

# RTW Exercise in SIMULINK

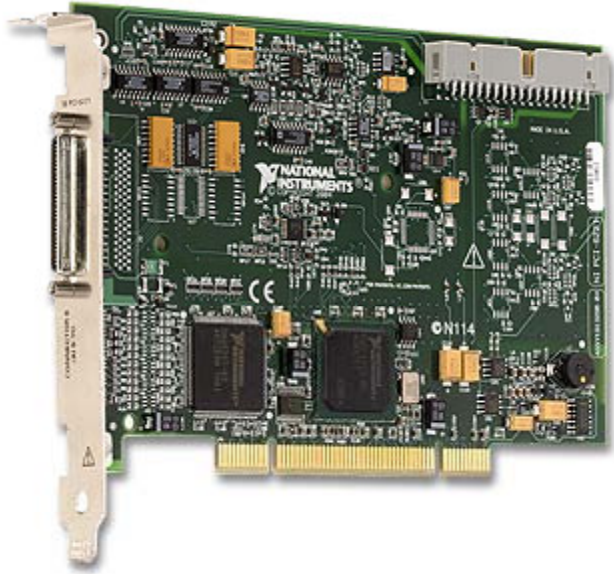
LUMS-SSE

CMPE 432

DR ABUBAKR MUHAMMAD

HASAN ARSHAD NASIR

# NI DAQ card

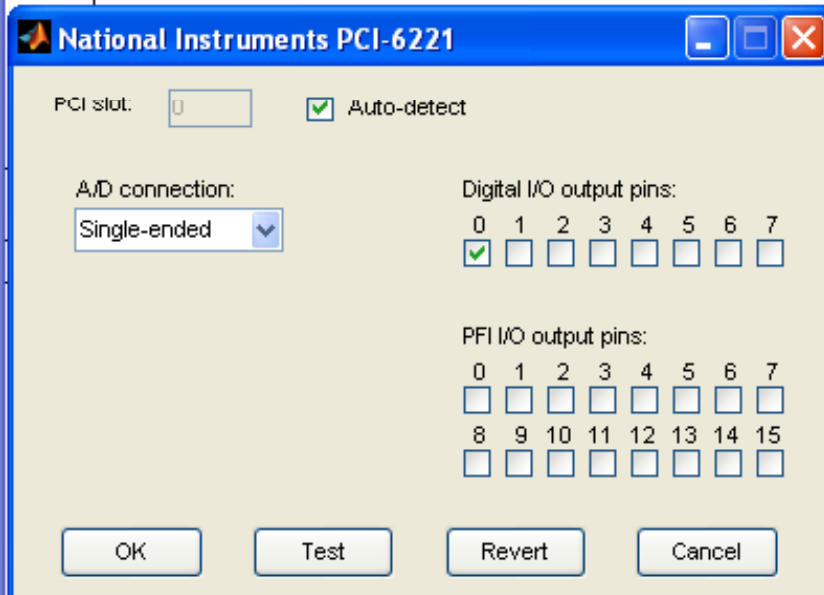
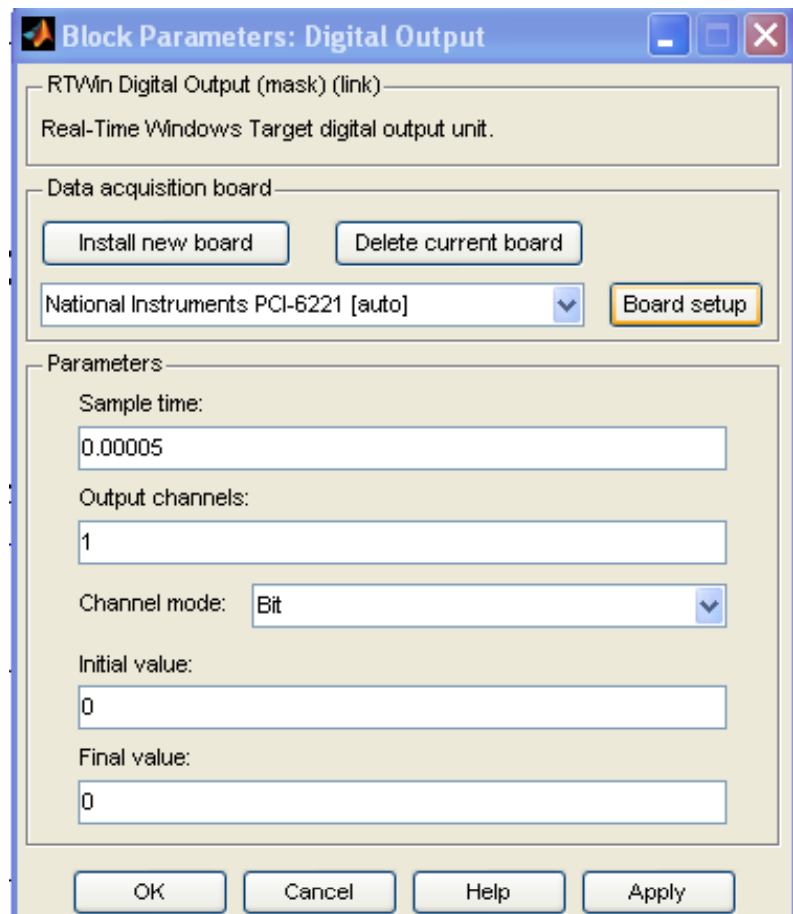


