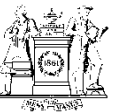

Lessons from JEHU

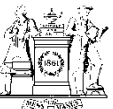
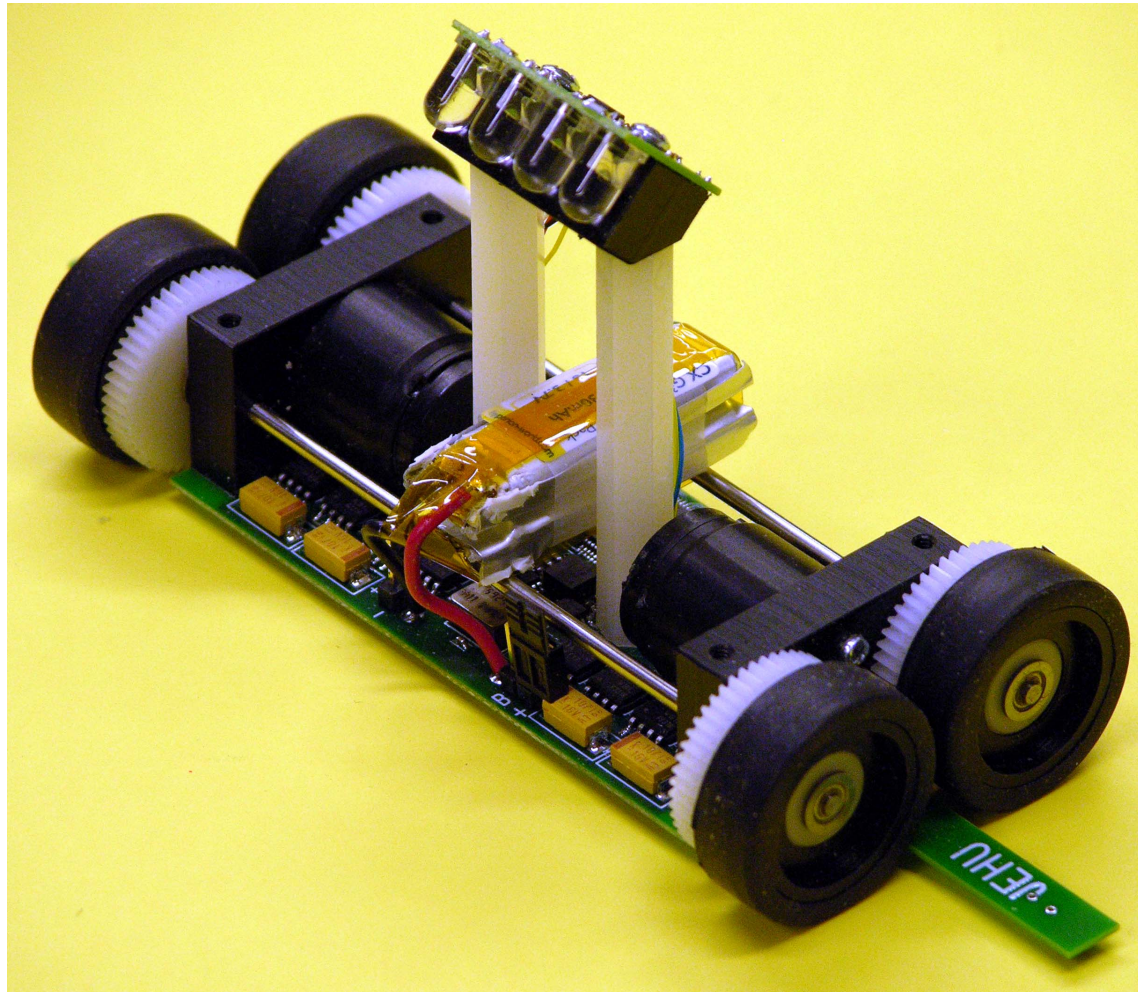
MINOS '15

Birmingham

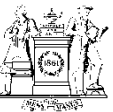
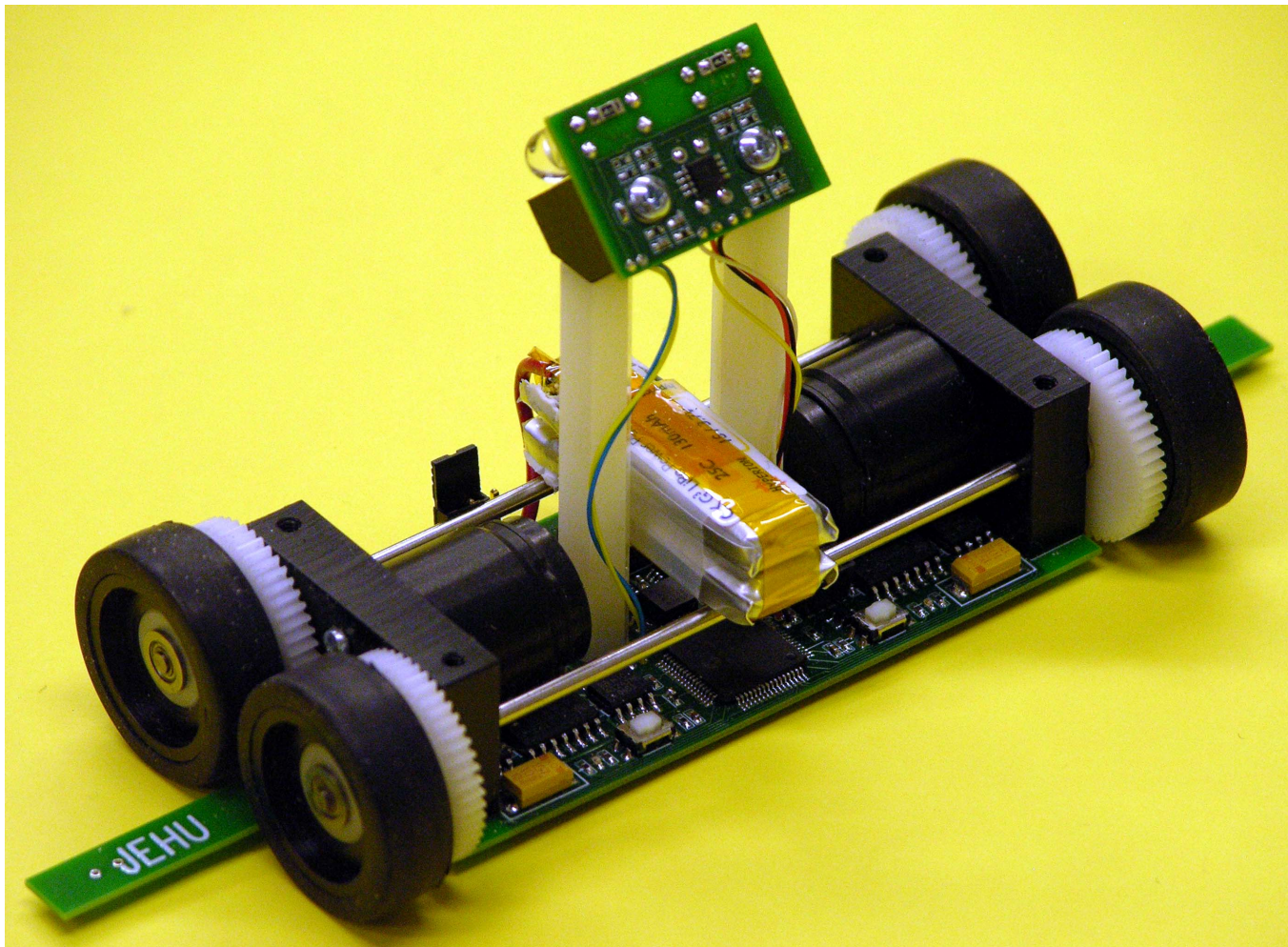
David Otten



