Honours Project Proposal: Sarah Dunn with Robotical

A Swift Playground App Teaching Children How to Code with Marty the Robot

Swift Playgrounds is an app produced by Apple designed to teach programming in an interactive and fun way. By making use of touchscreen technology Swift playgrounds allow users to edit code on an iPad using gestures such as tapping or swiping the screen. Users write code on one side of the screen and then immediately view the results alongside the code.

This ease of use makes Swift playgrounds an ideal tool for teaching people, especially children, how to program. Apple have developed a series of coding lessons using the Swift playground framework to teach beginners how to program with Swift. In addition, several robotics companies including Lego Mindstorms, Sphero and MeeBot have developed Swift playgrounds allowing users to program robots or drones.

This project will involve designing, developing and testing a Swift playground app for use with Marty the Robot. Marty is an affordable walking robot designed for education. Unlike the other robots Swift playgrounds have been designed for, Marty has a unique walking mechanism and expressive abilities based on the movement of his eyebrows. He also comes equipped with numerous sensors allowing him to perform and feedback on a variety of tasks. As such he offers a unique way for individuals to interact with their code and stimulates learning.

The Swift playground app produced for this project would be aimed at children between the age of 7 and 11 (Key Stage 2). There already exists research and literature on how Swift playgrounds have previously been used in UK school curricula and how robotics can be used to introduce children to STEM subjects. The first stage of the project will be reviewing this. The student will then design a unique concept for a Swift playground that exploits Marty’s potential, taking into account research on child engagement and the use of robotics for education. The student will then develop the app and test it with users, including in a classroom setting should time permit.

The output of this project has scope for flexibility depending on the abilities of the student. The Swift playground could be a very basic app teaching one concept of programming, or an able student might produce a whole suit of lessons.
Completion Criteria:
Development of a Swift playground app to introduce children to programming using Marty the Robot

Difficulty:
Variable: A strong student may design and produce an innovative app that demonstrates an understanding of digital education for children. A weaker student may produce an app for Marty based on a simplified version of one of the currently available apps for other robots.

Desirable Skills:
Programming in Swift/ iOS environment

Essential Skills:
Knowledge and basic experience of mobile app development
Ability to review current research and literature on child education using robotics and tablet apps

Ethical Considerations:
If the app is to be tested at coding clubs or in the classroom permission would need to be obtained from all relevant parties.

Resources Required:
Computer with iOS programming environment (XCode or equivalent)
An iPad would be useful for testing the final app, but is not essential as emulators exist

References:
1. https://www.apple.com/uk/swift/playgrounds/
7. https://www.asee.org/public/conferences/64/papers/15803/view