**NI PCI-6221**  
**16-Bit, 250 kS/s, 16 Analog**  
**Inputs**

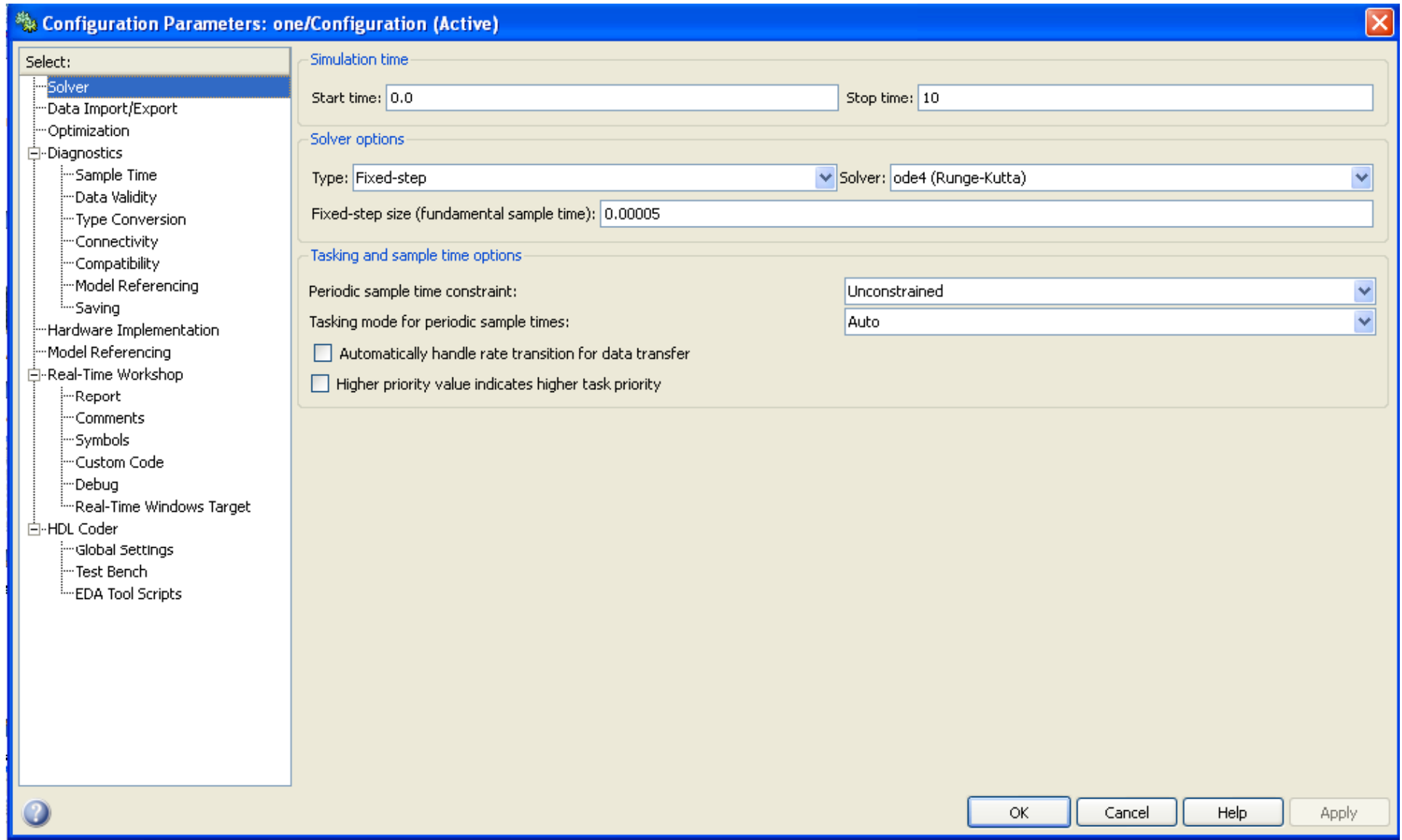


**NI SCC-68**  
**68-Pin Terminal Block**

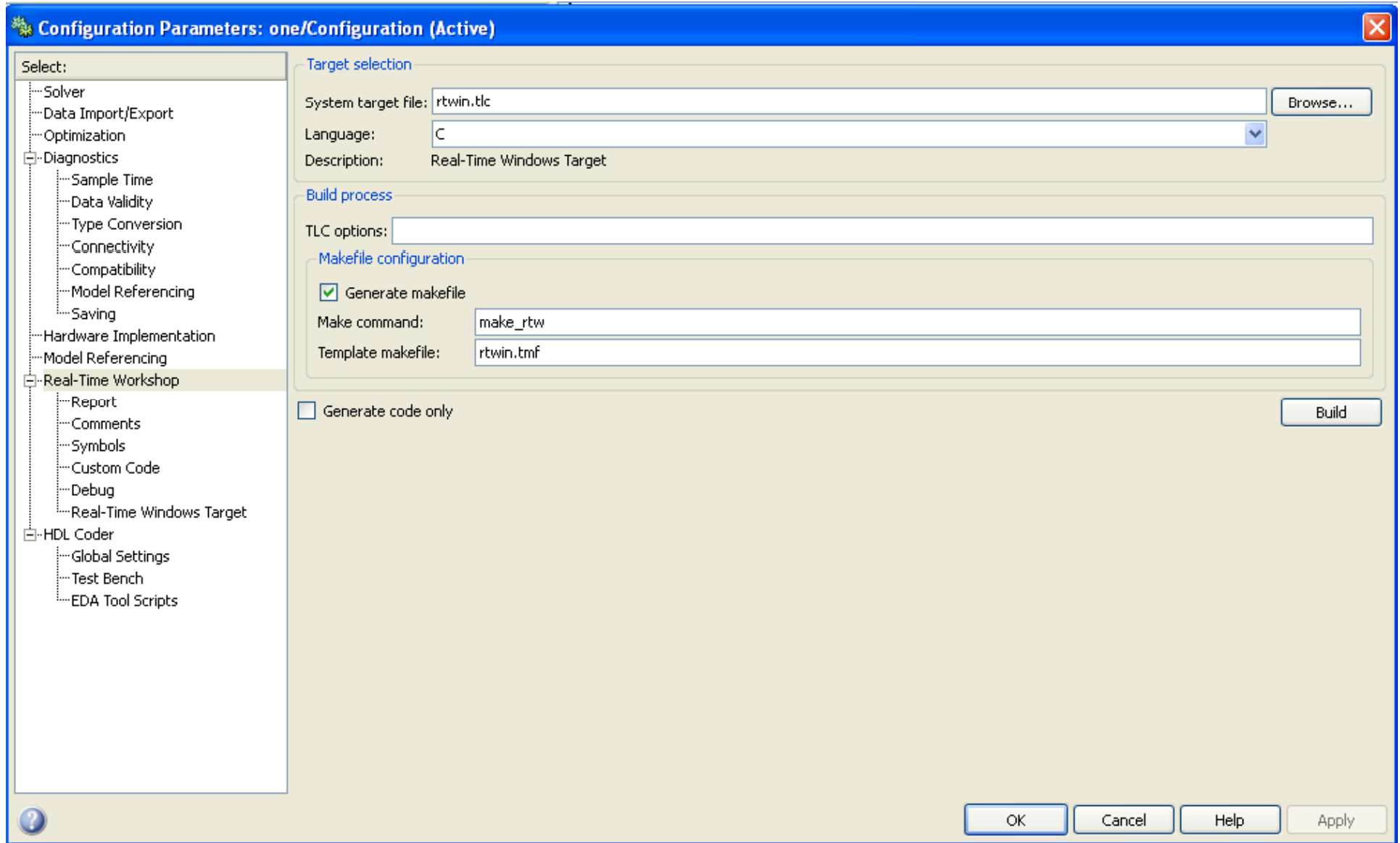
