

Lab 2 – Tutor Dash Specification Outline

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1. Introduction

The availability of tutors and tutoring services on college campuses is insufficient to satisfy the need for them. This is because private tutoring is a difficult market to get into without proper connections, formal tutoring may not be able to suit the schedule of the student who wishes to help, and formal tutoring offered through an organization often has too many requirements for a student tutor to feasibly fulfill when applying. Allowing students to register as tutors through Tutor Dash will increase accessibility to the profession and thus encourage them to engage with peers in their campus community through the offering of help and guidance in a variety of courses.

It has been proven at ODU that the introduction of student peer tutoring services is highly beneficial. One such place in which this is seen is in courses pertaining to math and computer science, which many students will tend to struggle with even if only for certain topics or concepts. Moreover, for many courses and particularly with regard to MATH103M (College Algebra), the introduction of tutoring and supplemental instruction resources into the classroom setting has markedly reduced the DFWI rates for the course and led to an increase in major retention among students. Through the decrease of DFWI rates many students have been spared the expenses of having to retake a failed course and rely upon grade forgiveness policies. Many students have stated that they enjoy peer tutoring because they feel more relatable to and comfortable with student tutors than they do with their professors and graduate teaching assistants. There is a formality expected by students with those relationships that is not present in peer tutoring, and it can at times pressure a student into not seeking help even when they genuinely feel that they need it for one or more of their courses.

Currently at ODU there is a wide variety of student benefit and tutoring resources available on campus, but because they are spread out across a myriad of departments, information about the tutoring services may be rarely updated and can be difficult for students to locate online in a university's web domain, and students are less likely to make use of them as a result. Tutor Dash will connect students and consolidate these resources through the provision of a centralized platform for students to communicate with each other and give or request tutoring services whenever necessary or desired.

1.1 Purpose

Many university students are qualified to aid their peers with course content but will often choose not to because of inconveniences with payment for the work that they do helping peers and with scheduling work hours around time necessary for school. Tutor Dash will rectify this through the provision of a platform where students can offer or request tutoring help at any time of day, and tutors will receive payment for their services immediately upon completion of a tutoring session.

Tutor Dash will be implemented as a smartphone application (for Android devices) that is designed to centralize the tutoring services available on college campuses and allow student users to search for and engage with tutoring services provided by other students in attendance at the same university. Students in need of course assistance will be able to request help and schedule tutoring sessions with fellow students, who through the application, have decided to assume the role of a tutor for their peers.

The services offered by the current university tutoring market do not suffice to fulfill the desires of students. They currently are very limited in scope; for example, ODU currently offers tutoring for only 132 courses when there are over 2400 courses available for registration

(“Campus Tutoring”, “Course-Specific Tutoring”, 2019). There is great inconvenience to students that can be seen in the fact that many tutoring resources are time-restricted to only several days per week or available exclusively by appointment. While more of the tutoring centers are open during the early afternoon, very few remain open until later in the afternoon and early evening. Studies have shown that this is a period of time that many students prefer to study during (Evans et al., 2017). Scheduling information for tutors and tutoring center open hours is not always up to date and reliable, so oftentimes students may arrive at one to request help and soon discover that there is no tutor currently present or available to assist them.

Tutor Dash will allow qualified students to tutor any class at their university, and they as tutors can make themselves available at any time of day that is convenient for them. Tutor Dash consolidates tutoring services onto a single platform, regardless of whether or not a student works for the university itself at a tutoring center or offers private tutoring services. Tutoring will be available both in-person and online for the entirety of each day.

1.2 Scope

Tutor Dash is designed to be used by university students who either desire to offer tutoring services to other students at their university or desire to be tutored for a course in which they struggle. The Tutor Dash project was first conceptualized by Team Gold when members familiar with the tutoring environment at ODU began to notice the insufficiencies and weaknesses of existing tutoring systems and services. Figure 1 features a process flow diagram that depicts the current procedure for a tutee locating a tutor, requesting help with coursework and understanding class concepts, and receiving said help from the tutor.

