LeafPad

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Abstract

The aim of our group was to bring an innovative product to the current market that would be beneficial for the people using it and at the same time friendly for the environment. Nowadays, a lot of paper is being used for notebooks so a decision was made to come up with an idea that would replace the old notebook, make people choose it over the normal notebook and the current competition on the market. Therefore an idea for a product was created, that would be similar to a normal notebook, but would offer more possibilities and reusability, which was the most vital part of the product.

1. Introduction

The group product's name is 'LeafPad' and its whole purpose is to help the consumer not only save money but to also help them be more efficient with their notes and drawings. It is a reusable product that is also wireless which should make it easier for the consumer to share their work with others. LeafPad is a great product to replace ordinary notebooks with due to its light weight and size. It is simple to use and anyone of any age can use it for whatever purpose they desire.

2. Background

When the group first came together, it became apparent to us that it was no easy task coming up with a product. It would take some planning, communicating and brainstorming. Our group decided to meet up in a pre-booked room and began to brainstorm different ideas. These ideas ranged from radical to quite boring and all the way to useless. After many ideas were thrown back and forth we then decided to take a step back and consider what we as students might need in our lives that would make life even just slightly easier. We then began to refocus the core idea for

our product on the basis that it would improve the life of students and hopefully not only students but a wide variety of the public.

The ideas started with suggestions of backpacks and other general accessories that students have in their lives. Possibly a backpack that would have some kind of special lock on it, that required a special key card or biometric key to unlock. Other ideas included something like a pen that when placed onto a surface would mimic the colour and texture of the surface and when the pen is placed onto the specifically designed screen it would replicate the desired surface for drawing or whatever the user desired. Finally, our group came to the conclusion that one of the most annoying things is having a heavy bag filled with notepads and then trying to keep track of all the notes over time. Our next step was to develop our idea further and try to come up with a type of notepad that could solve the problems that brought us to this conclusion in the first place.

3. Overview of the product
The product 'LeafPad' looks like an ordinary notebook, but it is a much more unique product than that. The LeafPad is a light weight and small in size product making it easier to manage and carry around. It varies in colour in order to give the consumer the option to choose the LeafPad that most appeals to their taste. This product can be used for notes or drawings, and whatever work is done on the LeafPad is saved on the buyers' favorite cloud service. This is done by using Wi-Fi and by the pressure sensible cover which tracks each pen stroke created on the LeafPad pages. Due to this product being able to save online, it can also be used to effortlessly share the notes or drawings online with people. Not only that, LeafPad can also be reused more than one time. When buying the LeafPad the consumer receives a special cloth that can be used to wipe away all the notes or drawings created on the LeafPad pages making this product very easy to maintain and use.

4. Possible markets
In order to find out what markets would suit our product, the group looked at the possible competition. Using Traffic Analysis from SimilarWeb, a comparison was made of the traffic sources of two competitors. The competitors are reMarkable, a Smart Notebook that retails for around $500 (about €407.43) , and Moleskin a traditional notebook company who launched a Smart Notebook last year, which retails for around $300 (about €244.54).

Looking at the price points of these competitors, they are clearly targeting higher income individuals or the 'professional' market. This leads to the conclusion that LeafPad's market should probably target those who still desire a product like this, but at a lower price point. The group believes that students would fit this market perfectly. The product is effectively solving a problem that they may encounter.

If the group was to prioritise the education market as the primary market, the group would be looking at a market that is valued at $252 billion (about €205,4 billion) by 2020.

In order to deliver LeafPad to this specific market, the group would have to prioritise volume over a large markup on the product itself, similar to someone like Amazon, who do not generate massive profits off their Kindle series. Instead Amazon focus on building a market around the product, possibly offering MOOCs (Massive Open Online Courses) and other learning supports through the product.

5. E-Commerce approach

It is believed that focusing primarily on e-commerce is the most cost effective way to sell LeafPad. Selling directly to the consumer and cutting out a middle-man should allow the group to pass these savings on to the customers, in turn allowing the group to focus on the education and students market. Simple platforms such as Shopify would allow the group to build an e-commerce site out of the box and put all of the efforts into product development and marketing.