# DI/DO Block setting in SIMULINK



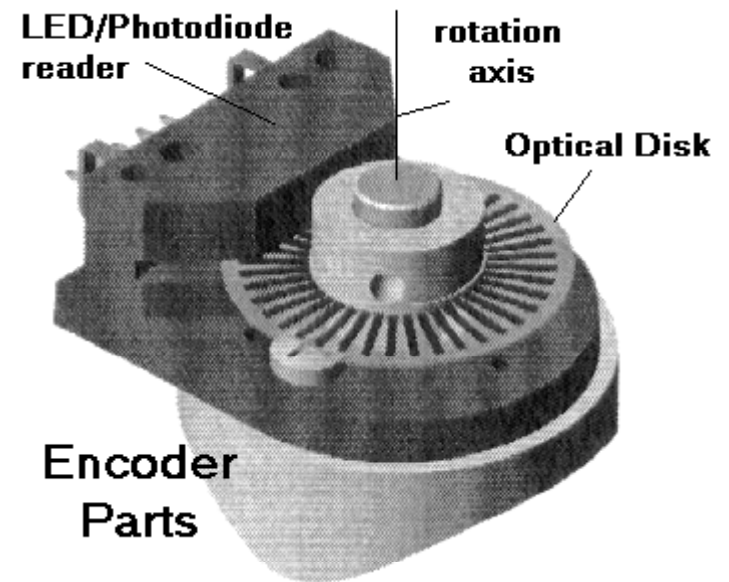
# Configuration Parameters



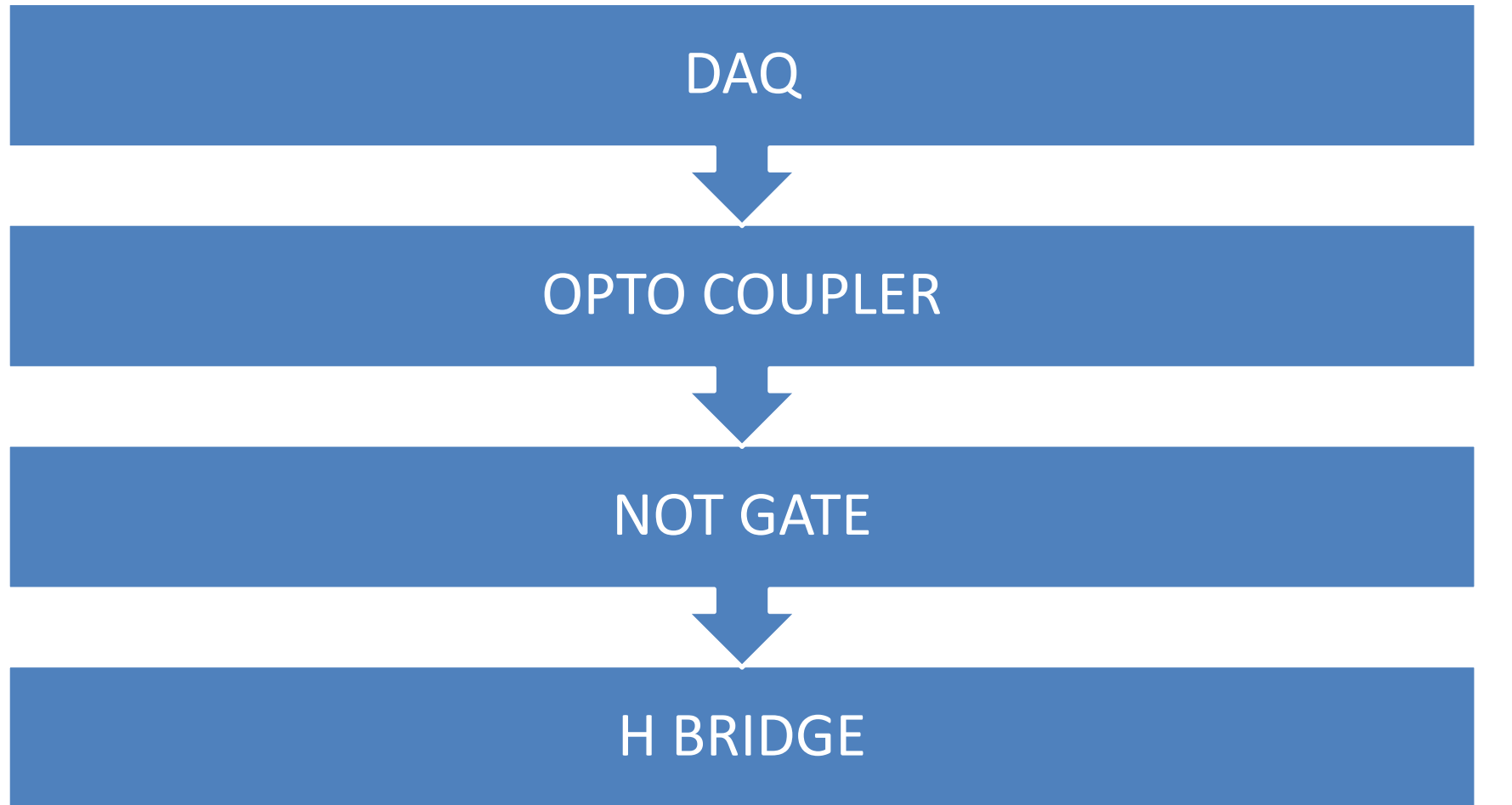
# Configuration Parameters contd.