Jehu – Front View



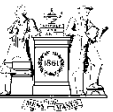
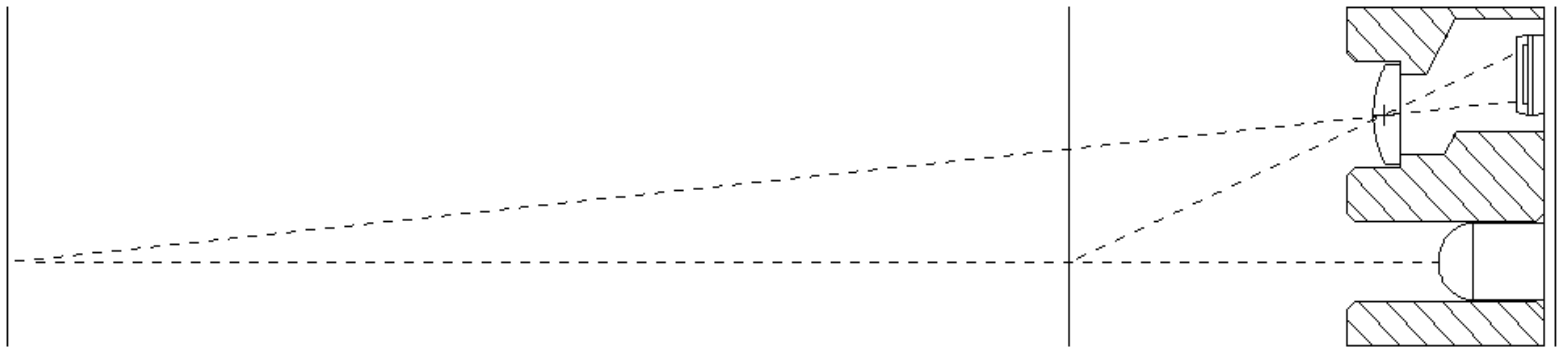
Jehu – Rear View



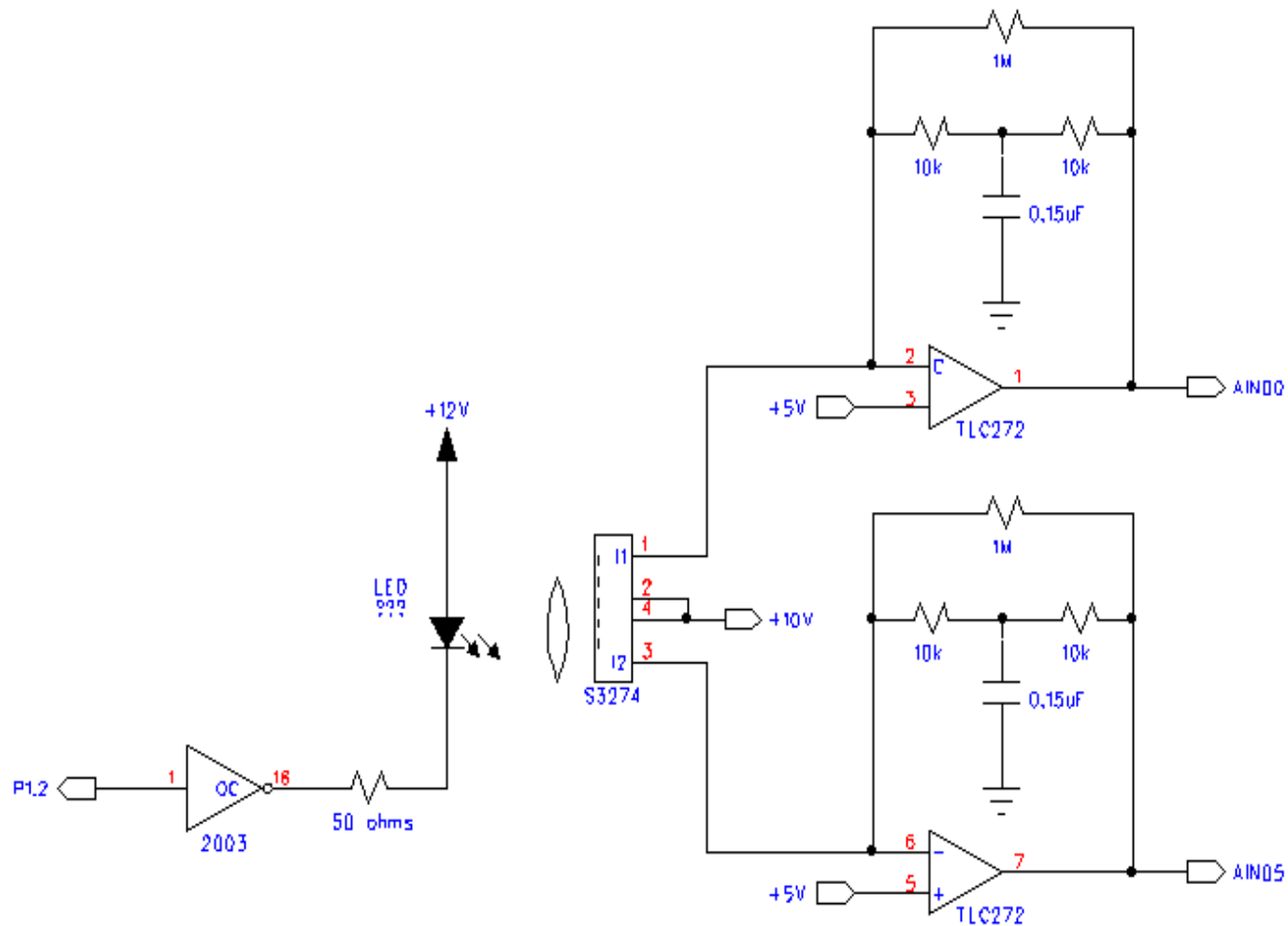
Sensor and Head Lights



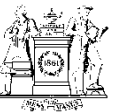
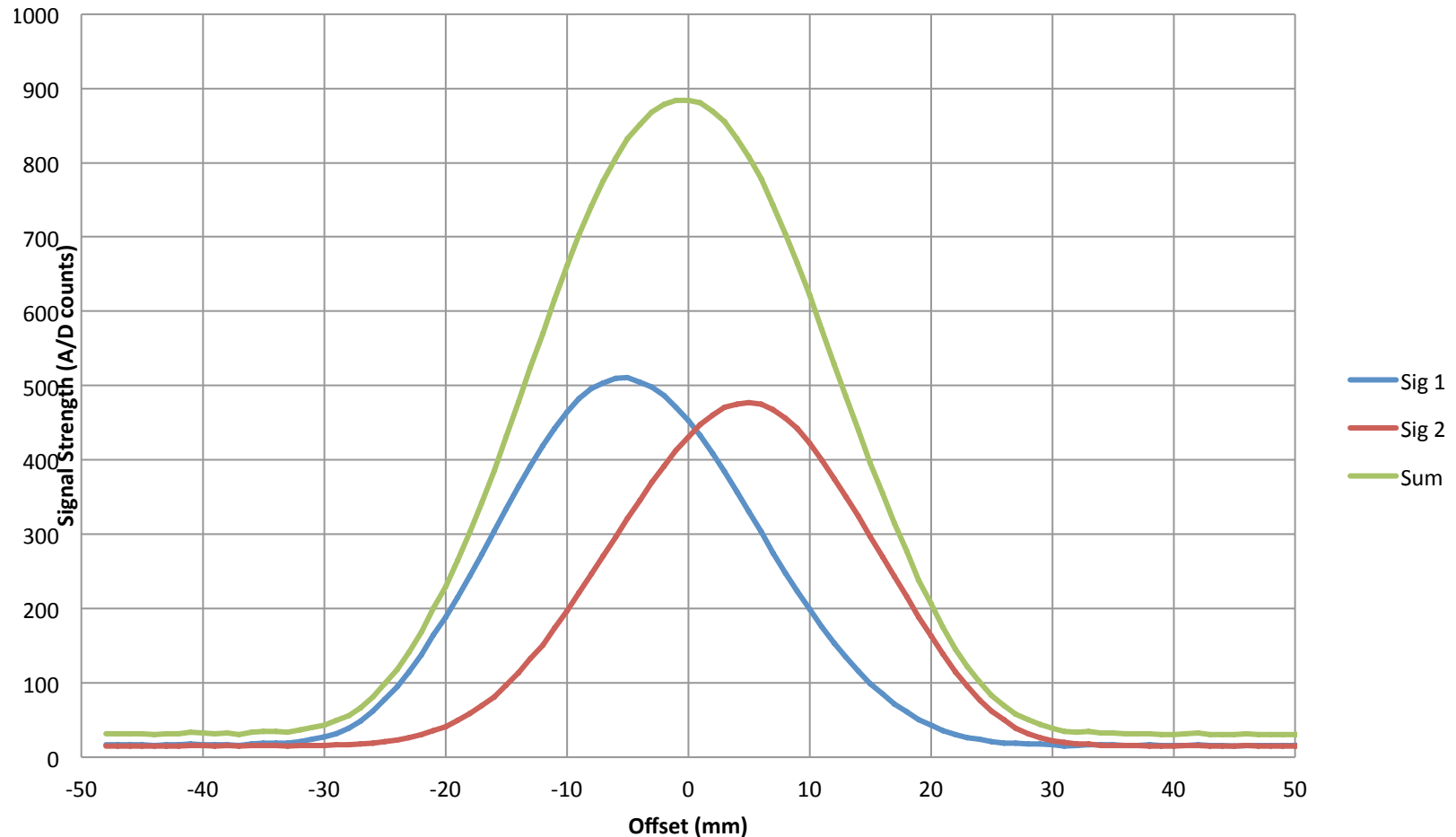
Mechanical Configuration



