Mobile Programming II Weekly Summaries

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1 Week 1 - February 2nd, 2021

1.1 Taxonomy of Cross-platform Mobile Application Development Approaches

[1]This paper attempts to explore recent approaches to cross-platform solutions and open research issues along with surveying existing cross-platforms mobile development approaches. It includes a comprehensive categorization of cross-platform approaches, explains their solutions, and compares them. This paper surveys the cross-platform approaches including Cross-Compilation, Virtual Machine, Model-Driven,and Web-Based approaches. It provides a detailed description for each approach and defines it's pros and cons, and introduces a sample of the solution and their possible limitations. The paper then proceeds to delve into cross-platform mobile development research in terms of different mobile platforms support, native programming languages support, user interface support, source code reuse and generating full mobile applications.

1.2 Consumer Preference to Utilize a Mobile Health App: A Stated Preference Experiment

[2]This paper aims to improve understanding of consumers' preference for utilizing a digital health administration app. A significant obstacle faced by healthcare consumers when using health services is the tedious task of filling repetitive, inefficient paperwork at multiple sites. Technology has the resources to reduce the burden of this task and this paper explores whether people would be open to the idea by investigating their willingness to use a digital health administered mobile app. The results from the study showed that consumers' had two main preferences regarding mobile applications. One being the time it took to register on the app and two being the data governance structure for the app. The paper comes to the conclusion that further research should be conducted in terms of these two concerns in order to break the barriers and provide better health assistance through a mobile device

2 Week 2 - February 9th, 2021

2.1 The effects of integrating mobile devices with teaching and learning on students' learning performance: A meta-analysis and research synthesis

[3]This study focused on performing a meta-analysis and research synthesis of the effects of integrated mobile devices in teaching and learning. They used 110 experimental journal articles which were coded and analysed. The research came to the conclusion that the overall effect of using mobile devices in education is better than when using desktop computers or not using mobile devices as an intervention. It has been discovered that many different combinations of hardware, software and intervention durations for mobile devices have been applied to various ages of users, teaching methods and domain subjects. The effect of such usage was greater for handheld devices than for laptops. The paper suggested for more elaborate design developments to exploit the educational benefits of possibly utilizing mobile devices.

2.2 Exploring the role of social media in collaborative learning the new domain of learning

[4]This paper examines the application and usefulness of social media and mobile devices in transferring the resources and interactions with academicians in higher education. The empirical study is focused on 360 students in a university in India and attempted to understand mobile devices' impact on students' academic performance. The study revealed that social media used for collaborative learning had a significant impact on interactivity with peers, teachers and online knowledge sharing behaviour. The study provided guidelines to the corporate world in formulating strategies regarding the use of social media for collaborative learning.

3 Week 3 - February 16th, 2021

3.1 Development of mobile application through design-based research

[5]This paper illustrated the development and testing of an innovative mobile application using design-based research. The study came to the conclusion that design-based research built on the principles of stakeholder centredness was effective in developing mobile learning applications. This was due to the fact that the researchers and practitioners were actively involved throughout the whole process and supported each other to produce an effective mobile application. In the future they will further evaluate the application to assess the effectiveness of the mobile learning system to complete the design of the system fully.

3.2 We're not addicted to smartphones, we're addicted to social interaction

[6]This review analyzes the healthy human need to socialize and the hyper-social facets of mobile device habits. It claims that the most addictive smartphone functions all share a common theme which is that they tap into the human desire to connect with other people. Oftentimes people chalk excessive mobile use to antisocial behaviours but this article suggests the opposite. However, it was also agreed upon that the pace and scale of hyper-connectivity pushes the brain's reward system to run on overdrive, which can lead to unhealthy addictions. Within moderation mobile use for the purpose of social interaction is healthy for humans but there is a limit to everything and this article supports that by claiming everyone needs to take the necessary steps to have a healthy relationship with their mobile devices.

4 Week 4 - February 23rd, 2021

4.1 Mobile and interactive media use by young children: The good, the bad and the unknown

[7]With more and more children being raised in the presence and utilization of mobile devices, this article explores the many types of interactive media available and questions their use as educational tools, as well as their potential detrimental role in stunting the development of important tools for self regulation. The researchers stated that in the past evidence has shown that increased television time decreases a child's development of language and social skills and the same effects can be expected for mobile use. These devices replace hands-on activities important for development of sensorimotor and visual-motor skills which are important for the learning and application of math and science.