6. Technical implementation

From a computer engineering perspective, LeafPad is a personal computing device. As such, it can be broken down into a number of layers, ranging from hardware to software. There are a number of ways to implement each part, but the final choice of implementation mainly depends on the functionality required and the cost. One more constraint is the consideration for a 'minimum viable product', which requires only the key parts of the product that make the product presentable to the market, while extra features are to be implemented later on. With that in mind, this section attempts to overview how to best realise the key components of LeafPad, and thus how to realise LeafPad itself.

Hardware

Physically, the first feature to be implemented is a lean, airy design. This can be done by crossing a thin, light-weight tablet (see Sony Xperia Tablet Z and Dell Venue 7) with a cheap notebook (for reference, Amazon Glare Free Kindle, £59.99 - about €68.48). For LeafPad's computing hardware, mobile chipsets (system on a chip integrated circuits that include a CPU, GPU, I/O, and other hardware) from AMD, nVidia, Intel, Qualcomm, and Arm (especially Cortex-A75, with its edge-to-cloud computing), are appropriate. Pricing tends to be agreed internally with the company selling the chipset. Battery-wise, li-ion batteries are promising and well-established. Record device battery lives reach 149 hours (Lenovo P2), and suppliers include multinationals like HP, but also smaller companies from Europe and China. Next, there are hardware features unique to LeafPad. To implement a

pressure sensitive surface display, standardly a capacitive touchscreen is a solution. It allows drawing by using a finger, but the problem is that normal writing utensils would not register with the surface. A paper from 2018 proposes Zinc Oxide pressure sensors that could be commercialised by LeafPad. Finally, a special cloth is needed to wipe what was written down. A solution is that the cloth, which can be of special textile, such as synthetic microfiber, could be registered by the pressure sensitive display, just like the writing utensils should be, and the displayed graphics can be flushed from the software side.

Software

Next, key logical features need to be implemented. For an operating system a mobile and real-time system type is the best. Together, they focus on responsiveness and predictability, and that agrees with how the user would interact with the notebook. On top of the operating system a user interface can be implemented, and on top of it various software applications can be presented, including wireless connectivity (or, more broadly, 'settings'), local storage view ('file manager'), sharing ('social media'). Another important software feature is 'mobile cloud' support (roughly, processing and storage done on off-site servers 'in the cloud', while the notebook itself is just an interactive platform for the user. More specifically, common Software as a Service cloud models should be supported, especially Cloud storage. Google Drive, for instance, has a REST Application Programming Interface that can help developers connect their applications to it. Other cloud storage services includes iCloud, DropBox, and OneDrive.

7. Discussion

This group originally met to start the process of designing a project for this module. As the reader has seen in section 2 of the report, background, the area we decided to design our product for was education but more specifically students within the education system. Our background may have covered a lot of what our group was looking to design but it did not end there. The "Overview of the product" shows the added possibilities of the product. A device that could be used by not only anyone in the education system, teachers or students, but also parents and artists etc. The possibilities became only what the customer made of them, and our group only laid down a basis for what could be possible. A look into the "Possible markets" will show that this product has been compared and subjected to other products that might be similar but are much more expensive and possibly unaffordable for the demographics that this product could reach out to.

Research was allocated to a member of the group to take an "Ecommerce approach" to selling the product and it was discovered that it would be the most cost effective method possible. The cutting out of a middle man from the marketing equation allows for greater focus to be put on both the customer and development of the

product moving forward. Section 6 of this report discusses the "Technical implementation" to the product. This opens a large variety of information, such as the software and the key physical features that go hand in hand with them. This includes such features as pressure sensitive surface display which has become expected in most if not all devices nowadays. We then conclude this discussion with a look towards the ever changing future that stands before us and what it will hold for this product as we move forward. This section is important because it outlines how this product could be the step in our technological evolution that brings handwriting back to the mainstream rather than trying to constantly moving away from what human beings have done for centuries.

This discussion of the overall report between this group shows the overall evolution of one idea that blossomed from the "Background" section to it's fully formed creation amongst this group.