PSD Amplification

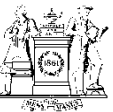


PSD Signals vs Offset

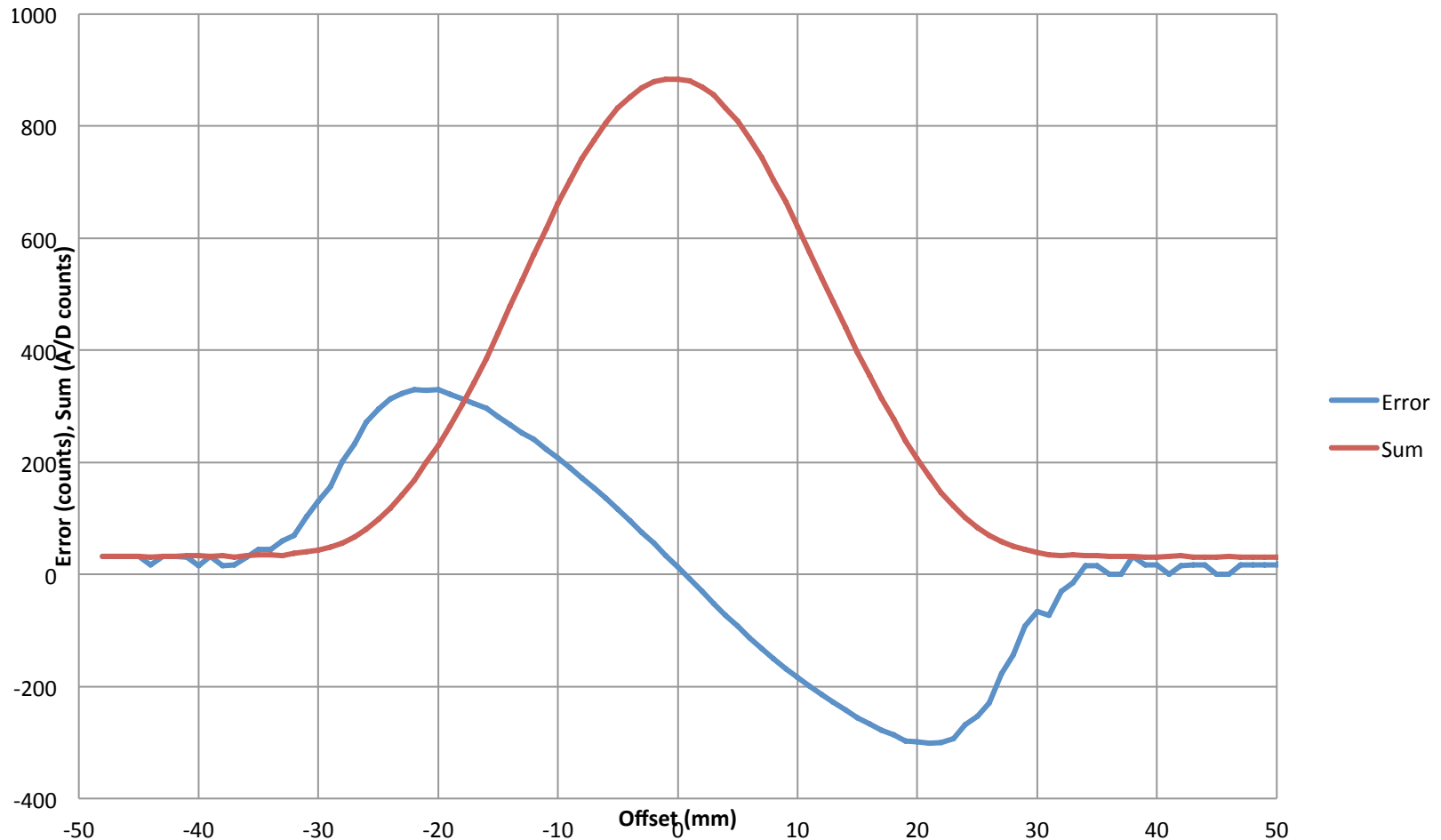


Error Signal Calculation

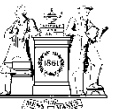
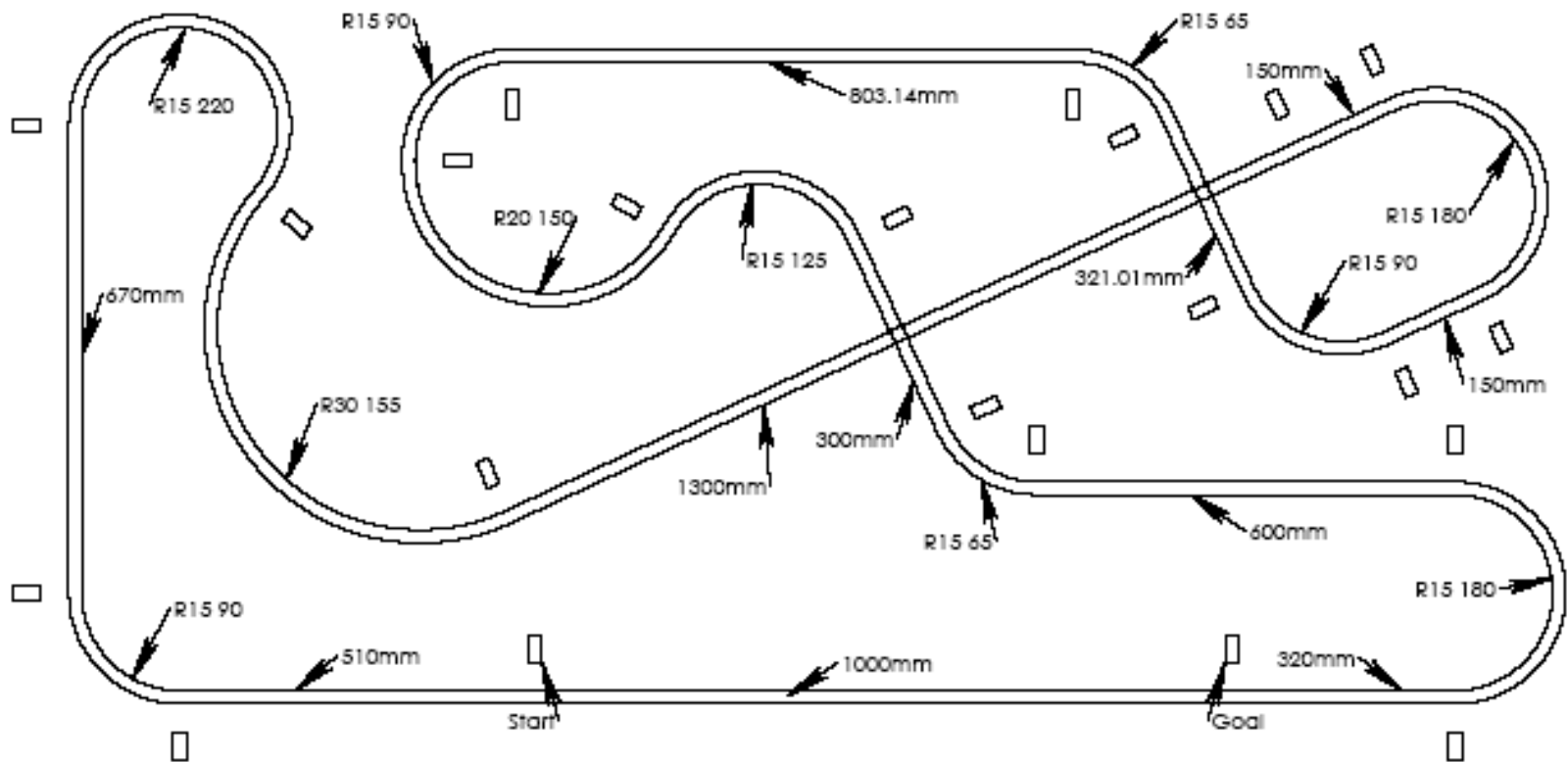
$$Error = (1024 \times Sig\ 1 / Sig\ 1 + Sig\ 2) - 512$$



