Guide for Ball in the Tube Device

A. Hardware Required
   a. Power Supply 7.5 volts with at least 2 amp current
   b. Arduino Uno
   c. 1/11 Voltage divider circuit – 2 Resistors were used 1Mega ohm and 100k ohm, in addition a 1 nano farad capacitor is recommended.
   d. MOSFET Switch Modules Amazon Link
   e. Short Range Sharp Infrared Sensor GP2Y0A41SK0F Amazon Link
   f. 3d printed tube Download Here
   g. DC motor acting as a generator to be coupled with the major brushless fan for speed measurement.
   h. Brushless dc fan Amazon Link
   i. Ping Pong Ball

j. Wires
k. Separate Power Supply for infrared sensor (5 Volt). Don't use the Arduino 5volt port as it will cause noise for the motor speed readings.

B. Setup
   a. Use Arduino pin 9 for pwm output to the mosfet switch module. Don't use other pins as some are not capable of giving pwm signal, and some can but with lower frequency.
   b. Use common ground for all system, connect ground of power supply of the fan, generator, and infrared sensor together with the Arduino ground pin.
   c. Center the tube over the direct airflow section of the fan, the fix it using hot glue or 3d print a mount optionally.

C. Software
   a. Use arduino toolbox for matlab Link
   b. If using linux, need to give read and write permission to the arduino before starting matlab, use this command : sudo chmod a+rw /dev/ttyACM0
   c. If using windows computer, replace in all the software provided the line connecting to arduino with this: a = arduino('com3','uno');
   d. Use the following link for reference of software implemented : Github Link