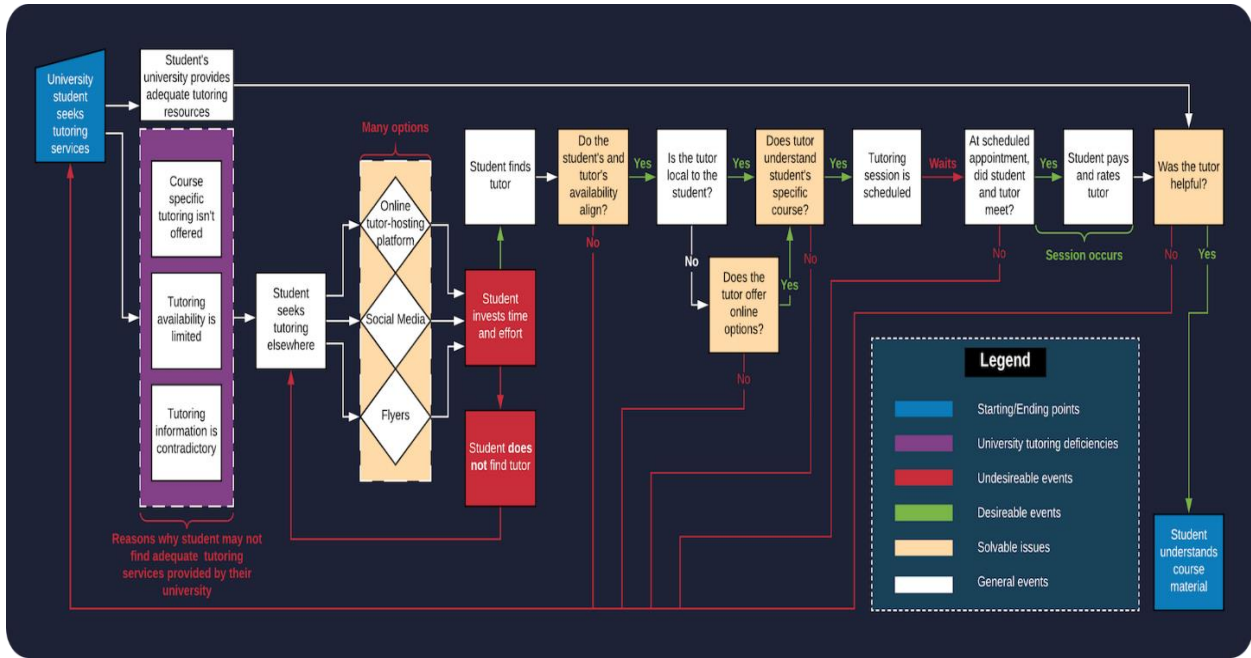


Figure 1. Students Seeking Academic Assistance

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Figure 2 covers the process that a university student must go through in order to attempt to begin private tutoring. Figure 2 similarly depicts the current process flow for tutors looking for tutees. Tutors looking for tutees face similar obstacles to tutees looking for tutors as shown in Figure 1. The diagram illustrates many of the decision obstacles that make it difficult for students to find compatible tutors.

