3.2.1 Finalized hardware design

Finalize your design for the output side of your waldo. Include dimensioned drawings of the final version of your mechanical design (they may be the same or different from what you submit in 3.1. If it is different, you should submit the drawing of the new input side too). Include a short description of your mechanical design, the design choices you made, and its intended movement and functionality (exceptional mechanical design and/or creativity will be rewarded).

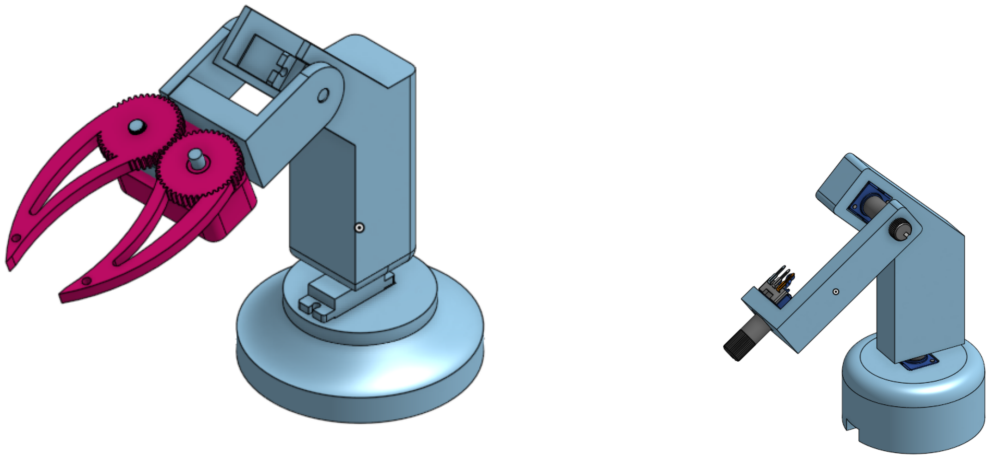

Figure 1. Output side (left) and Input side (right) of the waldo device (CAD file attached with submission)

The mechanical design of the output side of my waldo device is geared towards enabling manipulation using a robotic arm with three degrees of freedom. The design choices made in this system are carefully tailored to mimic the natural motion of a human arm, allowing it to efficiently grasp small items from a table.

The first degree of freedom is achieved through a horizontal rotation at the elbow joint. This allows the robotic arm to pivot left and right, providing the lateral reach required to position itself over the desired object on the table. The second degree of freedom is introduced with a vertical rotation in the arm segment. This motion mimics the raising and lowering of the human arm, enabling the robotic arm to adjust its height and reach towards objects of varying heights on the table. The third degree of freedom is implemented in the claw, which is designed to open and close in response to the rotation of a servo motor. This gripping action is essential for the arm to securely grasp and hold small items, just like human fingers.

3.2.2 Hardware fabrication and analysis

Make the output side of your waldo. Use the supplied SG90 RC servos, or you may optionally purchase your own servos. Note that the supplied servos are weak. Do an analysis of the potential current usage by your circuit, including the current sourcing capabilities of your power supply. You may need to search online for more precise SG90 servo current specifications. Submit a document that includes your analysis of the total current draw of your circuit in the worst case (ItsyBitsy, potentiometers, servos etc.) as well as the current sourcing capability of

your power supply(s). If you use something other than the SG90 servos, include a spec sheet for the servo you used. Include a schematic circuit diagram of both the input and output sides of your waldo that includes the power source(s).

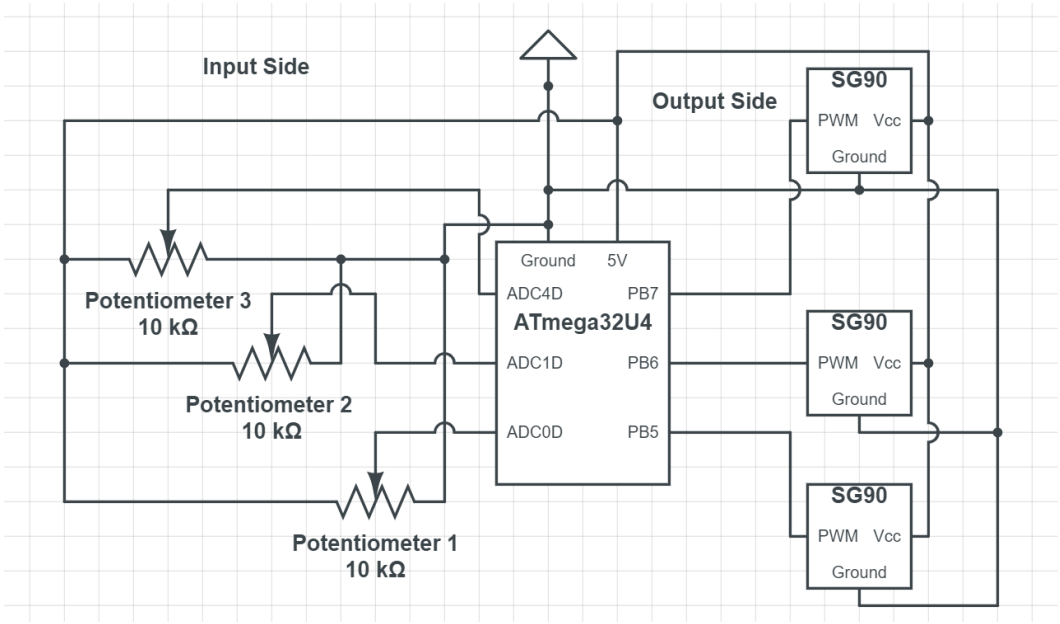

Figure 2. Schematic of the waldo circuit for input side (left) and output side (right)

3.2.3 Software Integration and demonstration

Write code that integrates everything to make a complete waldo input/output system. You may use the events and services model. Once completed, your output should accurately mimic the input with minimal delay. Look at the example videos provided for reference of expectations. Submit well commented code. Submit a link to a video showing the full range of motion of each degree of freedom and also that the input and output match at least 2 intermediate points. (Do not send more than 10 seconds of video)

Video: 3.2.3 Demo

3.2.4 Do a dance!

Show us what your waldo can do! Submit a video of your robot dancing to a 10 second portion of music choreographed to the selected music (announced in class). We will have a competition at the end of the class where the TA's will vote on the best projects. Each winning project will receive 1 extra late day and a fabulous prize.

Dance Demo with Music: Waldo Dance