8. Future possibilities

There are many options of improvement for our product. With the development of technology, our product can be updated with new features. For example, a built-in projector could be added or the pressure sensible cover could be removed and the paper could do the tracking of a pen's strokes. Moreover, a software could be implemented in the notebook, that would make possible to connect the notebook not only with cloud services, but also Microsoft Word or Google Docs, which will make handwriting modern again because people would be able to work on the same document on their computer, smartphone, and notebook. Another future, which can be added also, is the possibility for a user to send his or her notes to a printer or to another notebook.

9. Conclusion

LeafPad, a digital notebook, has two central motivations, customer efficiency and energy efficiency. There are many other inventions that offer the same, but the group, as a group of students, offers their own personal take on these two issues, in the form of LeafPad. Feathery and personalised design, storage, sharing, reusability, – all these are capabilities and unique points of the product. Again, many competitors offer similar functionality, but for professional designers. Thus, as students, we uniquely focus on students. The educational market in the near future is to stem further, and there are fresh and effective methods on how to reach it, from online sales to online courses. With minor details in electronics and code, LeafPad can be actualised, following the now deep-rooted steps of modern tablets, electronic readers, and mobile devices. This actualisation would be a minimum version of LeafPad, but, indeed, there are future possibilities for expansion. Expansion would expand the physical functions, the applications, and the societal impact of LeafPad,

combining the ancient power of pen and paper with the power of a billion clock pulses per second and exabytes of interconnected information.

References

- (*Amazon: Kindle E-Reader, 6" Glare-Free Touchscreen Display, Wi-Fi (Black) - Includes Special Offers*)[Online]. Available from: https://www.amazon.co.uk/All-New-Reader-Glare-Free-Touchscreen-Display/dp/B0186FESVC/ [Accessed 20 April 2018].
- (*arm developer: Cortex-A75*). Available from: https://developer.arm.com/products/processors/cortex-a/cortex-a75 [Accessed 20 April 2018].
- Bacon J., Harris T. 2003. *Operating Systems: Concurrent and distributed software design.* Harlow, England: Pearson Education Limited.
- (*Europages: Your search : #mobile phone battery*). Available from: https://www.europages.co.uk/companies/mobile%20phone%20battery.html [Accessed 20 April 2018].
- (*GSMArena: Battery life test results*). Available from: https://www.gsmarena.com/battery-test.php3 [Accessed 20 April 2018].
- Little S. 2018. *CA170 Computer Applications notes*[Online]. Dublin: Dublin City University. Available from (with log-in): https://loop.dcu.ie/course/view.php?id=4085 [Accessed 18 April 2018].
- *(Global Report Predicts EdTech Spend to Reach $252bn by 2020)*[Online]. 2016. London: EdTechXGlobal. Available from: https://www.prnewswire.com/news-releases/global-report-predicts-edtech-spend-to-reach-252bn-by-2020-580765301.html [Accessed 15 April 2018].
- (*Google Drive REST API Overview*)[Online]. 2018. Available from: https://developers.google.com/drive/v3/web/about-sdk [Accessed 19 April 2018].
- Sosinsky B. 2011. *Cloud Computing Bible*. Indianapolis: Wiley Publishing Inc.
- (*Tablet PC Comparison*). 2017. Available from: http://www.tabletpccomparison.net/ [Accessed 20 April 2018].
- Vishniakou S., Chen R., Ro Y.G., Brennan C.J., L. Cooper, Yu E.T., Shadi A., Dayeh S.A. 2018. *Improved Performance of Zinc Oxide Thin Film Transistor Pressure Sensors and a Demonstration of a Commercial Chip Compatibility with the New Force Sensing Technology*[Online]. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1002/admt.201700279 [Accessed 20 April 2018].
- (*Wikipedia: List of tablet PC dimensions and case sizes*). Available from: https://en.wikipedia.org/wiki/List_of_tablet_PC_dimensions_and_case_sizes [Accessed 20 April 2018].

- (*Wikipedia: System on a chip*). 2017. Available from: https://en.wikipedia.org/wiki/System_on_a_chip [Accessed 20 April 2018].
- Woodford C. 2017. *Microfiber cleaning cloths*[Online]. Available from: http://www.explainthatstuff.com/microfibercloths.html [Accessed 20 April 2018].