4.2 Mobile technology and child and adolescent development

[8]This is another study exploring the use of technology among children and adolescents. It focuses on the complicated impact mobile technology has on infants, toddlers, children, teens and parents. There were risks to be observed in terms of cognitive control, attention in contexts, peer pressure, sleep, mood and mental health and more. The study came to the conclusion that all articles showed mobile technology posing potential dangers, and areas where development may be supported. In terms of potential development, mobile technology offers new, unique ways for young children to maintain contact with family members not physically present.

5 Week 5 - March 2nd, 2021

5.1 COVID-19 Mobile Apps: A Systematic Review of the Literature

[9]This study conducted thorough research and carried out a systematic review of COVID-19 mobile application. The main findings of the paper is that mobile devices have been found to benefit citizens, health professionals, and decision makers in facing the COVID-19 pandemic. The mobile apps can help by increasing the reach of reliable information to both citizens and health professionals, decreasing misinformation and confusion, tracking symptoms and mental health of citizens, home monitoring and isolation, discovering new predictors, optimizing health care resource allocation and reducing the burden of hospitals. This research focused on younger and middle-aged individuals and will expand to older participants in the future.

5.2 Applications of digital technology in COVID-19 pandemic planning and response

[10]This was another study focused around COVID-19 and how digital technologies was one of the many resources that helped countries control and monitor the disease. In the planning and tracking phase, tools such as migration maps, which use mobile phones, mobile payment applications and social media to collect real time data on the location of people, allowed Chinese authorities to track the movement of people who had visited Wuhan market, the pandemics origin. With this data, machine learning models were developed to predict the regional transmission dynamics of covid and guide the border check and surveillance. Iceland used mobile technology to collect data on patient-reported symptoms and combine these data with other datasets such as clinical and genomic sequencing data to reveal information about the pathology and spread of the virus. Singapore launched a mobile phone app that exchanges short-distance bluetooth signals when individuals are in proximity to each other. These are some of the examples of the application of mobile devices in terms of gaining and spreading information regarding the virus. It was crucial to helping countries successfully "manage" the virus.

6 Week 6 - March 9th, 2021

6.1 Mobile game that uses implicit learning improved children's short-term food choices

[11]This was a study conducted on Indian 10 and 11 year old kids and how their food choices were affected by playing a pediatric dietary mobile game which utilized implicit learning. With obesity being a real problem among young kids and dietary decision being one of the leading factors, this game

aimed at educating players without making them aware of the lessons through innovations in neurocognitive training and immersive technology. These kinds of games have the potential to influence lifestyle behaviour changes and lead to better health outcomes. In this particular game, an avatar fights robots that represent unhealthy foods, and the avatar's speed and body shape vary in response to the type of food it eats. The research came to the conclusion that the game significantly improved children's food choices immediately after play.

6.2 'Earable' computing: A new research area in the making

[12]This article is targeted around a new sub-area of mobile technology that is called "earable computing." And it is believed that earphones will be the next significant milestones in wearable devices, and that new hardware, software, and apps will all run on this platform. The research questions that underlie earable computing draw from a wide range of fields, including sensing, signal processing, embedded systems communications, and machine learning. Earphones can sense facial and in-mouth activities such as teeth movements and taps, enabling a hands-free modality of communication to smartphones.

7 Week 7 - March 16th, 2021

7.1 Computer vision app allows easier monitoring of diabetes

[13]This article is about a free mobile app which is a computer vision technology with an intention of monitoring glucose levels in people with diabetes. The technology works for any type of glucose meter and it reduces waste by eliminating the need to replace high-quality non-bluetooth meters, making it a cost-efficient solution. The app is straightforward as the user simply takes a picture of their glucose meter and the results are automatically read and recorded, allowing much easier monitoring of blood glucose levels. Besides blood glucose monitors, the system has been tested on different types of digital meters such as blood pressure monitors, kitchen and bathroom scales.

7.2 App analyzes coronavirus genome on a smartphone.

[14]This article is about another app, but this one can analyze the genome of the coronavirus on a smartphone in less than half an hour. The app Genopo, makes genomics more accessible to remote or under-resourced regions, as well as hospital bedside. The Genopo app took an average of 27 minutes to determine the complete coronavirus genome sequence from raw data, which the researchers say opens the possibility to do genomic analysis at the point of care in real time. The researchers also showed that the Genopo can be used to profile DNA methylation in a sample of the human genome.