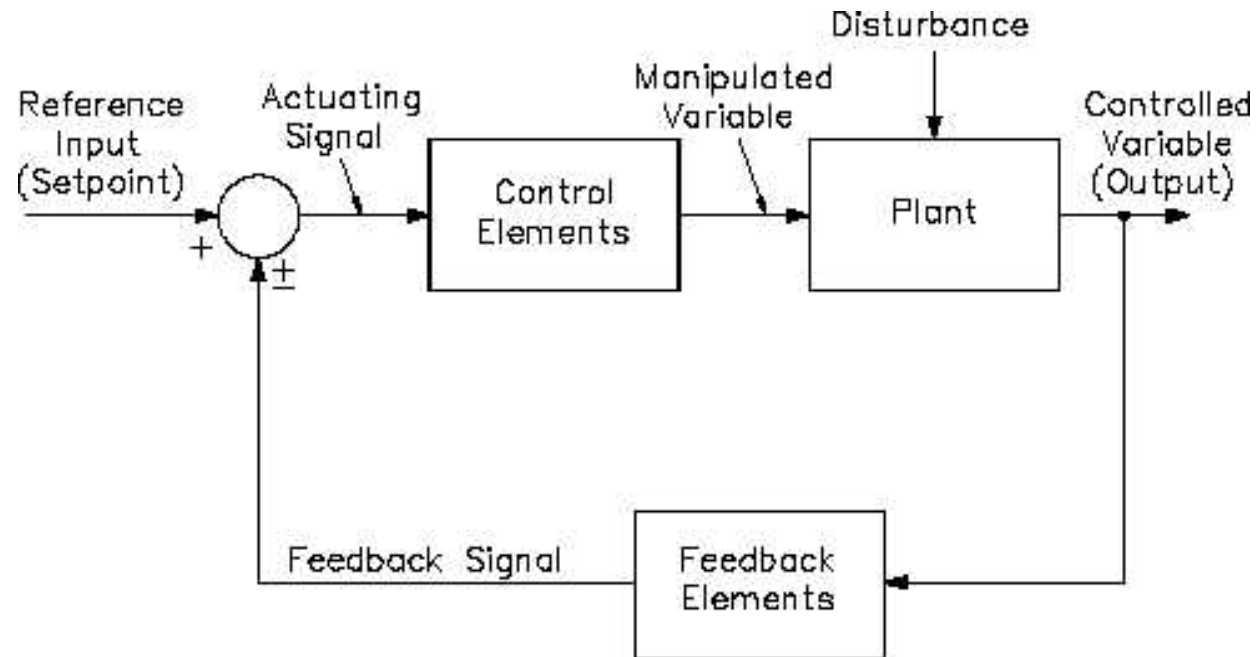
# Speed Control of DC Motor



# Path from DAQ to DC motor!



# Main Control Loop

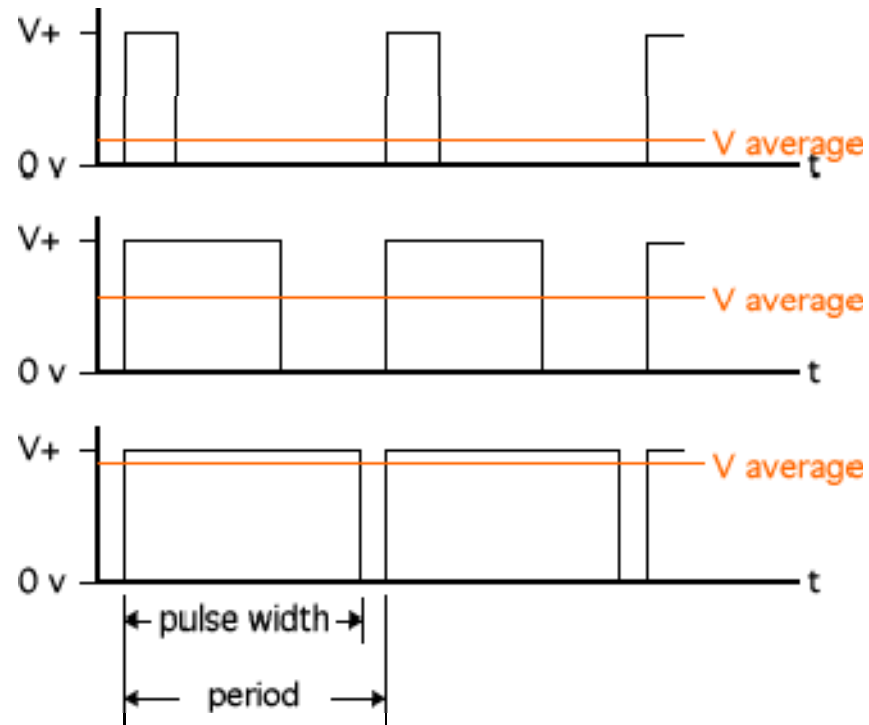


- 1) Reference = Desired rps.
- 2) Control Element = P or PI or PID or PD.
- 3) Plant = DC motor.
- 4) Feedback Elements = Encoder.
- 5) Feedback Signal = Actual rps



