



Progress Report for

## **Flipp: A Page Turning Device**

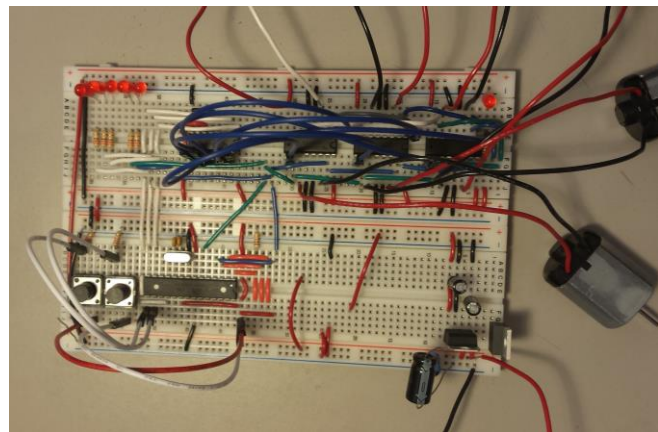
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The Lex-Aid team is currently in the process of designing a proof of concept for Flipp: A page turning Device. At this point in the project, 3 months and 3 weeks into the semester, the Lex-Aid team is proud to report that we fully expect to have our proof-of-concept for Flipp ready for our scheduled demonstration date of December 22<sup>nd</sup>, 2015. We currently estimate that we are 2 weeks behind schedule according to the schedule outlined in our proposal. While we are well into the assembly and integration phases of the project we are forecasting that these phases will not be completed until December 15<sup>th</sup>. This delay is caused primarily by an increase in the scope of our project that was agreed to after our meeting with Lukas as well as by some minor setbacks in the design of the mechanical and electrical systems. The Lex-Aid team intends to dramatically increase their time commitment to the project as the semester draws to a close in order to cover this shortfall to ensure the readiness of the project by the demonstration date.

At present the main body for the device has been constructed and work on the arms that will provide the mechanical motion needed to flip the page are more than 50% complete. The main body of the device with a view of the main arm is pictured below in Figure 1.



*Figure 1: Main Body of Flipp*



*Figure 2: Breadboard of electrical circuitry for Flipp*

The initial tests of the electrical components of the circuit is complete with the entire circuit being laid out on breadboards with the microcontroller, voltage regulators, motor drivers and current sensors all working together. A picture of the breadboard layout for the circuit is in Figure 2. Work is well underway to design a surface mount printed circuit board that will unite all of these subsystems and is scheduled to be completed by the time of submission for this document.

From this point onward the remaining work to be done is well understood. The PCB design will need to be sent off to be etched. Once we receive this board we will solder our surface mount components to the board and verify that our electrical systems all operate in harmony. Work is also underway to complete the remaining arm that needs to be constructed as well as to construct the flaps which will hold the book in place. After this the majority of the work will shift to focus on the integration of the mechanical, electrical and software subsystems.

As of the writing of this report the Lex-Aid team has spent \$967.19 on the construction of our device. The breakdown of where this money has been spent is outlined below in Table 1.

| <b>Project component</b>     | <b>Spending to Date</b> |
|------------------------------|-------------------------|
| <b>Materials</b>             | \$158.49                |
| <b>Mechanical Components</b> | \$110.00                |
| <b>Electrical Components</b> | \$698.70                |
| <b>Total</b>                 | <b>\$967.19</b>         |

This puts us over our projected budget of \$763 by \$204. The reason these expenditures are greater than predicted is primarily because we have explored avenues for the realization of the device which have proven not to be fruitful. At the time of our technical specifications we were planning to lift the pages of the book using a vacuum pump however after purchasing and performing tests with a pump it was found that this method was too unreliable for this project and instead a solution using arms and rubber wheels was pursued. As well, it was our original intention to design the main body of our device from aluminium however after purchasing the required materials and getting some fabrication done it became apparent that it would be too difficult for us to work with this material further due to our lack of access to fabrication tools. Another major expense was the purchase of motors. At the beginning of this project we didn't have a firm understanding of the types of motors that we would need to realize our design. This led to the purchase of a number of small DC motors which turned out to be unsuitable for our applications. At this point the only major expenses remaining are the fabrication of our PCB and the purchase of small mechanical and wooden components to complete the integration phase of development. At this time we are revising our proposed budget upwards from \$967 to \$1250.

The team is at Lex-Aid has spent many hours so far researching, designing, debugging and integrating the systems that will form Flipp: A page turning device. Despite some minor setbacks, particularly in the area of the budget, the team is fully confident that we will be able to demonstrate a working prototype of our device at our project demonstration.