8 Week 8 - March 23rd, 2021

8.1 Gamifying interventions may improve mental health.

[15]This article focuses on a study that found mobile mental health intervention into a smartphone game can potentially improve well-being. This five week study showed that gamifying the content of mobile interventions improved resilience, a key character trait that reduces the susceptibility to depression, stress, and anxiety. To improve the effectiveness of the mental health apps, the author proposed turning intervention content into a game that includes levels that need passing, feedback, points, and other gaming elements. After five weeks, resilience and anxiety were better in the game group than the other group. A gamified mental health intervention app that retains user interest and improves resilience could maximize the benefits of mobile intervention by helping prevent depression, anxiety, while at the same time being convenient and a way to avoid getting professional help and experiencing the associated stigma and negative feelings.

8.2 Teamwork can make the 5G dream work: A collaborative system architecture for 5G networks.

[16]This is focused on a research that designed a novel system architecture where collaboration between cloud service providers and mobile networks operators play a central role. A collaborative architecture like so would allow for optimizing the use of network, computing, and storage resources which will unlock the potential of various network services and applications. It is likely that today's network infrastructure won't make the cut unless significant improvements are made to enable the advanced, 5G applications expected in the imminent 5G era. Through simulations, the research team went on to demonstrate how CSP-MNO collaboration could bring about potential performance improvements.

9 Week 9 - March 30th, 2021

9.1 Tool to protect children's online privacy.

[17]This is focused on a study of 100 mobiles apps for kids of which 72 were found to have violated a federal law aimed at protecting children's online privacy. Researchers developed a tool that can determine whether an Android game or other mobile app complies with the federal Children's Online Privacy Protection Act. The tool was 99 percent accurate and researchers plan to make it available at no cost. The researchers' technique accesses a device's special-purpose register, a type of temporary data-storage location within a microprocessor that monitors various aspects of the microprocessor's function. Whenever an app transmits data, the activity leaves footprints that can be detected by the special-purpose register.

9.2 Usability Studies on Mobile User Interface Design Patterns: A Systematic Literature Review

[18]This paper provides an overview of recent studies on the mobile designs and provides an analysis on what topics or areas have insufficient information and what factors are concentrated upon. The review showed that the touch screen is the major factor that forms research directions of mobile user interface, however, it also showed the enormous knowledge gap as well. It was discovered that there were some categories where no research can be found, despite their significance to mobile interface. Some of these topics included control and confirmation, revealing more information, and lateral access. There is insufficient empirical-based data to establish a solid design guideline, and there is still a need to assess more factors that influence its usability.

10 Week 10 - April 6th, 2021

10.1 Usability evaluation of adaptive features in smartphones.

[19]This paper is concerned with the study that aims to analyze effectiveness, efficiency, and satisfaction based on the existing adaptive features in smartphones. These adaptive features include screen rotation, voice commands, LED notifications and kid mode for android and iOS platforms. The effectiveness and efficiency are measured by considering task completion within a specific time while satisfaction is measured through a questionnaire technique. The study showed that screen rotation and voice commands resulted in lower usability. Whereas, LED notifications is a dominant feature having almost 88 percent effectiveness compared to a non-adaptive environment. The study suggests that the adaptive features must be applied after careful analysis of user tasks and context.

10.2 Getting Started With Developing for Tizen Smartwatches

[20]This article provides information about the increasing popularity of smartwatches and resources available to create applications for Tizen smartwatches. With acceleration of adoption of wearable and other smart mobile devices, now is the time to develop applications for a rich ecosystem of connected devices. This article specifically focuses on the Tizen and Samsung developer communities as they offer resources and accessible options for developers to expand their portfolio to wearable.

11 Week 11 - April 13th, 2021

11.1 Understanding enterprise mobile app development

[21]RedHat provides information regarding enterprise mobile app development which is the practice of creating and deploying portable, scalable, and trusted mobile applications to help large organizations engage with customers, partners, and employees. This topic explores what enterprise mobile application development is, the different approaches, why mobile developer services should be used, why they should be developed as an integrated service, how they can maintain security, and how they will serve both workers and customers.

