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Final Project Objective 1. - Explanation

Analysis of Software Systems

11/30/20

**HIPA: The Future of User Immersion and Productivity**

As time has gone on year after year, technology and its users have become increasingly intelligent and innovative. From finding a way to cram 1000 songs onto the iPod shuffle, to shifting the understanding of what a phone or tablet is truly capable of, Apple alone has been a massive contributor to technology’s growth in the palms and brains of its users and bright-minded developers. They have shifted the paradigm for what people view technology to be capable of for the everyday consumer, and this is only an example of one company. Microsoft, Amazon, Google, and many more companies are innovating far beyond what is thought to be normal and natural for a phone, laptop, PC, tablet, and technology user in general to experience. Innovation does not stop, in fact it only seems to grow stronger with time. Given the current circumstances of the world, it only seems right that we have a greater necessity for stronger and more intuitive technology. Since necessity is the mother of invention after all, we are living in the perfect time for innovation that will rock the world of technology and challenge how users experience it like never before. Hence, my new application is known as HIPA: Holographic Interface Personal Assistant.

HIPA (especially version 1.0 - which is the basis for this project) works similarly to any schedule or todo list application, in fact that is its main functionality. HIPA’s main function is to have two separate yet similarly useful features. The first is a schedule feature that contains events that can be loaded, customized, scheduled for specific and recurring times, and notifications and reminders can be configured for each event, while upcoming events and the completion of previous events are also tracked. HIPA’s second feature is a todo-list feature that works similarly to the schedule, except the todo-list is organized based on tasks. Tasks can be named, created, completed, and deleted. Specific dates and times can be assigned which can be changed and even snoozed for 15 minutes intervals (along with scheduled events as well) while notifications can be toggled for both as well. HIPA keeps track of how many tasks and events need completed on the given day, and shows you the completion progress of both of them through a progress bar that is available as a widget on mobile, viewable in the mobile application itself or in the watchOS version and watchface, or through the holographic interface that is projected through your phone.

While HIPA may seem to be a typical scheduling and todo-list application all packed into one, and it is, my inspiration for creating this application came from wanting my google calendar notifications and my todo-list notifications(I use an app called Todoist) to all come from one central location with the same functionality. However, thinking past this, I wanted something more than just a simple schedule and todo-list. I wanted innovation, something I can work toward far past graduation, and even dream of doing one day to leave my mark on the industry so that I can get truly excited about this project. After recently watching Marvel’s MCU movies with my girlfriend, I became very intrigued by the interface that Tony Stark interacts with while doing prototype engineering. Like the image shown below, he has holographic models in front of him, and he is able to pinch to shrink and enlarge the models and move, spin, connect them, get rid of them, and add new ones, and overall interact with them with such ease and simplicity. It seems like a concept that would be incredible to work with and so immersive to use. That was the inspiration behind the holographic interface option for HIPA, and it is simply one option for the applications use, users can simply use the mobile version and potentially pair it with the watchOS version if they so choose to experience the app in a more archaic and “normal” way, but I believe the holographic interface option will open the door for all kinds of creators, developers, and companies to launch themselves further into designing and understanding so many different concepts better with the assistance of holographic technology.



The entire holographic interface involves multiple different 3D holographic models consisting of polygons (similar to the 3D modeling for video games) appearing before a user by placing a user's phone down screen-up in front of them, and the screen projecting the holograms upward. The holographic interface only uses basic shapes, such as a rectangular prism and/or cube, or even a 2D square/rectangle, for a calendar and a todo-list, etc. The user can interact with these holograms in order to select specific dates, and then to add an event or create a new one on that selected day when working with the calendar hologram, or to edit or create a task that is selected when working with the todo-list hologram. Once the holographic interface is booted up after typing login information in the actual mobile application, the user's name appears at the top of the amount of space that is designated for holograms to appear (the size of this space can be changed in application settings but does have a limit due to problems with how far the iPhone is able to display light). Underneath the users name there will be two large rectangles, one that is the users todo-list, and the other is the users current schedule, which displays the current month similar to Apple’s calendar application (this also can be changed to specify weeks or years by pinching the hologram. Any and all interaction with the hologram interface involves tapping to select dates, events, or tasks, or scrolling along a scroll bar in the event of editing or entering a time or date for a notification or deadline. There is no holographic keyboard option for this version, although it is being looked into for the next version. Any input that would normally involve typing while in the holographic interface is simply done by speaking the necessary text into the microphone, which the user is prompted for with a holographic display saying “speak now.” The holographic interface also contains a holographic “X” icon somewhere in the display to exit individual pieces of the interface should it get too crowded or to exit the entire holographic interface and swap back to mobile display only.