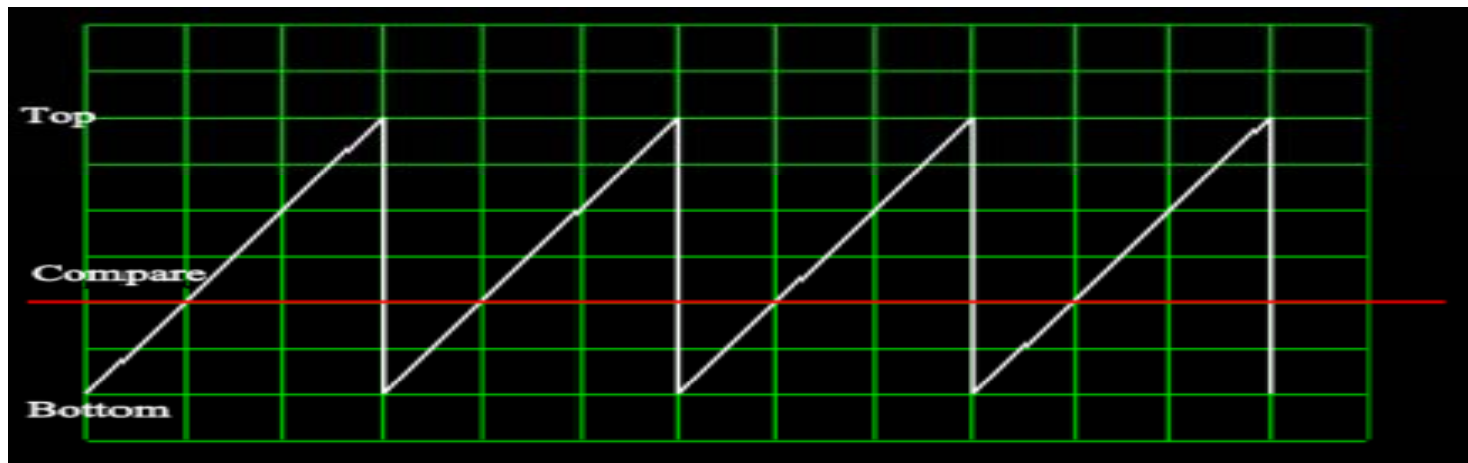
# First issue on hand

- PWM generation

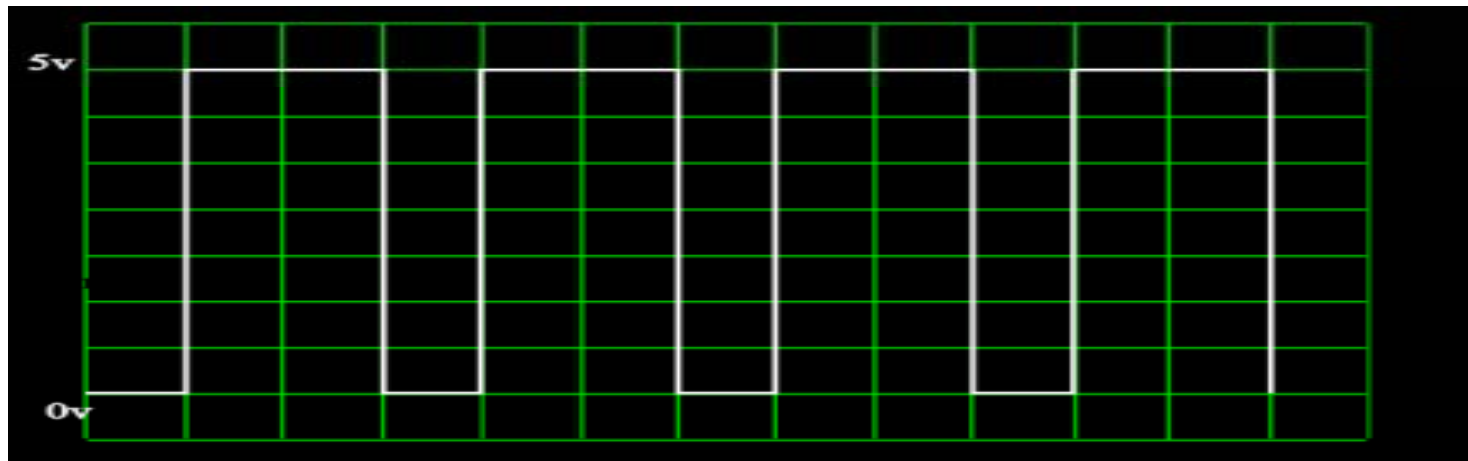


# First issues on hand contd.

- PWM generation

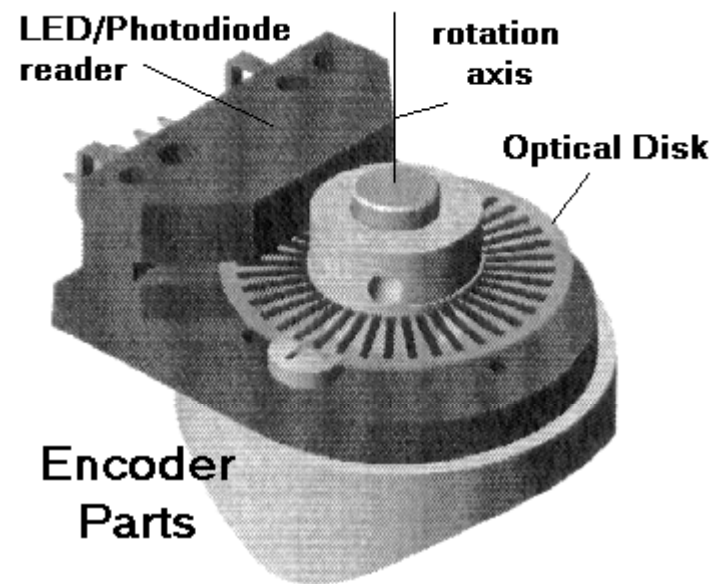