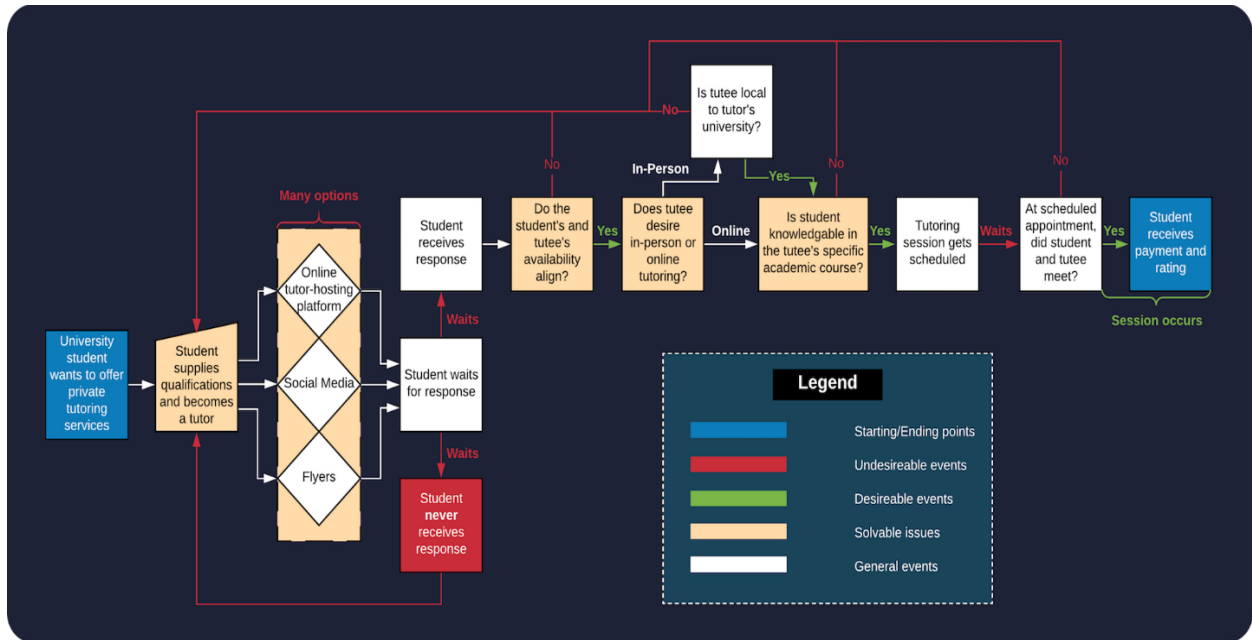


Figure 2. Students Seeking Tutoring Advertisement

Tutor Dash adds convenience to the process of tutoring for tutees by allowing them the possibility of receiving help at any time of day; moreover, it adds convenience for tutors by serving as a platform through which they can advertise and offer their services, which before was only possible primarily through the posting of flyers around campus and the distribution of business cards. Tutor Dash merges the two current process flows illustrated in Figures 1 and 2. By providing a niche tool that connects students at the source, many of the current decision obstacles can be avoided.

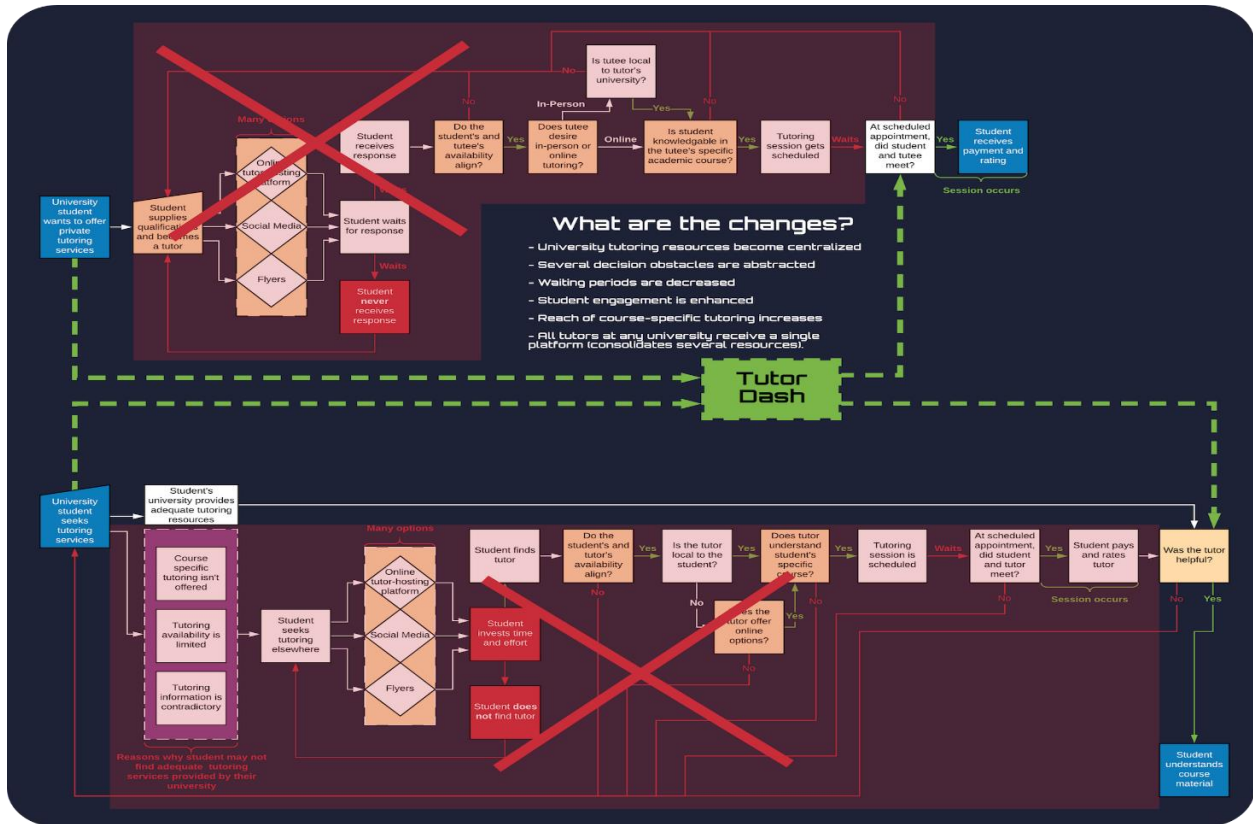


Figure 3. How Tutor Dash Affects the Current Processes

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1.3 Definitions, Acronyms, and Abbreviations

Course-specific tutoring: Academic assistance services provided for a particular course at a particular university.