While the idea and concept of the holographic display was an extreme undertaking within itself, making sure it is user friendly is just as important, if not more so. Due to the newer nature of this type of technology, and only the support for pinching, tapping, and dragging holograms within the interface, a new type of hardware needed to be developed. In order to accommodate this, we have developed the GIPA Grip, which acts as a carbon-fiber sleeve to place over your index finger and thumb, with both sleeves being connected together by a piece of wire long enough to allow for full range of motion between the index finger and thumb, also being connected to your phone via bluetooth so users can interact with the holograms without needing another cord to attach to their phone. The specific hardware within the sleeves, along with the wire connecting them, allows for the user to physically interact with the holograms within the holographic display. Without going into gruesome detail, the user's phone is able to track what pieces of the interface are where on the holographic display (due to the size settings mentioned earlier as well as the holograms always defaulting to the same location about booting). Holograms can be pinched to make them smaller and larger, or change the scope of the view in the case of the schedule. Holograms can also be shifted around to be in any location of the display, even stacked on top of each other, in which case that most recently interacted with one will take precedence, like different windows on top of one another in MacOS. When any of these interactions are done, they are tracked and monitored by the database, and their x, y, and even z values (if a specific hologram is 3D) are updated real time within the app and the cache of the current work-session. This allows for the user to continue to interact with the holographic interface as the holograms positions change beyond their default placement. The only problem with the design choice is that a great deal of memory is spent on the cache constantly checking and keeping track of the individual coordinates of each holographic window, including the smaller scroll bar windows that are almost exclusively used when assigning times to events or tasks. We have accounted for this however and are looking into ways to save space and money on data storage in later versions.

Within the mobile-only version, the same interface applies without the customization options of pinching and dragging across the screen. There will be a main menu that allows the user to see their schedule/calendar, and then a button on that respective schedule/calendar screen to add events or create them after selecting an individual date on the calendar/schedule screen. There will likewise be a separate screen for the users todo-list. This list will not be a calendar format, but more similar to a regular dropdown list that the user can prioritize the task listing based on many different criteria such as completion date or time, date or time created, etc. Within the todo-list view, users can add new tasks or edit current ones, as well as mark any task as complete. The mobile version will also give users notifications whenever they designate that they should receive a notification for an event or task. By default, the user receives a notification 24 hours before a calendar/schedule event, 15 min before said event, and at the designated time for the event. By default, the user receives a notification for a task at the time specified for it to be completed by. When receiving a notification, the user can mark the event or task as completed/finished respectively within the notification itself, the user can also invoke a snooze function, which stalls the notification for 15 more minutes, and re-notifies the user after 15 minutes have passed, giving the same options to either complete, snooze, or ignore the notification. If a notification is ignored, no more notifications will be given, but the event/task will still be listed in the users schedule or todo-list and be uncompleted, the user must manually go into the app and complete it after this point.

Within the watchOS version, there is a watch face widget that tracks the percentage of events and tasks completed out of the amount assigned for the current day, and uses a scrollbar to indicate this. Notifications are also received through the Apple Watch, which allow for the same options on mobile, being snooze, complete/finish, or ignore. If the app itself is opened in the watch, users can view their schedule or todo-list, and can add events/tasks, however events and tasks can only be created through voice commands.

After deliberating, researching, and developing, I am confident that GIPA will be the new leader in graphical design and interfacing, and will pioneer a new generation of user immersion. There are future plans for GIPA to include machine learning algorithms to track tendencies such as how late or on-time someone usually is and change deadlines based on that, among a myriad of new features. It is an exciting time to be a developer, and to assist in building the future of technology!