**ME192 Final Exam Study Guide**

**12-8-14**

**Coverage** - (Ch. 6, 7, 8, Machine Vision, Special topics)

**Time and Date** - Monday Dec 15, 5:15 – 7:30 p.m., Eng. 192.

**Prep Session** - Saturday 13th at 10:00 a.m.-12:00 p.m.

**General direction:**

50% on textbook problem solving and 50% on practical application of the knowledge gained

Closed book, but one sheet of notes is allowed

– *Complex equations will be provided as needed.*

Study guide

 Review textbook example problems

 Review homework and quiz problems

Around 15 problems total – May be a few fill-in the blank problems

**3-4 problems from chapter 6**

 Inertia tensor, parallel axis theorem.

 Development of linear acceleration

 Calculation of torque

 Forward iterations via Euler-Newton equations

 State space equations

 Configuration space equations

Lagrangian dynamic formulation – centrifugal and coriolis terms in the equations

**2-3 problems from chapter 7 (Study the textbook examples and homework problems)**

 Angular position, velocity and acceleration

Linear path with parabolic blends

 With via points or pseudo via points

**1-2 problems from chapter 8**

 Terminologies – Singularity, Degrees of Freedom, Redundancy, Compliancy

 Control resolution, repeatibity,

 Actuators, encoders, motors, sensors, etc.

Singularity –Loss in degrees of freedom, boundary condition, divide by zero determinant.

**2-3 problems from** **Special topics**

Linear positioning (Cartesian robot) – definitions – control resolution, accuracy

PLC – Retentive memory circuit and creating a rising (or falling) edge condition

Vision –Morphology, edge extraction. gage, mas, window, threshold, conveyor tracking

**2-3 practical and lab questions**

Transformation equation for two camera conveyor tracking system for the SCARA robot.

Linear path tracking of a SCARA robot – positional control & inverse solutions

Gripper rotation – Linear move – How is the gripper angle is kept constant in XY plane.

Routine V+ pick up and drop off commands

V+ problem on linear tracking and use of

 Inverse transformation via DECOMPOSE and SET/TRANS( ) command

Belt tracking commands –

Resetting the encoder location and tracking the belt within the window.

Shifting laterally to pick up object at correct orientation