Produces an output of



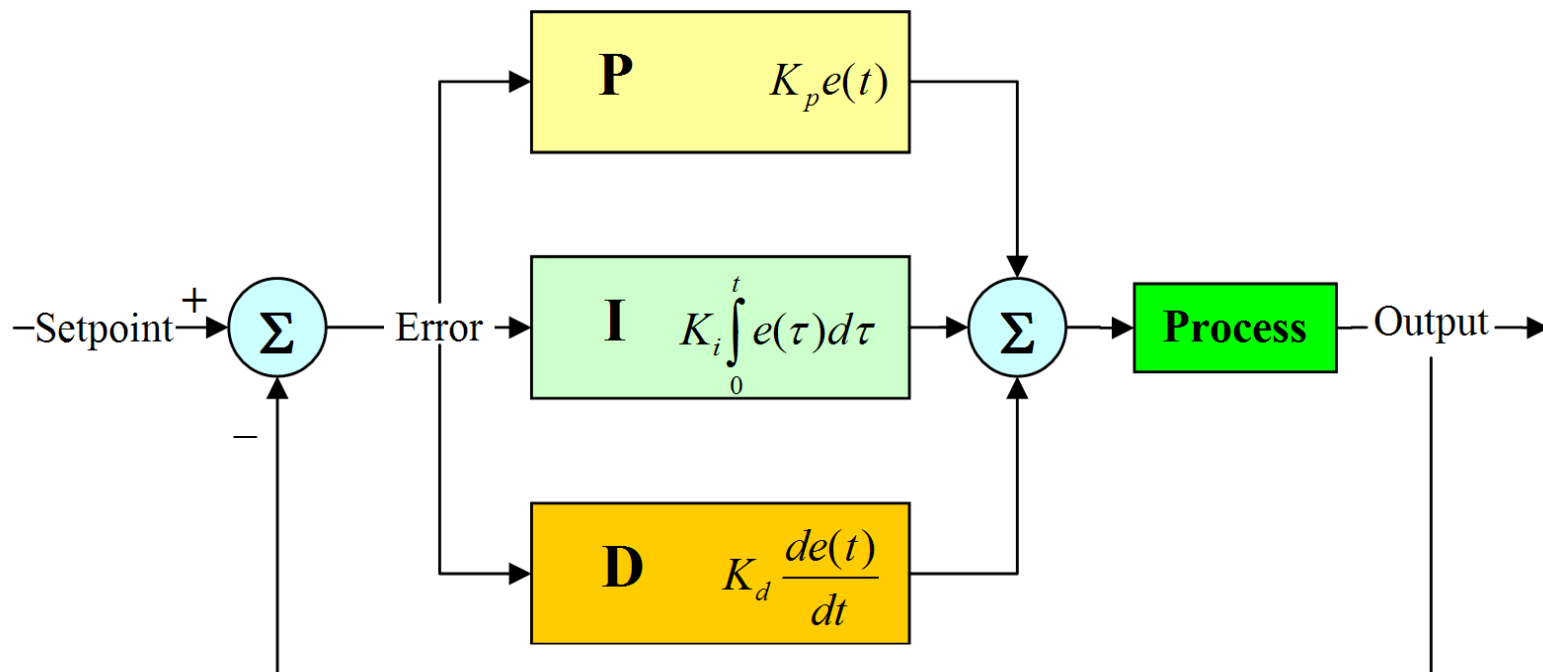
# Second issues on hand

- Encoder Measurement
  - Pulses to rps

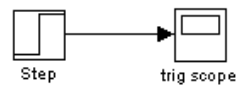
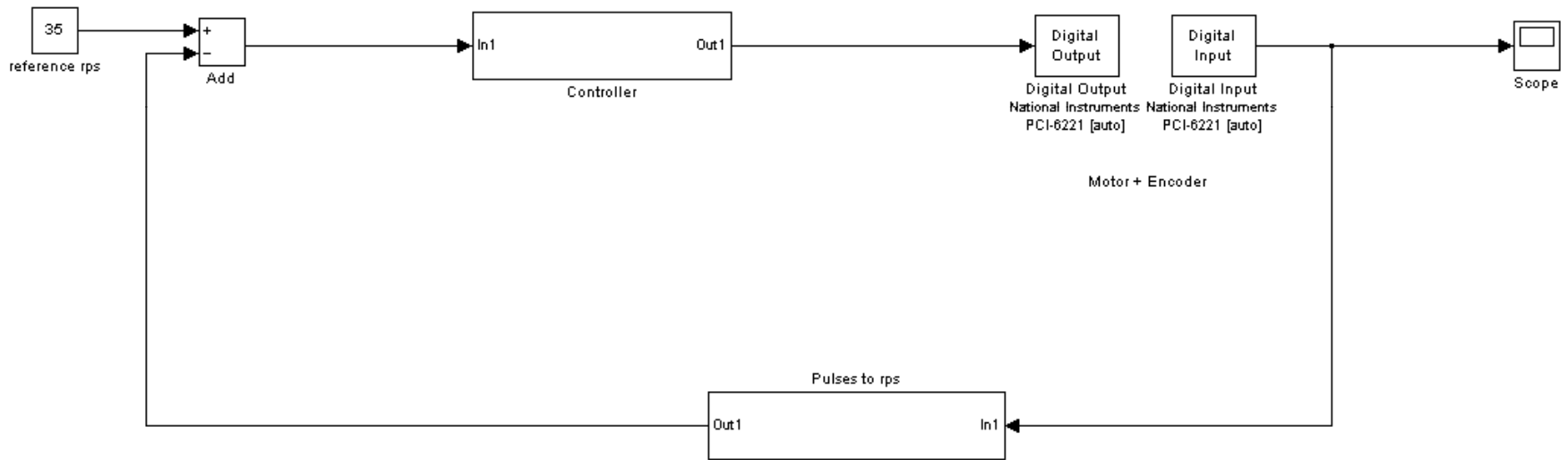