11.2 Is mobile app a new political discussion platform? An empirical study of the effect of WeChat use on college students' political discussion and political efficacy

[22]This paper focuses on how the increasing application and popularization of mobile applications have dramatically transformed people's daily political lives through offering innovative mechanisms for interpersonal communication. Their empirical survey with 282 WeChat users reveals that WeChat has a relatively new outlet of political information, which fosters online political discussion with others about government and politics. The study's conclusion not only provides empirical evidence of citizen engagement through WeChat in an authoritarian country, but also extends the theory of uses and gratification to the new media adoption in the political life of people.

12 Week 12 - April 20th, 2021

12.1 Study shows over 200 mobile apps related to dermatology

[23]This article is about a surge in mobile apps related to dermatology that has allowed scores of smartphone users to track and diagnose a wide range of skin diseases, but doctors are urging caution. The study found mobile applications for monitoring psoriasis, connecting people with patient organizations, diagnosing melanoma, dispensing sunscreen advice, dermatology education and skin medications. One of the doctors in the study said the rise in medical apps in general and dermatology in particular offers the chance to expand care into rural and underserved populations. But he also says to remain cautious as not everything being shared online is reliable.

12.2 Multi-mobile computing system makes apps sharable on multiple devices.

[24]This article is about computer scientists who have developed a new computing system that enables current, unmodified mobile apps to combine and share multiple devices, including cameras, displays, speakers, microphones, sensors, and GPS, across multiple smartphones and tablets. Called M2, the new system operates across heterogeneous systems, including Android and iOS, combining the functionality of multiple mobile systems into a more powerful one that gives users a seamless experience across the various systems. All a user would have to do is to download the M2 app from Google Play or Apple's App Store. No other software is needed. One mobile system runs the unmodified app; the input and output from all systems is combined and shared to the app.

13 Week 13 - April 27th, 2021

13.1 Some mobile phone apps may contain hidden behaviors that users never see

[25]A team of cybersecurity researchers has discovered that a large number of cell phone applications contain hardcoded secrets allowing others to access private data or block content provided by users. The study has found that the apps on mobile phones might have hidden or harmful behaviors about which end users know little to nothing. In the research conducted they found that 8.5 percent of the apps they evaluated, contained something the research team labeled "backdoor secrets" which are hidden behaviors within the app that accept certain types of content to trigger behaviors unknown to regular users. A key reason why mobile apps contain these 'backdoor secrets' is because developers misplaced the trust. The article suggests that in order to truly secure their apps, developers need to perform security-relevant user-input validations and push their secrets on the backend servers.

13.2 Mobile apps and online reviews influence consumer behavior

[26]Mobile apps are changing the way brands connect with consumers and have the potential to boost a company's bottom line. According to a new Iowa State University study, there is a direct link between app use and purchase activity – the more engaging the app, the more customers will spend. The findings are significant considering the growth in mobile apps. Studies project that the number of downloaded apps is expected to surpass 268 billion by 2017. However, more than half of the apps that are downloaded are deleted after one use, Kim said. To capitalize on the mobile app market, companies must create an app that provides value to consumers. The study, which consisted of two parts, first looked at the effect of negative reviews on purchase activity.

Researchers found that viewers of the negative comments subsequently bought less. For the second part of the study, researchers conducted an experiment to gauge consumer reaction to a company apology. The effect was just the opposite. Viewers had a positive impression – they felt the company cared, was trustworthy and honest. The response can vary depending on the situation. In the paper, researchers cited JetBlue's Customer Bill of Rights as an example of how prompt response to negative electronic comments can regain customer trust and satisfaction.

14 References

[1]El-Kassas, W. S., Abdullah, B. A., Yousef, A. H., Wahba, A. M. (2015, October 23). Taxonomy of Cross-Platform Mobile Applications Development Approaches. Ain Shams Engineering Journal. https://www.sciencedirect.com/science/article/pii/S209044791

[2]Lim, D., Norman, R., Robinson, S. (n.d.). Consumer preference to utilise a mobile health app: A stated preference experiment. PLOS ONE. https://journals.plos.org/plosone/article?id=10.1371

[3]Sung, Y.-T., Chang, K.-E., Liu, T.-C. (2015, November 23). The effects of integrating mobile devices with teaching and learning on students' learning performance: A meta-analysis and research synthesis. Computers Education. https://www.sciencedirect.com/science/article/pii/S0360131515300804.

[4]Ansari, J. A. N., Khan, N. A. (2020, March 16). Exploring the role of social media in collaborative learning the new domain of learning. Smart Learning Environments. https://slejournal.springeropen.com/articles/10.1186/s40561-020-00118-7.