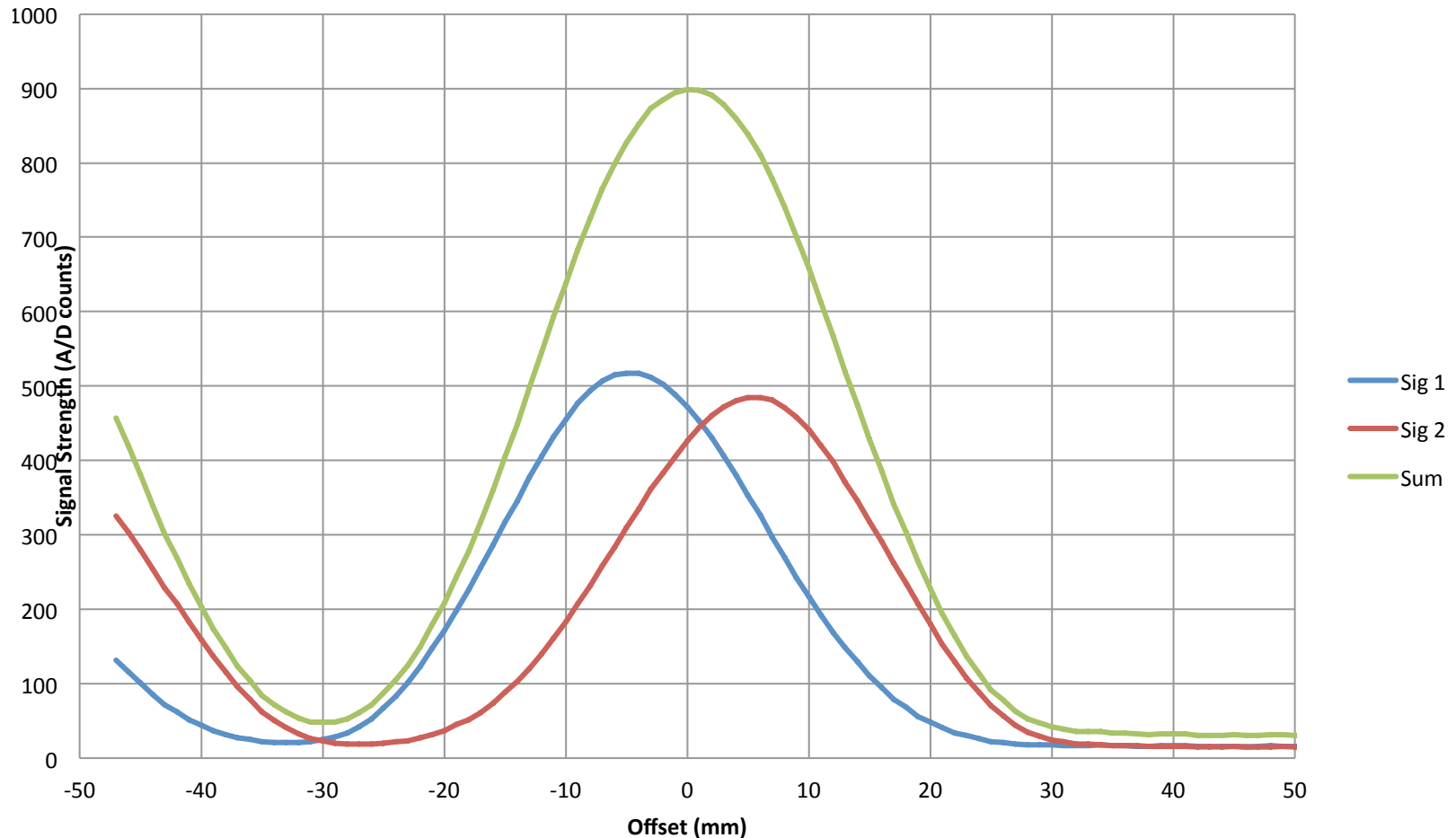
Error Signal vs Offset



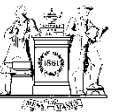
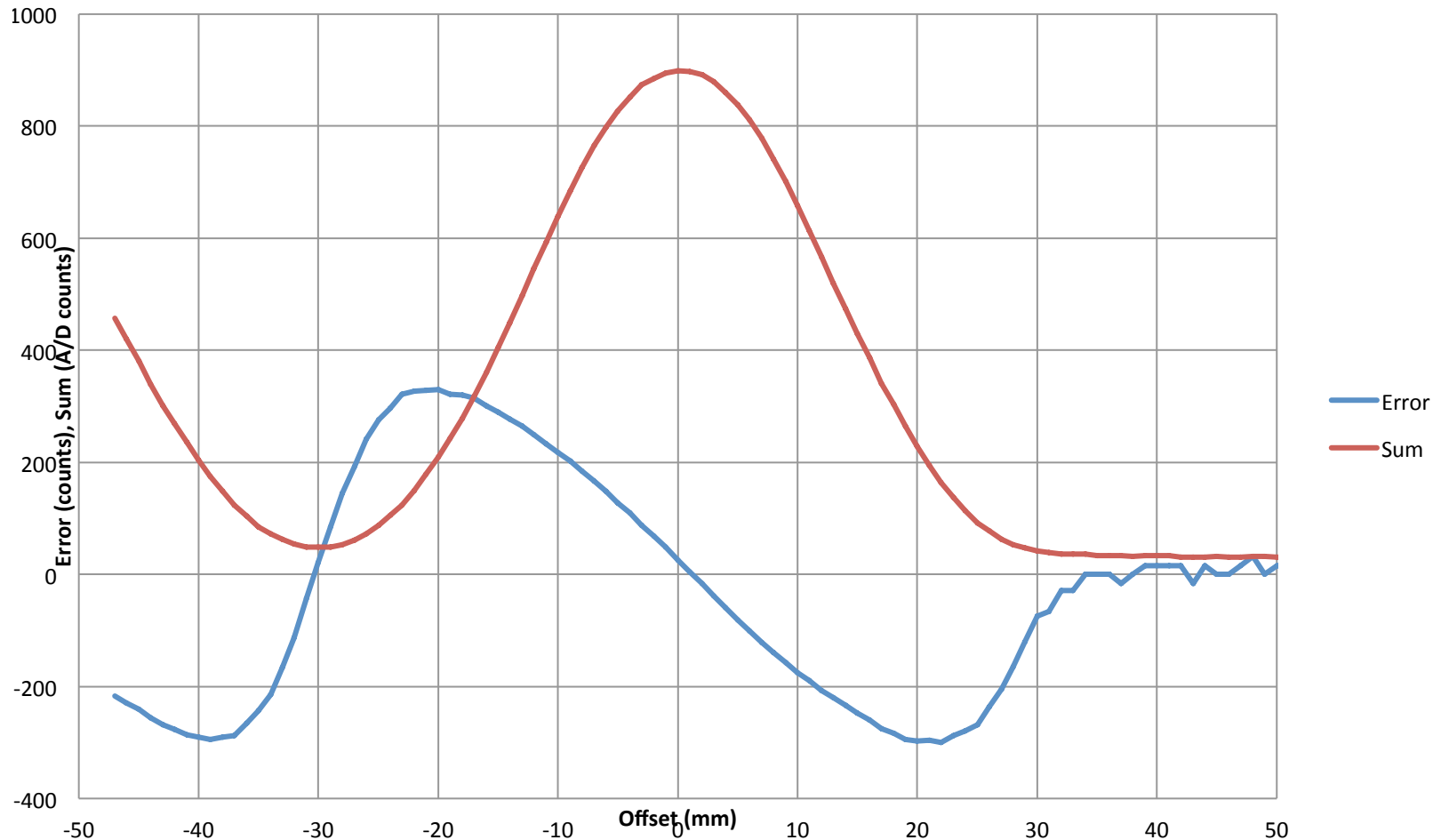
Typical Track



