

**Design Studio #4 - Weekly Progress Report #14**

DS Instructor: Gülbin DURAL

Partners:

* Fatih ÇALIŞ
* Fatih ÇAM
* Recep GÜNAY
* Huzeyfe HİNTOĞLU
* Sarah ILYAS

In this week, we have re-designed and 3D printed the components for the shooting mechanism. The design is done using the Autodesk Fusion 360 software and consists of a rack and a pinion. The dimensions of the components are decided by testing the compressing distance of the spring such that it generates enough force. The pinion in this design is a gear with some broken cogs. We designed three versions with different inner through hole shapes since we are planning to try them with different motors. Their 3D drawings is depicted in Figure1.



Figure1: The pinion designs for different motor shafts

The rack is designed with the same approach and its 3D drawing is shown in Figure2. (Fatih ÇALIŞ)

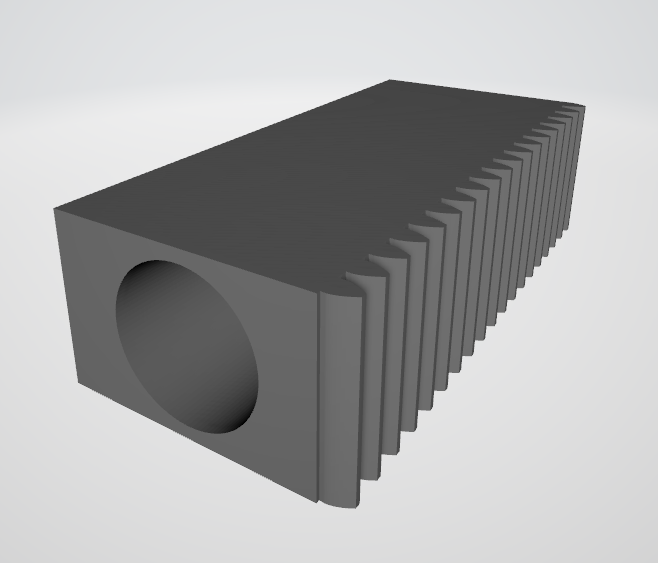


Figure 2: The rack designed for the shooting mechanism

Also, we have worked on control algorithm. The algorithm bases on taking signals from RC and evaluating them. According to these signals, robot and camera movement are carried out. For this purpose, we used Arduino. The receiver of RC is connected to Arduino pins. An interrupt code is written on Arduino for these pins. If any change occurs on these pins that means there is a move command from RC transmitter, Arduino creates interrupts to handle this events. Interrupts are defined for all pins separately. Therefore, we can understand which commands comes from transmitter according to the interrupt pin names. For example, if interrupt occurs on pin number 1, we understand that move forward command is sent from transmitter. This is how we handle command signal transfer between RC and Arduino.

The second issue is how to interpret command signal. Another piece of code is written for this accomplishment. RC controller has two joysticks and both can move vertically and horizontally. This provides 4 channels utilization on these joysticks. We used one of the joysticks for robot movement and the other one for the camera movement. When these joysticks are moved, the interrupt code that is written for the first duty provides output value between 1000 and 2000 according to the position of the joysticks. For instance, channel 1 gives 1000 value when it is in leftmost position, and gives 2000 in rightmost position. Similarly, channel 2 gives 1000 value in lowermost position, and gives 2000 value in uppermost position. Channel values vary between these values according to joysticks’ positions. In order to give proper motor commands, we mapped channels output values into 25 regions that has 5x5 dimensions. Each region has 200 value sensitivity for both channels. For example region one that is in the leftmost and uppermost position corresponds to channel 1 values between 1000 and 1200, and channel 2 values between 1800 and 2000. Controller puts any signal between these values into this region. According to each region, we give certain motor commands to move robot. For example, when joystick is moved vertically up only. this means move forward command is sent. Interrupt occurs and channel 1 gives value between 1400 and 1600, and channel 2 gives values between 1800 and 2000. Controller interprets its region and and gives full power motor commands in forward direction. As a result, robot moves forward as desired. This is how command signals from transmitter are obtained, interpreted, mapped and transformed to motor commands using controller Arduino. (Fatih ÇAM)