I concluded that Fingerprint Identification would be both one of the safest methods as well as relatively feasible to implement.  Additionally, a design was completed outlining what specific ciphers will be used and how they will be used, to ensure the product is secure where it needs to be as well as well as easy to use and produce. This was also due to the fact that there was a primary decision made on certain parts of the Control System, notably the Microcontroller to be used (one of the Raspberry Pi line – preferably the Pi Zero due to its tiny footprint). This was due to the flexibility offered by this and Linux, and given the wide range of flexibility that exists on the internet and elsewhere regarding how to effectively use the device. Additionally, Python, the language primarily used to program a Pi is a language familiar to myself and is notable for a number of useful libraries including Pycrypto, which includes the ability to encrypt using a number of ciphers, including AES.  Problems encountered: Given the time taken for completing Biometrics research and preliminary control system research I am yet to reach the period of completing a product specification. Additionally, I realised that I was yet to include that as a task on my Gantt Chart, thus had not allocated any time to it.  Steps taken to overcome / effect on plan: I added the creation of design specification on my Gantt Chart and project plan systems, ensuring that a sufficient period of time is allocated to it. In fact, I removed time from the designing stages, as I believed that this was the first and most important stage of the design.  Plan for the following week: I hope to write up my biometrics research, and start the complex process of choosing specific parts for the control system. Additionally, I want to start to define the processes the user will have to carry out to use the product, notably how the user will enter new passwords. Though I have a plan in my mind, this is largely not researched and so I am unsure whether it is the most efficient manner of solving the problem or whether there are better ways which I am yet to consider. | | | | | | |
| 14th December 2015 | Activities Undertaken:   * Produced a basic cipher, to be used for the transfer of information from the computer to the product, since this is likely how it will be done. * Basic research into the structure and effectiveness of QR codes, as well as how they could be read by a Raspberry Pi with a camera, and how they could be produced. * Basic testing with the cipher. * Research into different forms of Biometric Security   Problems encountered:   * Possible complexity of most forms of Biometric Security systems – as well as the fact that the cutting edge part of Biometrics is very private, when contacted, AimBrain rejected the idea of providing any possible statistics of the product. * Time delay in deciding the exact MCU – though likely leaning towards the Raspberry Pi (Zero) * Challenge of producing a QR code generator, a more complex task than I had anticipated.   Steps taken to overcome / effect on plan:   * Attempt to find some (though very inaccurate) statistics – as they are often still worth discussing as they are sometimes better for the user (less intrusive) or more secure. Additionally, there are a few forms of Biometric Security, such as simply capacitance, which since they are so poor, could be easily evaluated if necessary. * This is currently pushing the entire plan backwards, since I largely cannot decide anything until this is decided. Hence, I plan to complete full and complete research in the next week, deciding completely on one MCU, then allowing me to begin the design over the week. * Attempt to find APIs which could be used on websites or indeed apps which would then allow the production of a QR code to be significantly simplified.   Plan for the following week: | | | | | | |
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1. Ganttproject.biz,. 'Ganttproject: Free Desktop Project Management App'. N.p., 2015. Web. 19 Nov. 2015. [↑](#footnote-ref-1)