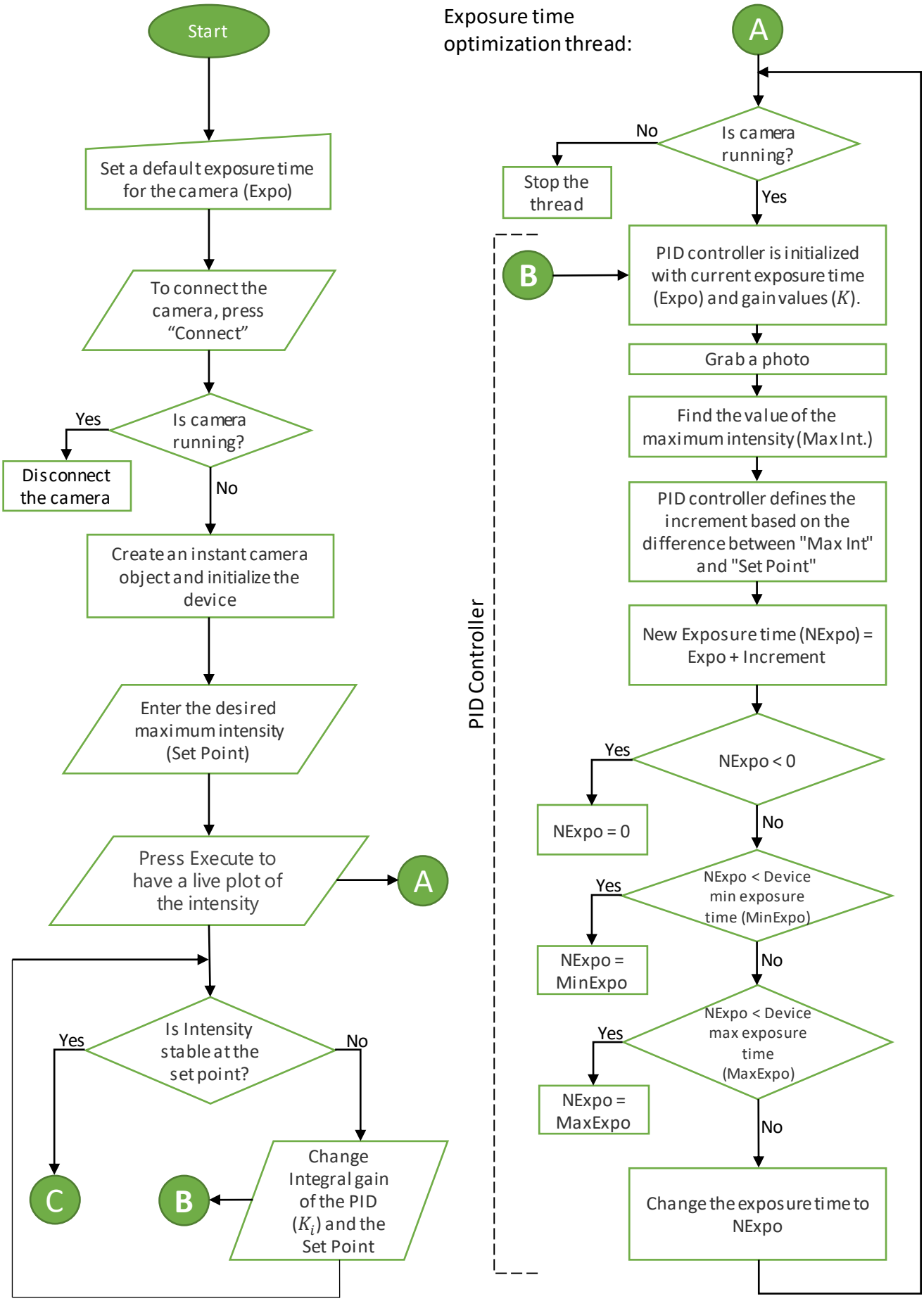
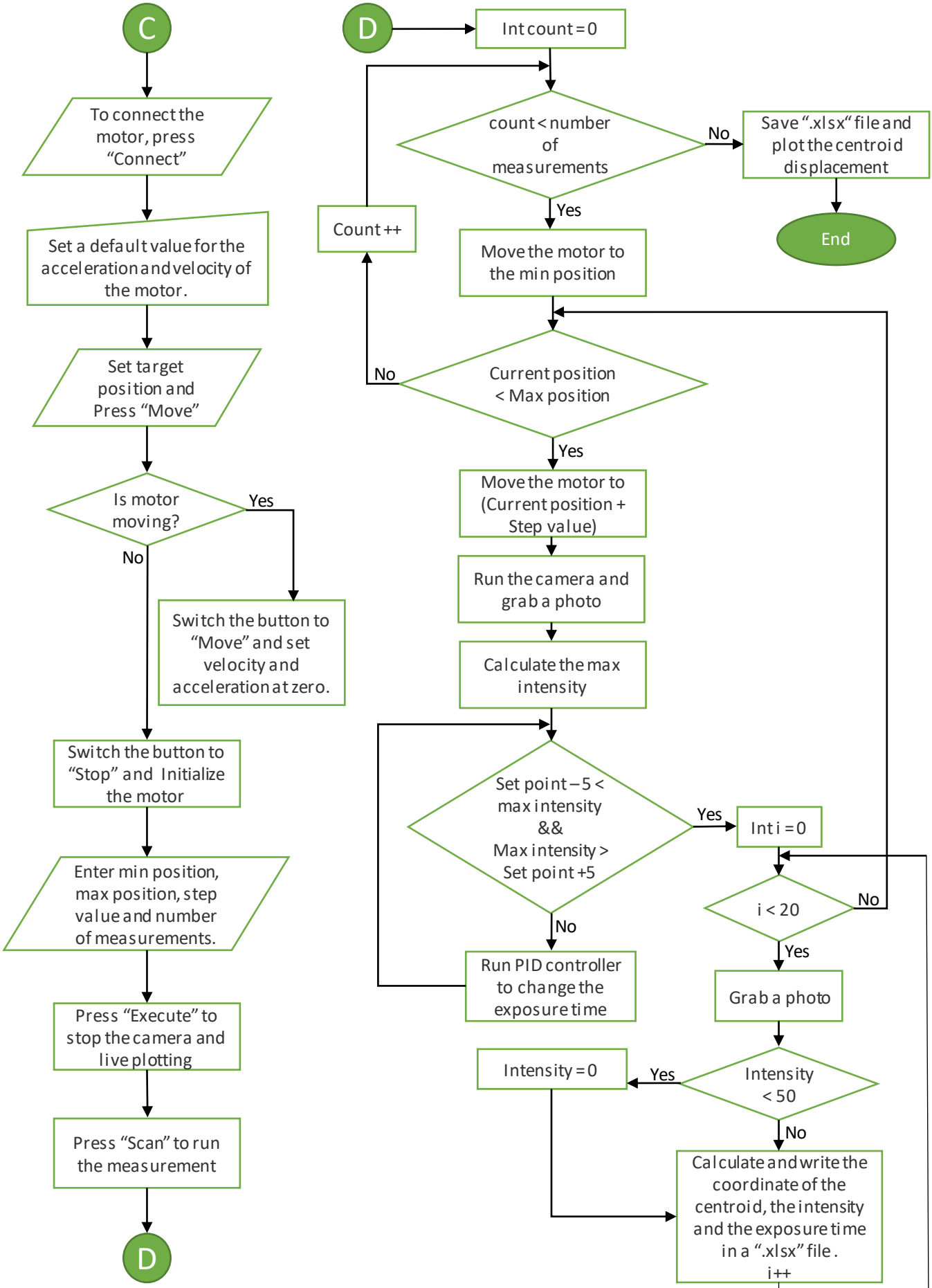

Start
Set a default exposure time for the camera (Expo)
To connect the camera, press "Connect"
Is camera running?
Yes
Disconnect the camera
No
Create an instant camera object and initialize the device
Enter the desired maximum intensity (Set Point)
Press Execute to have a live plot of the intensity
A
Is Intensity stable at the set point?
Yes
No
C
B
Change Integral gain of the PID (K_i) and the Set Point
Exposure time optimization thread:
A
Is camera running?
No
Stop the thread
Yes
PID Controller
B
PID controller is initialized with current exposure time (Expo) and gain values (K).
Grab a photo
Find the value of the maximum intensity (Max Int.)
PID controller defines the increment based on the difference between "Max Int" and "Set Point"
New Exposure time (NExpo) = Expo + Increment
NExpo < 0
Yes
NExpo = 0
No
NExpo < Device min exposure time (MinExpo)
Yes
NExpo = MinExpo
No
NExpo < Device max exposure time (MaxExpo)
Yes
NExpo = MaxExpo
No
Change the exposure time to NExpo


C
To connect the motor, press "Connect"
Set a default value for the acceleration and velocity of the motor.
Set target position and Press "Move"
Is motor moving?
Yes
No
Switch the button to "Move" and set velocity and acceleration at zero.
Switch the button to "Stop" and Initialize the motor
Enter min position, max position, step value and number of measurements.
Press "Execute" to stop the camera and live plotting
Press "Scan" to run the measurement
D
D
Int count = 0
count < number of measurements
No
Save ".xlsx" file and plot the centroid displacement
End
Yes
Count ++
Move the motor to the min position
No
Current position < Max position
Yes
Move the motor to (Current position + Step value)
Run the camera and grab a photo
Calculate the max intensity
Set point – 5 < max intensity && Max intensity > Set point +5
Yes
Int i = 0
No
Run PID controller to change the exposure time
i < 20
No
Yes
Grab a photo
Intensity = 0
Yes
Intensity < 50
No
Calculate and write the coordinate of the centroid, the intensity and the exposure time in a ".xlsx" file.
i++