

Group 12

**THE TWO WHEEL
DEAL**

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Goal

- Design and build a self-balancing Segway-like transportation device that uses feedback from accelerometers and an angular rate sensor to keep the wheels under the rider.

Component Overview

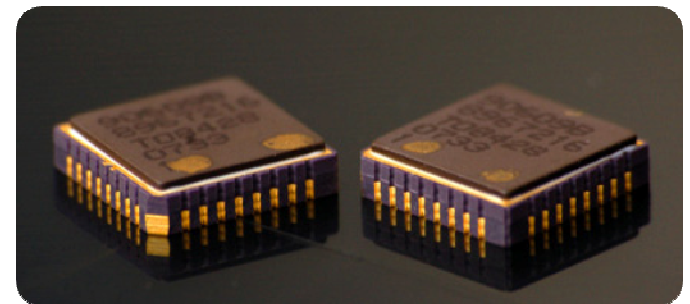
- Microcontroller Requirements
- Sensor Requirements
- Motor Requirements

Microcontroller Constraints

- Requirements:
 - 2 16-bit PWM outputs for precision motor control
 - 3 10-bit ATD inputs for sensors
 - At least 8 general I/O pins
 - Plenty of memory for math libraries and high instruction throughput
- Atmel ATmega32
 - 2 - 16-bit PWM
 - 8 – 10-bit ATD
 - 32 general I/O pins
 - 32 kB flash
 - 16 MIPS
 - PDIP package

Sensor Constraints

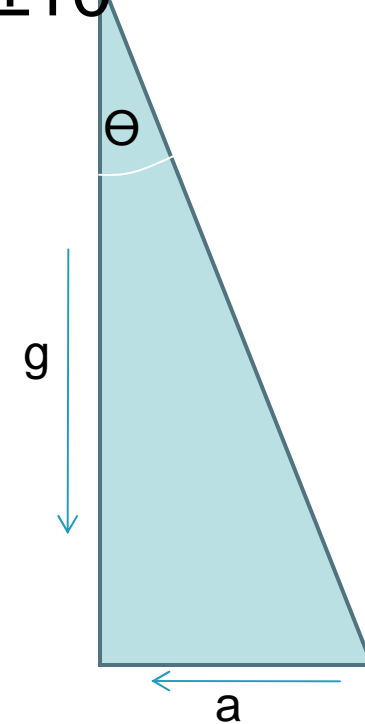
- ◎ Accelerometer - Analog Devices ADXL203
 - Dual-axis
 - Low-G ($\pm 1.7g$)
- ◎ Angular Rate Sensor - Melexis MLX90609E2
 - Medium sensitivity (± 150 %s)
 - Low cost



Motor Constraints



- Requirements:
 - Top Speed: 15 mph
 - Max Recovery Angle @ 15mph: $\pm 10^\circ$
 - 100 kg passenger
- NPC-T74 brushed gearmotor
 - Top Speed: 22 mph
 - 20° recovery angle at 15 MPH
 - 200 lb output shaft load rating



Questions?