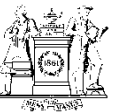
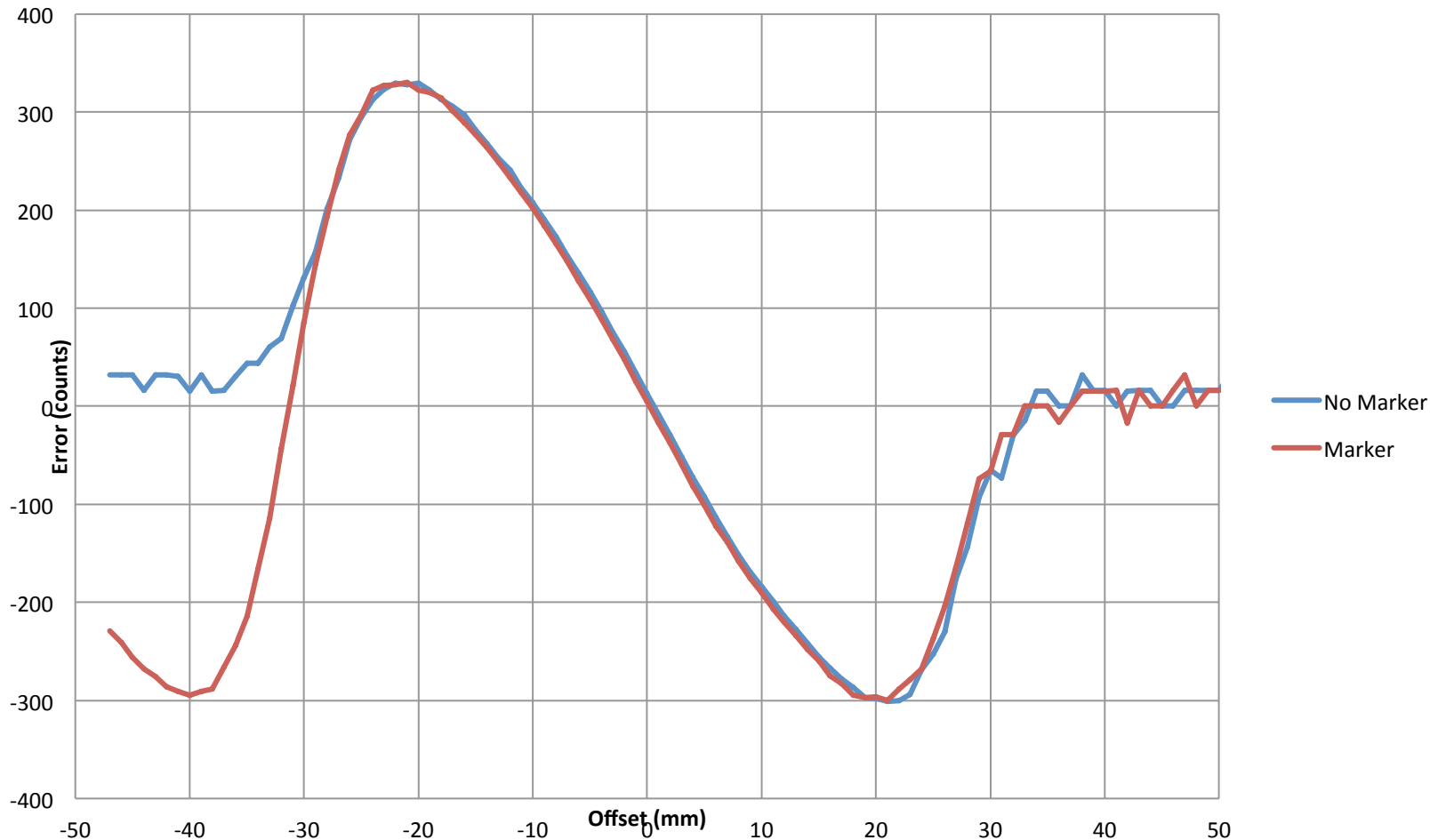
PSD Signals vs Offset