DFWI: An acronym for Drop/Fail/Withdraw/Incomplete. This relates to university course incompleteness status.

DFWI rates: Represents the ratio of university students who do not complete their courses to students who do complete their courses.

Direct Competitor: Another product or company which is solely involved in the same domain space as Tutor Dash.

Entity: A person, object, or external server that serves as a leveraged functional component of the Tutor Dash product.

FERPA: The Family Educational Rights and Privacy Act is a United States federal law that protects the privacy of educational records.

Indirect Competitor: Another product or company which is involved in the same domain space as Tutor Dash but does not focus solely in that space.

Tester: Individuals responsible for testing the quality of the software.

Tutee: A university student seeking academic assistance.

Tutor: A university student offering independent tutoring services that are qualified based off previously taken courses.

Uber: A ride-hailing company that offers the Uber mobile app, which you can use to submit a trip request that is automatically sent to an Uber driver near to you, alerting the driver to your location.

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1.5 Overview

This product specification provides a high-level look at the goals and overall structure of the structure of the Tutor Dash prototype. It establishes the motivations of and necessity for such an application and provides a brief description of how Tutor Dash will achieve its goals. This specification also describes the architectural design of the prototype and how that design contributes to the functional capabilities of Tutor Dash. Further detail is provided regarding the various types of interactions between the application, external components, and third-party APIs such as Braintree, Firebase, and Google Maps and Calendar. Finally, the specification provides a precise list of requirements which the prototype must satisfy.

2. General Description

Tutor Dash will be an Android mobile application that allows students to engage with one another as tutors of one or more courses and tutees seeking help with a course. The application development of Tutor Dash incorporates a variety of APIs including Firebase, Braintree, and Google Calendar.

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2.1 Prototype Architecture Description

The Tutor Dash product prototype will consist of a mobile application usable by multiple users at Old Dominion University. It will serve as a proof-of-concept for the real-world product. The core features of the application that will be implemented include the verification and qualification algorithms used when a user applies to become a tutor, the rating system, and the utilization of existing APIs to handle payment processing, account creation and maintenance, and the scheduling of tutoring sessions that are held through web conferencing or in person. Tutor Dash consolidates a set of existing tools with the addition of new features like pay-rate calculation and the automation of meeting setup and payment processing for greater user convenience and accessibility to the application. User account information will be stored in the Firebase database and authenticated through the Firebase Authentication service. The number of queries that can be made to the database are limited per week, and storage size for user accounts can be upgraded at a later point for a real-world product that requires more space.

Product Tutor Dash is comprised of the following major components:

- **Firestore:** Provides the capability to store and update user account information. The application's database will also store user reviews, chat logs, blacklisted user information, and school and course information.
- **Braintree:** Provides the capability to conveniently and securely handle payment processing between users.
- **Google Maps:** Provides the capability to locate other Tutor Dash users on the map discovery view.
- **Google Calendar:** Provides the capability to conveniently schedule and edit tutoring sessions between users.

- Android Smartphone: Provides the capability for the user to download and install the Tutor Dash application.
- GUI: Provides the capability for the user to interact with the various features and functionalities of the application.
- Transcript Parser: Provides the capability for users who wish to become tutors to upload their official university transcript and have it parsed and processed for a comprehensive list of courses that they are eligible to tutor.