# Third issues on hand

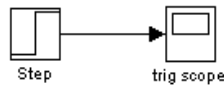
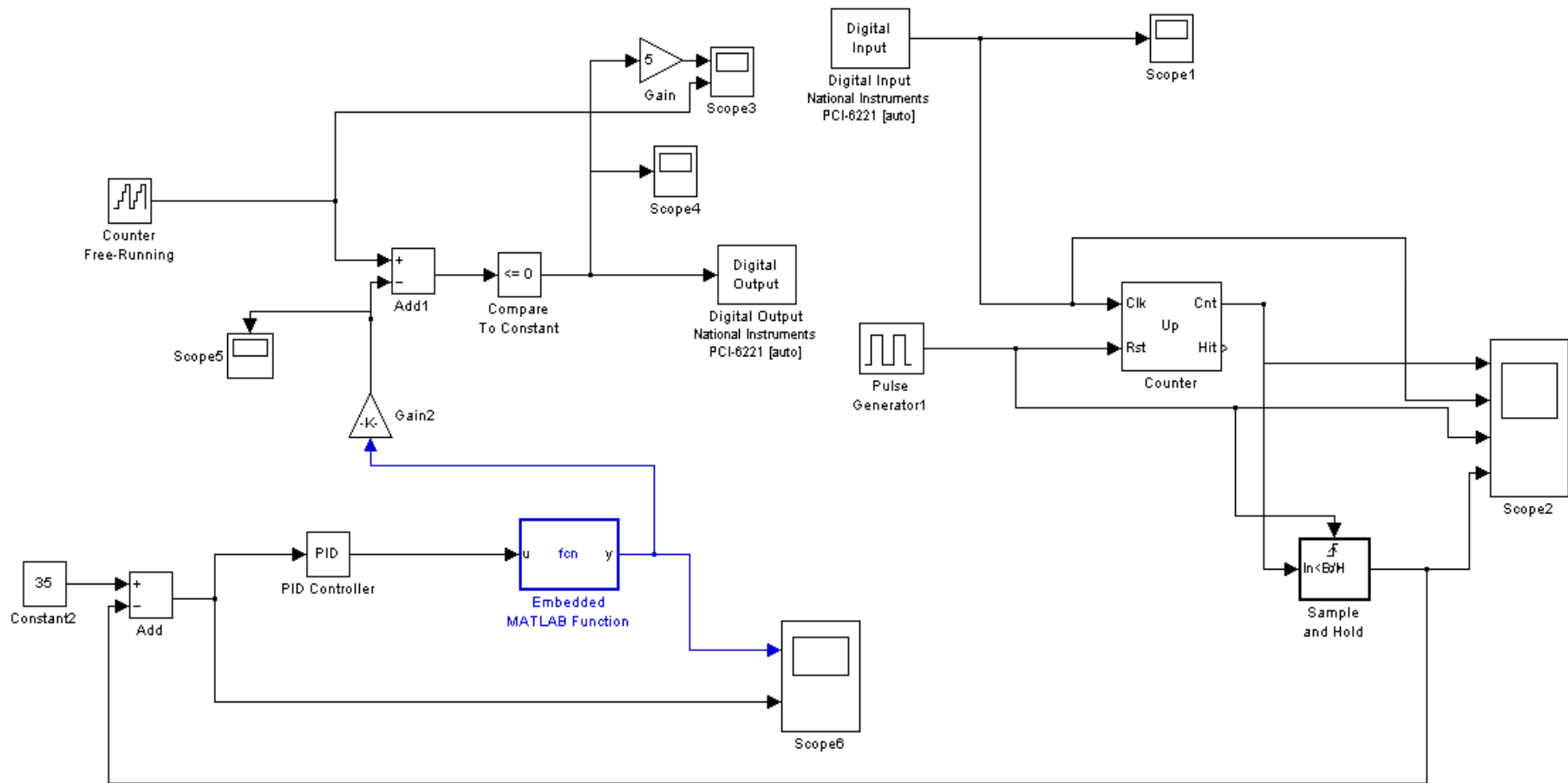
- Controller PID