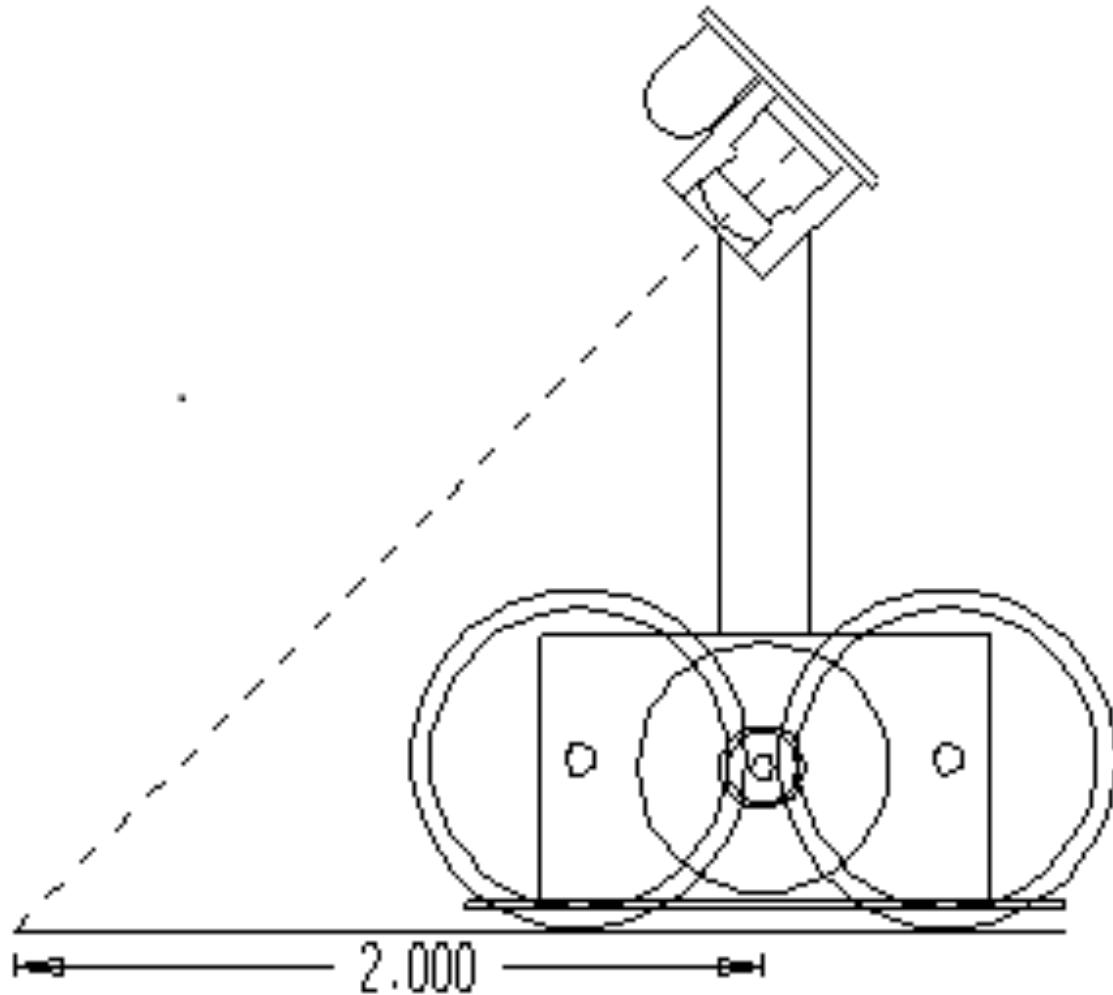
Error Signal vs Offset



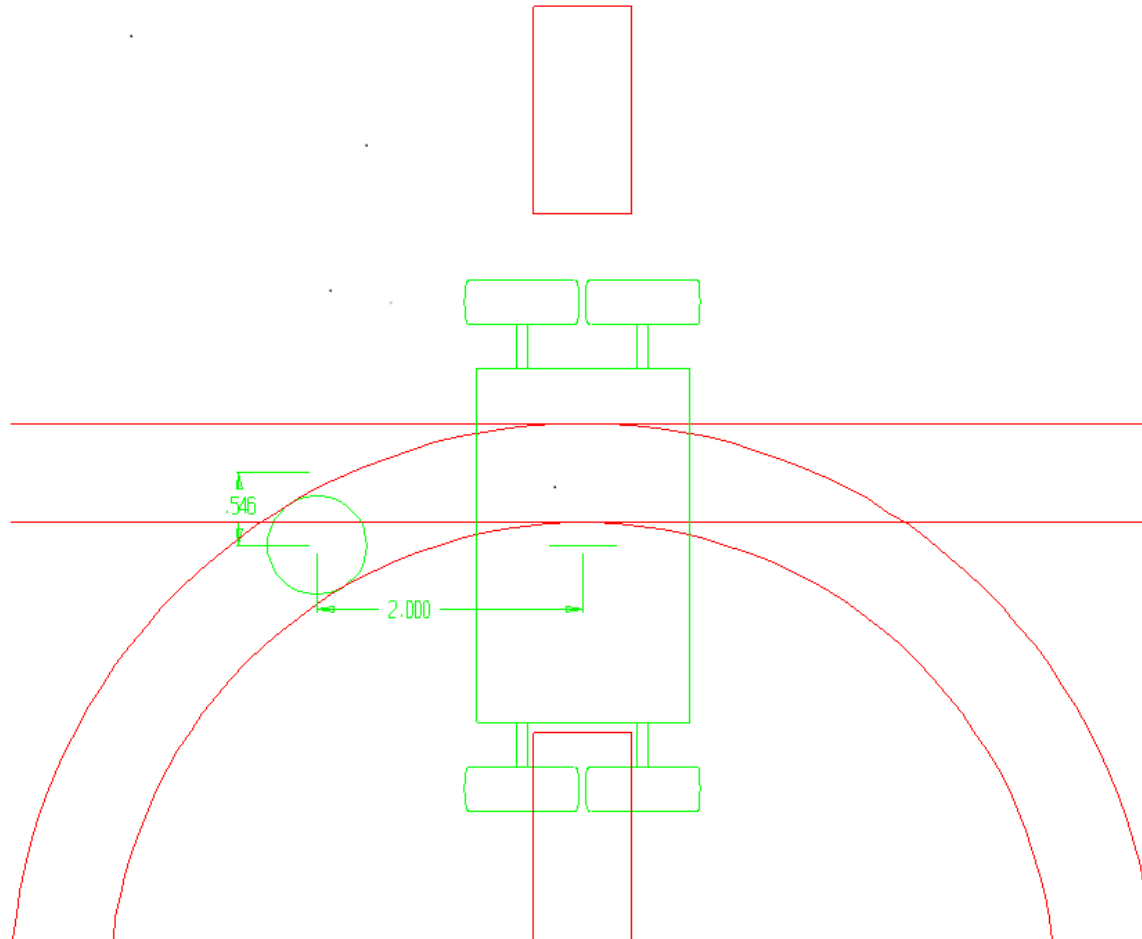
Error Signal vs Offset



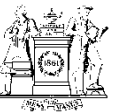
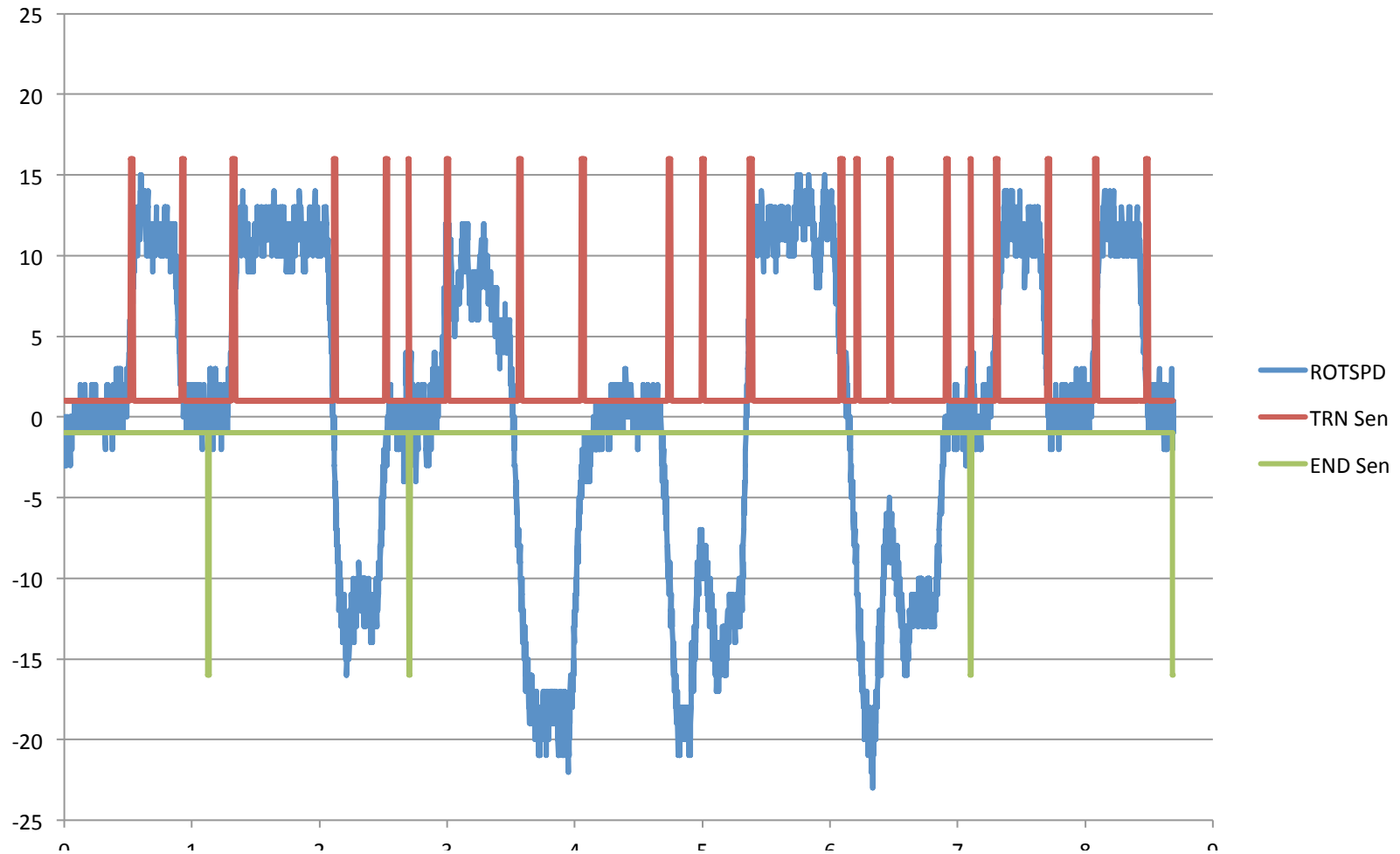
Jehu Side View



