Maddox Scott

Ms. Sakthikumar

IB Computer Science, Period 5

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**Criterion A: Planning**

Scenario

**Client/Advisor**

My client is Ethan Kennedy, a member of Skyline High School’s *FIRST Robotics Competition* (FRC) team. He has been on the team for four years, competing at the local, regional, and international level. Much of the work regarding fabricating and assembling physical components of the robot can be attributed to him.

My advisor is my father, Sean Scott. He possesses extensive experience in software engineering, with a masters degree in computer science from the University of Texas, Austin. Currently, he is the chief product officer of a digital security company, and is familiar with the software engineering process. Any software design questions will be directed to him.

**Initial Consultation with Client**

Refer to Appendix (B.1) for the initial consultation.

**Scenario/Problem**

Every season, the Skyline robotics team faces unexpected problems during the development of their robot. Many of these, they can overcome themselves. However, several issues arise due to the nature of being a high school team. A lack of equipment, from simple electric drills to complex machines such as 3D printers and CNC machines, is always a problem, and Ethan’s team does not always have the budget to purchase new tools on-demand Appendix (B.1). Furthermore, with only a single computer lab to host their meetings, the Skyline robotics team lacks the amount of space needed to construct a full-sized replica of the game field used at competitions, which is crucial for obtaining robot driver practice. These complications are not exclusive to Ethan’s robotics team, as many teams across the country are plagued with asset deficiencies.

Last season, another high school’s robotics team invited Ethan and his team to use their CNC cutting machine for part production. Although this machine was open to every team, few teams were aware of this unique opportunity Appendix (B.1). Labeled as a “coopertition,” FRC teams are always looking for new ways to support other teams towards collective success. If teams possessed a superior method for sharing and borrowing tools amongst each other, low-funded teams would not be as disadvantaged.

| **Solution to Problem**  After evaluating the problem, I have decided to develop a mobile application using Flutter and Dart for lending and borrowing tools between teams, capable of displaying each team’s location in Google Maps, what tools they possess for lending, and what time of the week they can be borrowed. |
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**Solution Rationale**

Although Ethan uses an iOS device, members of his team and other teams utilize a wide array of mobile devices Appendix (B.1). If this solution is to reach widespread implementation, different operating systems must be accounted for. Flutter is designed for cross platform development, which will enable the final product to be utilized countless types of devices. Unlike other development languages, Flutter and Dart possess libraries for native Google Map implementation. By using Google Maps, I will have dozens of preexisting functions at my disposal, from finding the distance between two locations to variably altering the map as new teams are added to the application. Lastly, by making the solution an application rather than a website, private identifiers such as team passwords can be saved locally, improving security. This is a good IA project for myself as I must familiarize myself with new types of abstract data structures such as hashmaps and sets.

**Success Criteria**

| Success Criteria Number | Description |
| --- | --- |
| 1 | The application must be able to display the locations of several teams within a single Google Map. When teams are added or deleted from the app, changes must be reflected within the map as well. |
| 2 | Teams must be able to add new tools to their accounts for lending. Each tool must have a labeled quantity and days of the week which it may be borrowed. |
| 3 | The user must be able to search for a tool by providing the tool’s name. The application must visually display the team closest to the user’s position which possesses the tool desired using Google Maps. |
| 4 | Teams must be able to submit emergency requests for tools not possessed by any other team, which are visible to and may be fulfilled by every team. |
| 5 | The application must prompt users to sign in when launching the app. Team credentials must be saved locally, and tools imported must be associated with only the teams which possess them. |
| 6 | The application must be able to delete tools from a team, as well as delete teams themselves from the application. |
| 7 | Implement an ergonomic graphical user interface which lends itself towards the mobile format using large text, high-contrast font, and buttons with sizes fit for the screen they are on Appendix (B.1). |

**Word count: 492 words**