ELEC 4000-003
Phase One Report – Swim View 2.0
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The primary purpose of this project is to extend a previous senior design group's project of designing an automated camera tracking system for the Auburn University Kinesiology Department. The current system, SwimView, includes a remote controlled camera system that allows the user to capture video footage of a swimmer. The system provides a live-stream of the video while simultaneously storing the footage for later use. This project will focus on designing and integrating a tracking system that will allow SwimView to be completely automated.

# SwimView 2.0 - Instruction Manual

## **Track and Cart Assembly** (Updated)

1. Connect track sections end to end for desired length of the track. U-bolts should line up on the same side as the power inlet or away from the pool.
2. Endcaps should be inserted into the end pieces of the track. The endcap with the hole should be oriented in-line with the pulley wheel.
3. Unroll the cable tray inside the U-bolts and the outside rail, ensuring that it will lay flat under the cart. The cable tray should be slid all the way to the carts power inlet.
4. Attach the end of the cable tray to the middle of the track with the provided clips.
5. Place the cart onto the track and ensure that all wheels are aligned correctly.
6. Feed the paracord through the cart making sure to go through the guide holes located under the cart. The paracord should be looped around the wheel once.
7. The end of the cord with the clip should be attached to the hole within the endpiece. The other end should be fastened with a knot and attached to the clip on the endpiece. Synch the paracord as tight as possible.
8. Place the cart in the middle of the track and ensure that the emergency brakes are on.
9. Connect the power cord to the cart and the wall. Ensure that the cable tray is attached to the L-piece beside the power inlet via bunjee cord. **Warning**: Leave the emergency stops on for at least one minute after energizing the system.

## Camera Arms Assembly

1. Refer to Enclosure 1 (pg.3) for instructions on assembling the recording camera arm (arm in pool).
2. The tracking camera arm (out of pool), should remain intact even when not in use, so it should not require any assembly.
3. The tracking camera pitch angle should be adjusted to the optimum angle by using the adjustment screw on the bottom of the camera mount.

## Box Power

1. Refer to Enclosure 1 - “Box Power” (pg.4)

## Video

1. Refer to Enclosure 1- “Video” (pg.4)

## System Energization

1. Open cover to the cart and turn on main power switch.
2. Close the cart and hold down the center XBOX button until the green lights begin to flash. When connection is made, the top left (Player 1) indicator light

will turn on.
3. Wait one minute before releasing emergency stops. System should start in manual operation mode. See top LED to verify manual operation (ON = Auto, OFF = Manual).

## Manual Operation

- Controller Operation
    - Right Joystick - Controls speed. The speed of the cart is proportional to the distance that the analog stick is moved from center. When the joystick is released, the cart will stop.
    - "A" - stop (if in autonomous mode, switches back to manual).
    - "Y" - toggles mode between manual and auto
    - "B" - Starts and stops recording
    - All other buttons, joysticks, and triggers have no function.

- There should be a person stationed at both ends of the track to ensure that emergency stops can be used if necessary.

## Autonomous Mode

- Controller Operation
    - "A" - stop (if in autonomous mode, switches back to manual).
    - "Y" - toggles mode between manual and auto
    - "B" - Starts and stops recording
    - All other buttons, joysticks, and triggers have no function.

- Ensure that the swimmer is wearing the provided pink belt.
- Adjust the tracking camera pitch angle so that the camera is pointing towards the swimmer.
- When ready to begin autonomous mode, stop the cart ("A") and toggle the mode ("Y"). The bottom LED should turn on when the cart has switched into autonomous mode.
- The cart should now track the swimmer. Small oscillations are expected when the swimmer comes to a stop or turns.
- If the swimmer moves out of the frame, the cart should stop. At this point, the cart should be toggled back into manual operation mode so that the swimmer can be found again.
- There should be a person stationed at both ends of the track to ensure that the emergency stops can be used if necessary.
- At any point in time, the system can be toggled back into manual operation mode by pressing "A" (stop) or "Y" (toggle mode).

## Maintenance

1. Refer to Enclosure 1 - "Maintenance" (pg. 6)
2. Periodically inspect the silicon on the camera and camera mount to ensure that they are watertight.

## Troubleshooting

1. Cart does not turn on
    a. Ensure that both ends of the power cord are connected.
    b. Make sure that both power switches are turned on
2. Controller will not turn on
    a. Ensure battery pack is correctly installed in the controller.
    b. Check battery charge and orientation.
3. Controller will not sync
    a. Ensure that the black USB cable is connected from the black wireless receiver outside of the box into the blue ARDUINO.
    b. Ensure that the blue USB to USB-c is connected from the raspberry pi to the blue ARDUINO.
    c. Verify that the orange LED on top of the ARDUINO is turned on. If it is not, cycle power to the cart.
4. Cart will not move in manual mode
    a. Ensure emergency brakes are released.
    b. Verify the yellow "auto" LED is off.
    c. Verify the Xbox controller is synced.
    d. Make sure the top of the cart is closed and locked.
    e. If still not moving, cycle power, and reconnect controller.
5. Cart will not move in autonomous mode
    a. Verify that the swimmer is moving and/or in the frame of the camera.
    b. Ensure the angle of the tracking camera is in the optimal position.
    c. Make sure the emergency brakes are released.
    d. Make sure the raspberry pi camera lens is not obstructed.
    e. Verify the yellow "auto" LED is turned on.
    f. Turn the system off and back on.
6. Mode will not toggle
    a. Verify the controller is on and synced to player one.
    b. Wait 30 seconds and try again.
    c. Turn system off and back on, and

For all other problems or if above solutions don't work, contact the Auburn ECE department.

See Enclosure 1 for information on video storage and streaming.