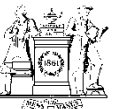
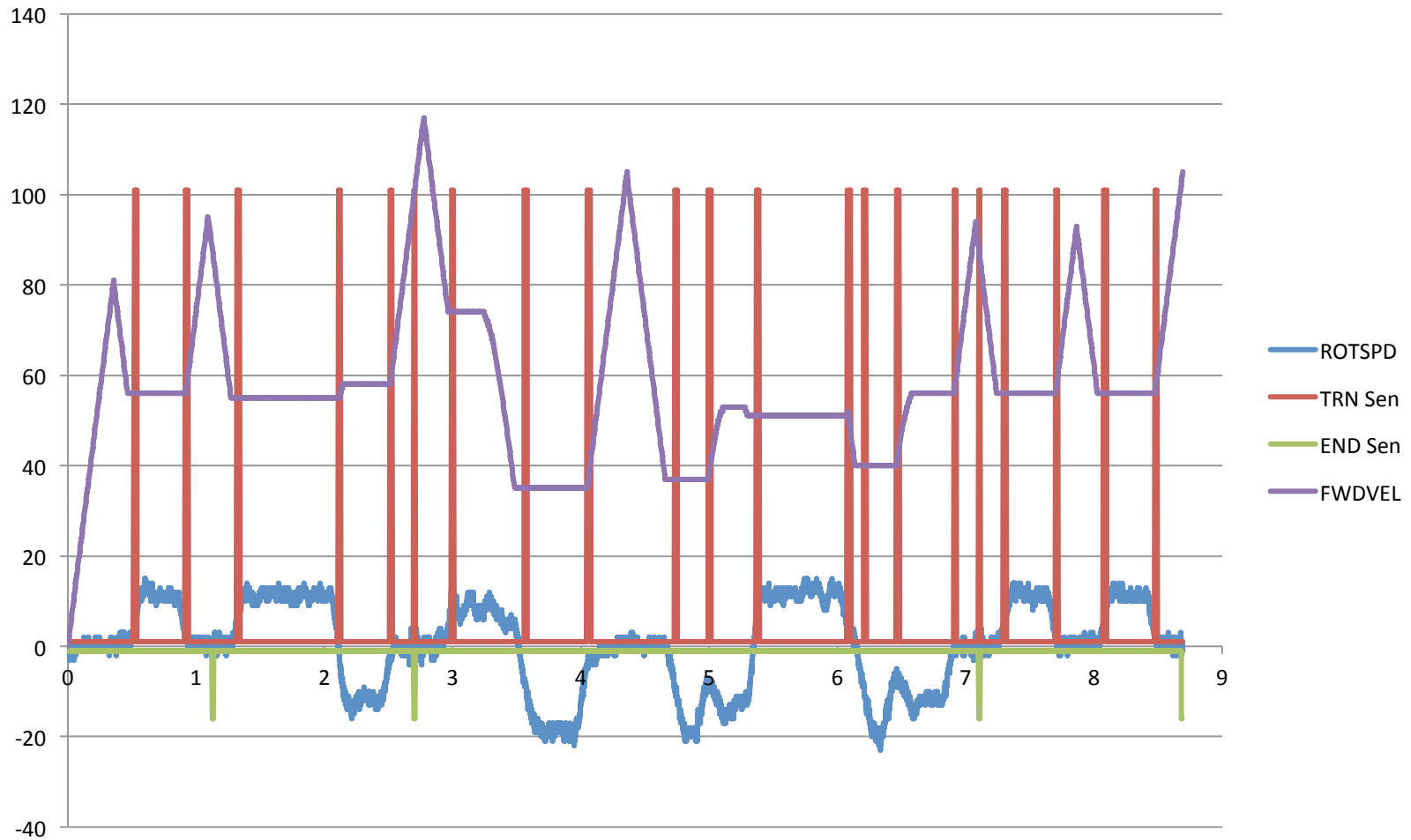
Effect of Sensor Placement



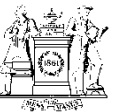
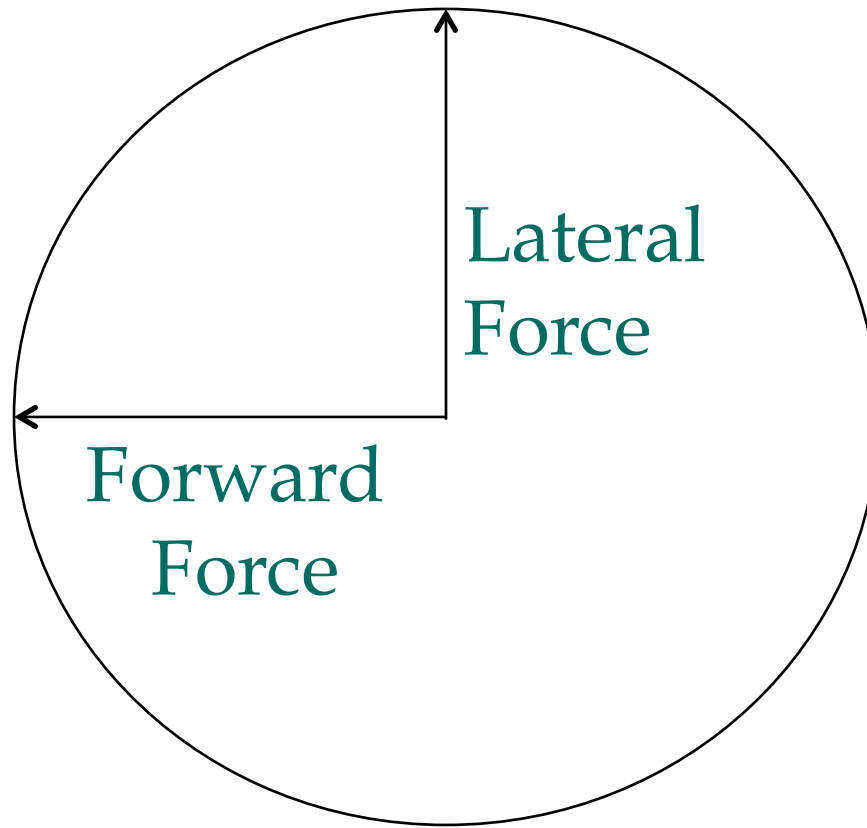
Search Data



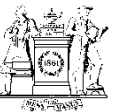
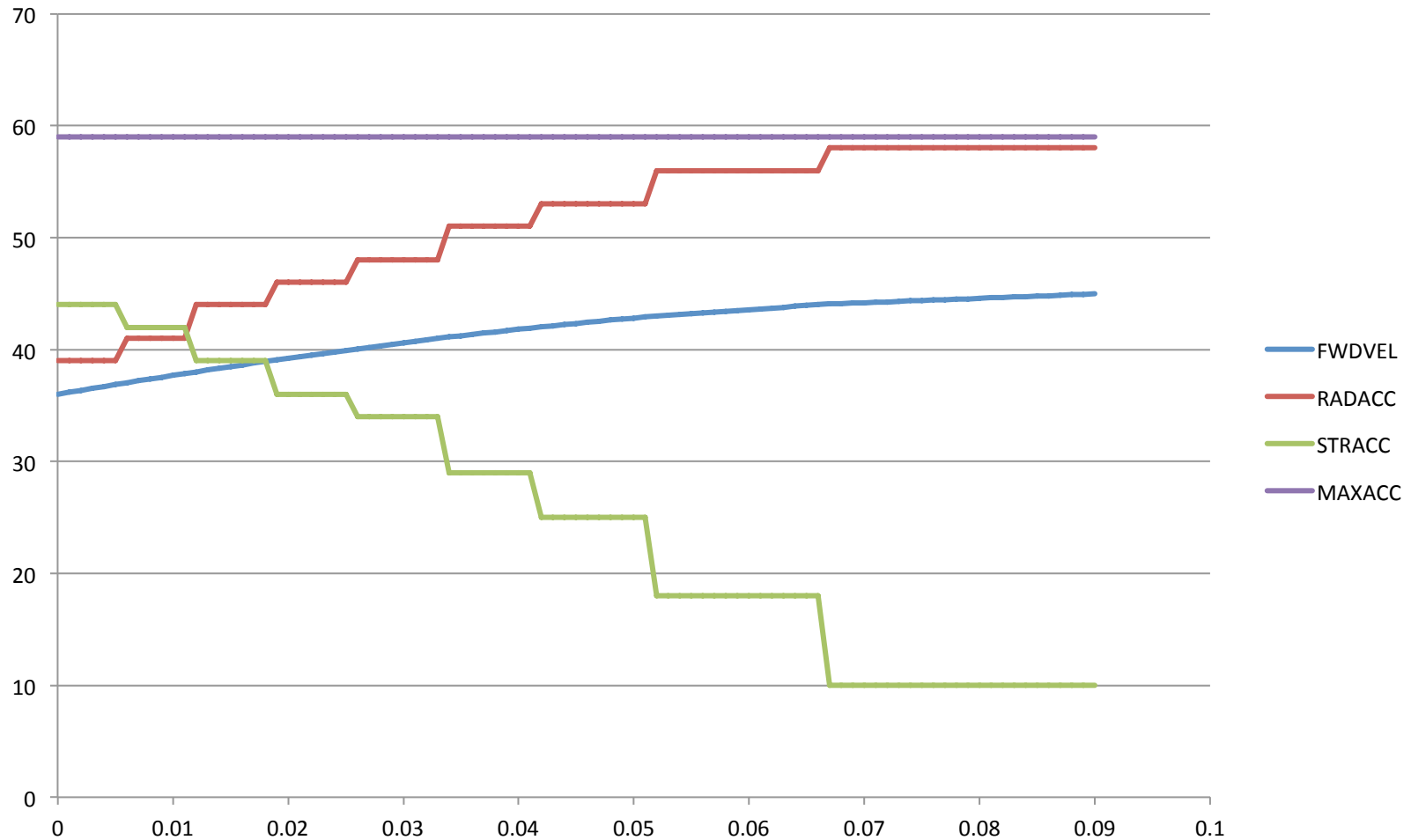
Calculated Velocity