[5]Development of mobile application through design-based research. Asian Association of Open Universities Journal. (n.d.). https://www.emerald.com/insight/content/doi/10.1108/A
02-2018-0013/full/htmlsec006.

[6]ScienceDaily. (2018, March 7). We're not addicted to smartphones, we're addicted to social interaction. ScienceDaily. https://www.sciencedaily.com/releases/2018/03/180307141337

[7] ScienceDaily. (2015, January 30). Mobile and interactive media use by young children: The good, the bad and the unknown. ScienceDaily. https://www.sciencedaily.com/releases/

[8]ScienceDaily. (2017, May 30). Mobile technology and child and adolescent development. ScienceDaily. https://www.sciencedaily.com/releases/2017/05/170530082037.htm.

[9]Kondylakis, H., Katehakis, D. G., Kouroubali, A., Logothetidis, F., Triantafyllidis, A., Kalamaras, I., ... Tzovaras, D. (2020, December 9). COVID-19 Mobile Apps: A Systematic Review of the Literature. Journal of medical Internet research. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7732358/.

[10]Whitelaw, S., Van Spall, H., Topol, E., Mamas, M. (2020, June 29). Applications of digital technology in COVID-19 pandemic planning and response. The Lancet. https://www.thelancet.com/journals/landig/article/PIIS2589-7500(20)30142-4/fulltext.

[11]ScienceDaily. (2021, February 10). Mobile game that uses implicit learning improved children's short-term food choices. ScienceDaily. https://www.sciencedaily.com/releases/2021

[12]ScienceDaily. (2020, December 15). 'Earable' computing: A new research area in the making. ScienceDaily. https://www.sciencedaily.com/releases/2020/12/201215091633.htm

[13]ScienceDaily. (2020, November 13). Computer vision app allows easier monitoring of diabetes. ScienceDaily. https://www.sciencedaily.com/releases/2020/11/201113124045.htm.

[14]ScienceDaily. (2020, September 29). App analyzes coronavirus genome on a smartphone. ScienceDaily. https://www.sciencedaily.com/releases/2020/09/200929123544.htm.

[15]ScienceDaily. (2020, September 2). Gamifying interventions may improve mental health. ScienceDaily. https://www.sciencedaily.com/releases/2020/09/200902152142.

[16]ScienceDaily. (2020, August 25). Teamwork can make the 5G dream work: A collaborative system architecture for 5G networks. ScienceDaily. https://www.sciencedaily.com/rel

[17]ScienceDaily. (2020, June 23). Tool to protect children's online privacy. ScienceDaily. https://www.sciencedaily.com/releases/2020/06/200623145354.htm.

[18]Punchoojit, L., Hongwarittorrn, N. (2017, November 9). Usability Studies on Mobile User Interface Design Patterns: A Systematic Literature Review. Advances in Human-Computer Interaction. https://www.hindawi.com/journals/ahci/2017/6787504/.

[19]Iqbal, M. W., Ahmad, N., Shahzad, S. K. (2017, September 1). Usability evaluation of adaptive features in smartphones. Procedia Computer Science. https://www.sciencedirect.com/science/article/pii/S1877050917316678.

[20]Getting Started With Developing for Tizen Smartwatches. Samsung Business Insights. (2020, June 10). https://insights.samsung.com/2019/01/23/getting-started-with-developing-for-tizen-smartwatches/.

[21]Understanding enterprise mobile app development. Red Hat - We make open source technologies for the enterprise. (n.d.). https://www.redhat.com/en/topics/mobile.

[22]Pang, H. (2018, August 9). Is mobile app a new political discussion platform? An empirical study of the effect of WeChat use on college students' political discussion and political efficacy. PloS one. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6085061/.

[23]ScienceDaily. (2013, September 25). Study shows over 200 mobile apps related to dermatology. ScienceDaily. https://www.sciencedaily.com/releases/2013/09/130925185603.htm.

[24]ScienceDaily. (2019, June 20). Multi-mobile computing system makes apps sharable on multiple

[25]ScienceDaily. (2020, March 31). Some mobile phone apps may contain hidden behaviors that users never see. ScienceDaily. https://www.sciencedaily.com/releases/2020/03/20033

[26]ScienceDaily. (2015, September 30). Mobile apps and online reviews influence consumer behavior. ScienceDaily. https://www.sciencedaily.com/releases/2015/09/150930092506.h