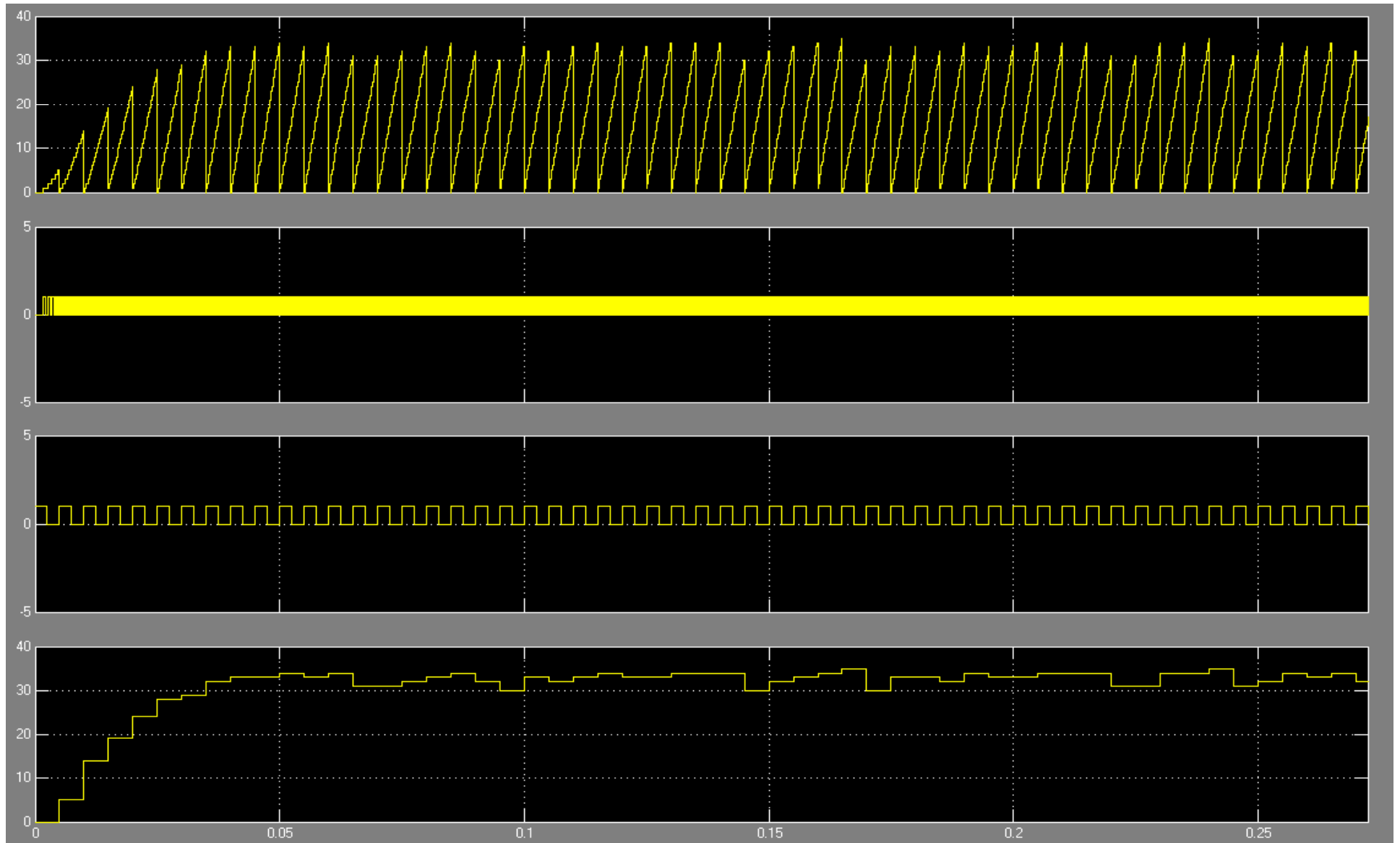
# Simulink Model simplified form



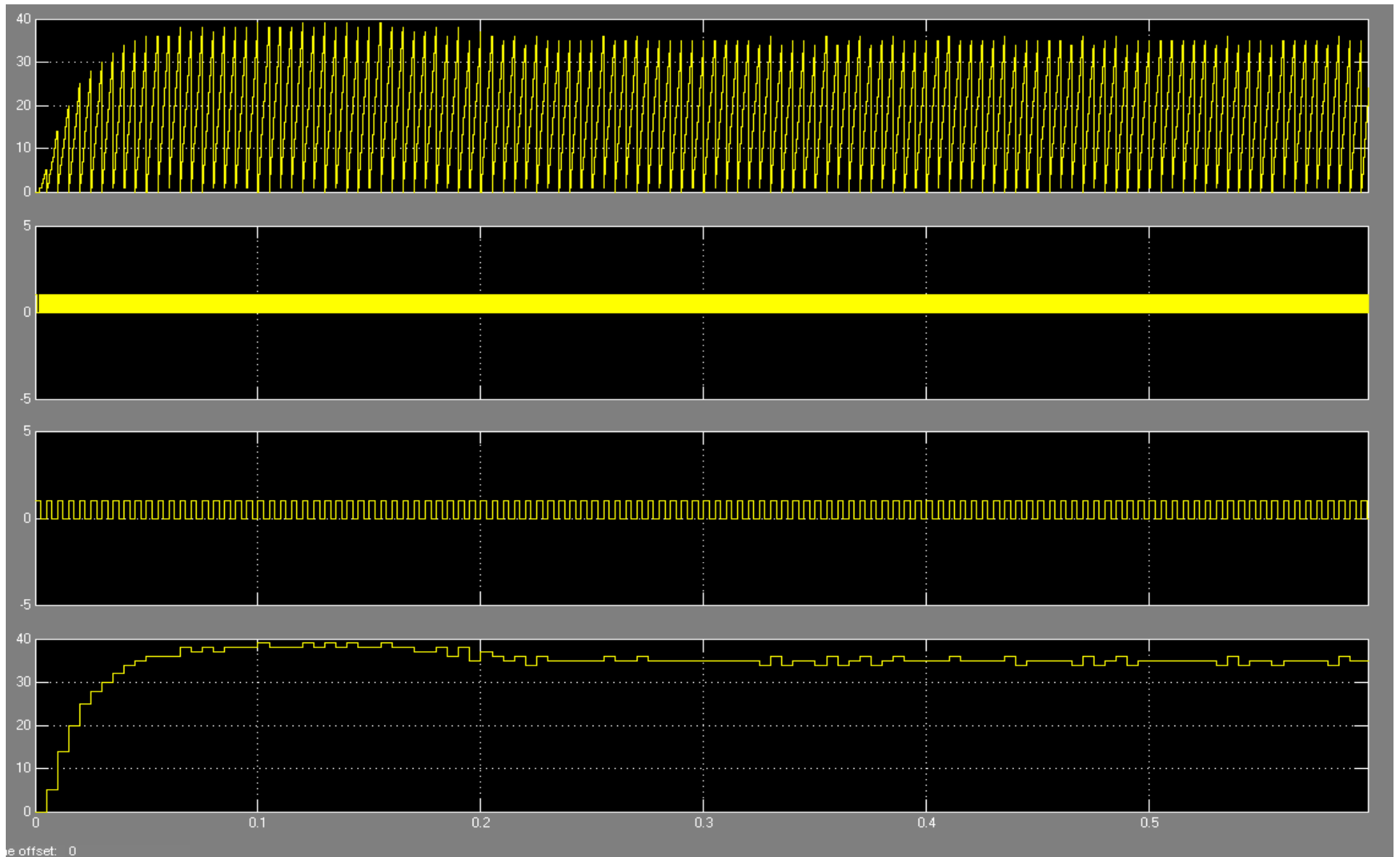
# Simulink Model exploded form



# Results with unity gain feedback



# Results with PI tuned controller





# Results

- Speed is controlled.
- Steady state error is removed.
- Advantages and Disadvantages.
- Challenges:
  - Tune PID to its best performance.
  - Position Control of DC motor.

Good Luck