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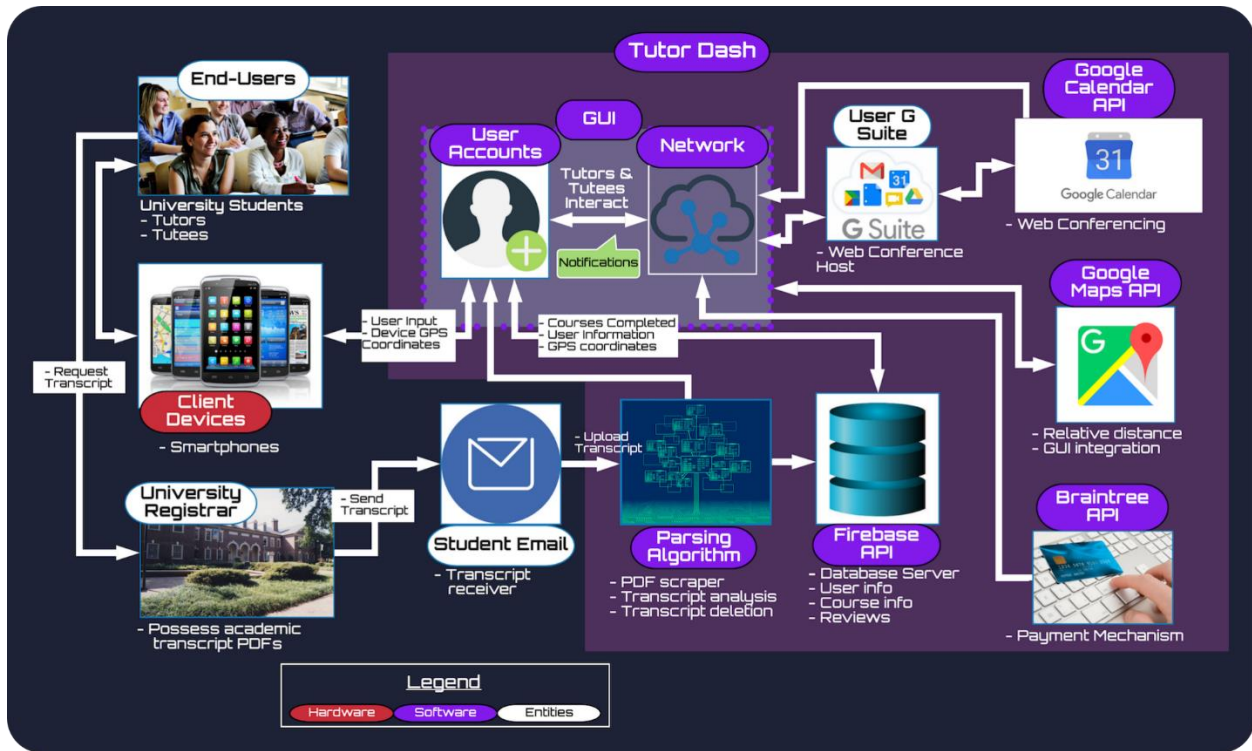


Figure 4. Major Functional Component Diagram

2.2 Prototype Functional Description

Tutor Dash will provide the capabilities for university students to both seek and offer tutoring services with the courses they are and have enrolled in. Upon account creation and registration, a student may opt to become a tutor, in which case they will be able to upload their official university transcript. The transcript parsing algorithm will generate a list of all courses that the student received a grade of B or higher in, and from this pruned course list students can select which courses they feel most comfortable assisting others with. Students will be able to search for other users and schedule tutoring sessions with them in real-time. Payments between users will be handled by Braintree automatically if both users consent and agree to the conditions of the scheduled session. Upon successful completion of a session, tutors will be able to rate the user who they tutored in similar fashion to how drivers can rate passengers in the Uber

application. Similarly, tutees will be able to leave a comprehensive review of the tutor who helped them.

2.3 External Interfaces

The Tutor Dash application will interface with Google software services including Google Calendar and Google Maps, the Firebase Cloud Firestore NoSQL database, and Braintree payment processing. The user schedule layout must interface with the user's personal Google Calendar and update it accordingly whenever a tutoring session has been established and planned between two users. The user search map discovery layout must interface with Google Maps, which will receive the current location information of all active users and display users within the search results accordingly.

When registering a new account, the input information in the account creation layout will be sent to Firebase and used in the creation of a new user profile. Before the user can begin using the newly created account, they must confirm their account through link interaction with a verification email sent by the Firebase Authentication API. The database will store all user and school data as well as the records of payments, reviews, user schedules, and chat histories between users. JavaScript Object Notation (JSON) is used to store, access, and update JavaScript objects that are converted into JSON text for the purposes of communicating with the server.

Braintree will handle all payment processing functionality for Tutor Dash. Whenever a transaction is created, the Tutor Dash front-end will request a client token from the server and initialize the client SDK. The server will then generate and send the client token back to the client using the server SDK. The customer will then submit payment information that the client SDK communicates to Braintree and returns a payment method nonce. The front-end sends the

payment method nonce to the server, and the server code receives the payment method nonce and then uses the server SDK to create a transaction.

2.3.1 Hardware Interfaces

The primary hardware interfaces implemented in the Tutor Dash prototype are an Android mobile smartphone that the app will run on and a router that provides a stable WiFi network and connection to which a user can connect in order to reliably interact with Tutor Dash services.

2.3.2 Software Interfaces

Firestore: Firestore is a NoSQL database that does not utilize Entity-Relationship Diagrams and instead stores all information as JSON documents.

Firebase Auth: Firebase Auth is an API that allows for the creation of user accounts and storage and verification of account information.

2.3.3 User Interfaces

Android Smartphone: An Android smartphone with a recent version of Android 3.0 is necessary for the proper functionality of all key features of Tutor Dash and its integrated APIs.