Mobile Application

How we transport the data through LogiSteps, and how the user views it quickly, is what makes the product useful. Without this, there is no reason for the product. The mobile app is not the only way to view the data or the only way to transport the data to the server, it may be the most effective. The mobile app allows for dynamic updates to the protocols and data. This means we are able to use the data in more ways down the line. This also means that we do not need physical access to the device to update it. Some other key advantages:

* **Power Saving –** The mobile app allows us to use Bluetooth on the LogiSteps device. Bluetooth is much lower power than the alternative which is LTE. This will save power on the device which should allow the device to be passively powered.
* **Ease of Use –** The mobile phone is something everyone has. Almost everyone also carries it with them everywhere. This allows for ease of use and no need to store data on the LogiSteps device or the phone (provided the phone has LTE turned on).
* **Small Application –** Because the web server is storing the data and is the primary method of displaying the data, the app only needs to grab the little data it needs from the web server. It also means that the app does not need to do any heavy processing of the data. This will keep the app small for those who have limited space on their phones.
* **Updates –** The use of the app store allows the push of updates to be seamless. Yes, the application needs to be pushed out to anyone who owns LogiSteps. However, the update does not have to come directly from development. The update can be developed outside of the store, then pushed when ready.

There are also disadvantages to this design. They need to be considered and ruled out as detrimental to LogiSteps. If they hurt the product too much, the design will fail and not be a viable product. The considerations are:

* **One More Device –** This design always requires the user to carry one more device on them. This could be annoying to those such as runners, and other athletes. Though most already have arm bands or waist bands to carry their phones when doing so, not all do. And not all want to.
* **Programming Language –** There are only two languages that are useable to android users. Kotlin and Java. Both have their advantages and disadvantages that could get in the way. This is due to the way the apps are designed. There is also only one environment that can be used to develop the application in, Android Studio. If one were to talk about apple, apple requires that development be done on an apple device. This poses an issue as a developer.
* **Hardware –** The mobile application development requires that the developer have the hardware to test. Android studio does have a virtual machine that can be used, but for this application it does not work. This is due to the need for Bluetooth. The virtual machine does not interface with a computer’s Bluetooth well.

There are three parts to this app. The first is the receiving. How is the app going to get the data from the microcontroller? The second is the sending. How is the app going to send to the server? The last is the GUI. What does the user want to see in a quick view and how is it displayed?

Bluetooth (Receiving)

The method for receiving data from the microcontroller has a few different options. One could use an actual wire connection, LTE, or Bluetooth. Of the three, only one is really acceptable for our constraints, Bluetooth. Bluetooth has a low energy mode, so it does not take up too much power. The power is a large constraint for LogiSteps to be passively powered. The lowest power that could be used is Bluetooth Low Energy. The highest power is LTE, ruling that out. The device is also an insole, so the wire is not very feasible. It would require there to be a port on it. The port would have to withstand being sweat on, stepped on, and in general getting wet. There is no real way to do this that is cost effective. It also requires the user to plug the device in every night. That is not very convenient.

Android has a library already in place for Bluetooth connection. It also has protocols in place to store the key for the product, so a connection can be done automatically after the pairing is done. The libraries are stored in three different permissions. These libraries are very well documented on the android developer page. CITATION 1.

HTTP (Sending)

The sending of the data has a few different options. As seen in the web application section of this document, there is SQL, NoSQL, and HTTP. They are all very similar in the way that they function through the mobile application. There are some things that limit what is being used however. The biggest being the formatting. With HTTP, one is able to format the data in any way we would like. This would help with the fact that LogiSteps will have its own format for data.

HTTP has a library in android as well. The library helps set up the connection to the HTTP server. It then has a way of reading through an input stream and writing to an output stream. There is full documentation on the android developer page. CITATION 2.

GUI

The user interface here has a lot to consider. The main user interface does not make sense to store on the phone without storing the data there. It just becomes redundant with everything else on it. That is why the phone GUI will be a secondary interface. It will only show some data, not all. This has to do with the web server being much more powerful and steady than the mobile app. It also saves space in the app.

The mobile app has a few things to consider. The main things, however, are what the user would like to see at a glance. The web server will have the full implementation of the user interface with all of the data, but what does the user want to see on their android device? The constraints mostly fit into the size of the device. for most devices, there can be about 6 things shown at a glance that are still readable. This is in a grid layout with boxes showing the data.

The data will be pulled off the web server for the GUI. The phone will not store the data. This is for the size factor on the phone, so that anyone, even those who have a million pictures, can use LogiSteps. The data will then be displayed on the GUI in a graphical format where it makes sense. Or in a number format when it does not. This way makes the most sense when considering LogiSteps is a fitness tracker.

There is also the connection to consider. If something is not working, how would anyone know that it is not the connection if the status is not shown in any way. The design also begs that there be a way for the phone to connect to the device. If this were not an option, users would have to buy a new phone with every device. That is not very cost effective.

Conclusion

LogiSteps middle point to the server will be a mobile application designed on an android system. The android system is due to hardware restrictions. The mobile app will pull the data from LogSteps microcontroller through Bluetooth. The Bluetooth protocols will only read the data from the controller. The mobile application will then re-route the data to a web server that will hold all of it along with have the main user interface. The mobile app will show limited data on the screen about the user, to cut the size of the app down. The app can show about 6 different things on an average screen when it comes to fitness tracking. It will also have an option to connect a new device and show the status of the device at the current time.

1. <https://developer.android.com/guide/topics/connectivity/bluetooth>
2. <https://developer.android.com/training/basics/network-ops/connecting>