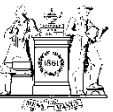
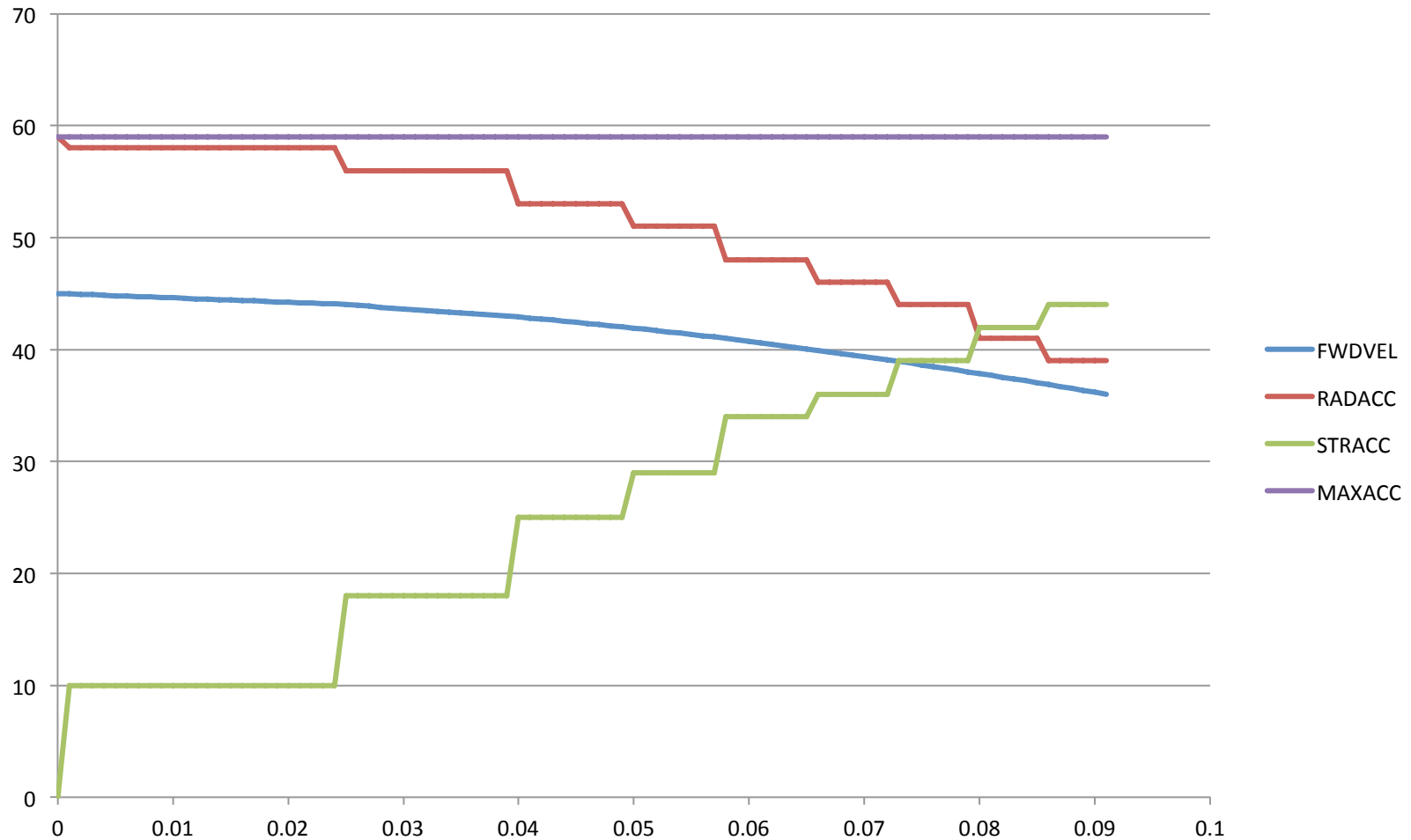
Assumed Tire Capability



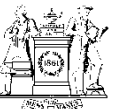
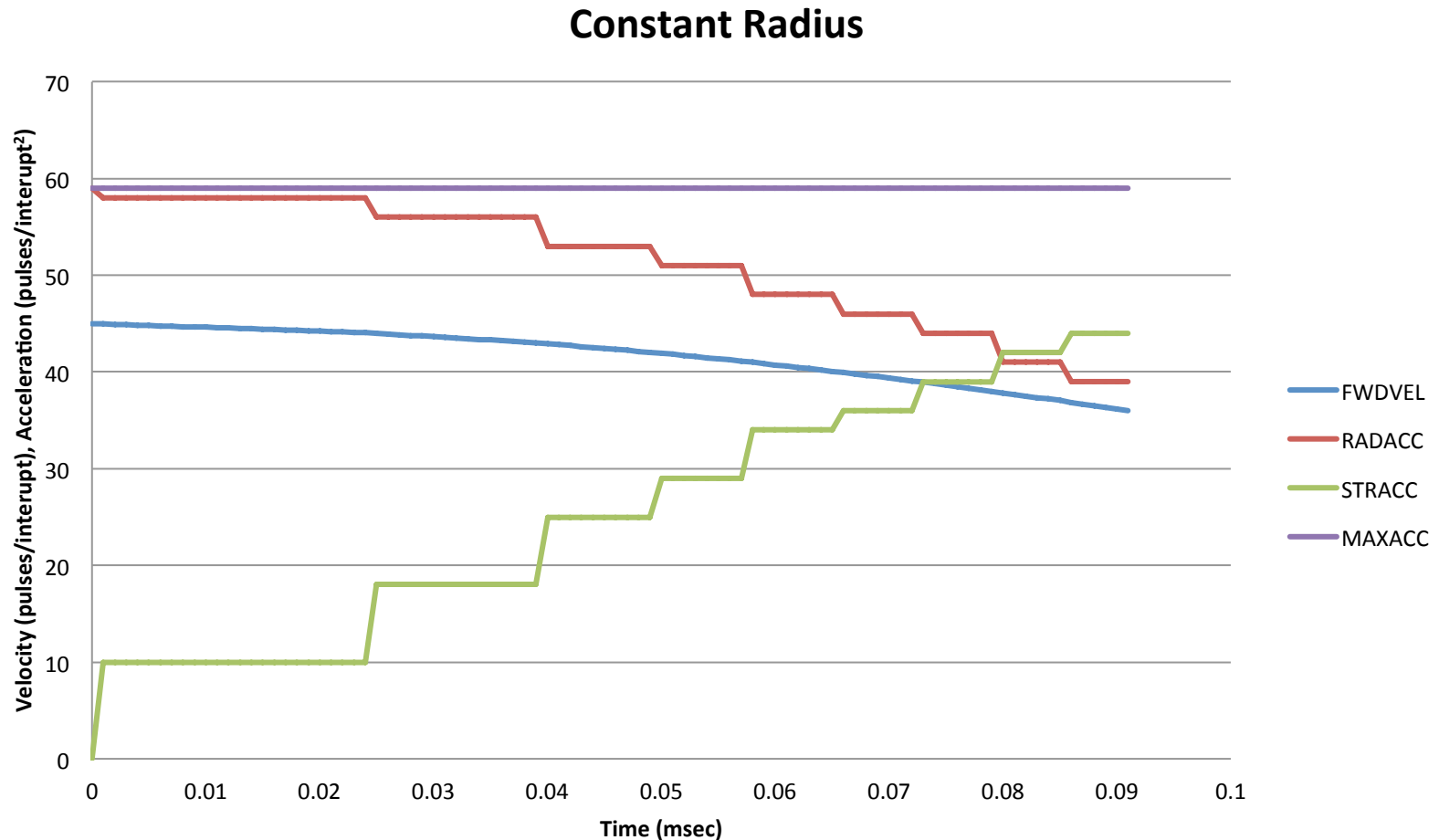
Velocity and Accel vs Time



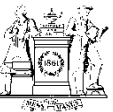
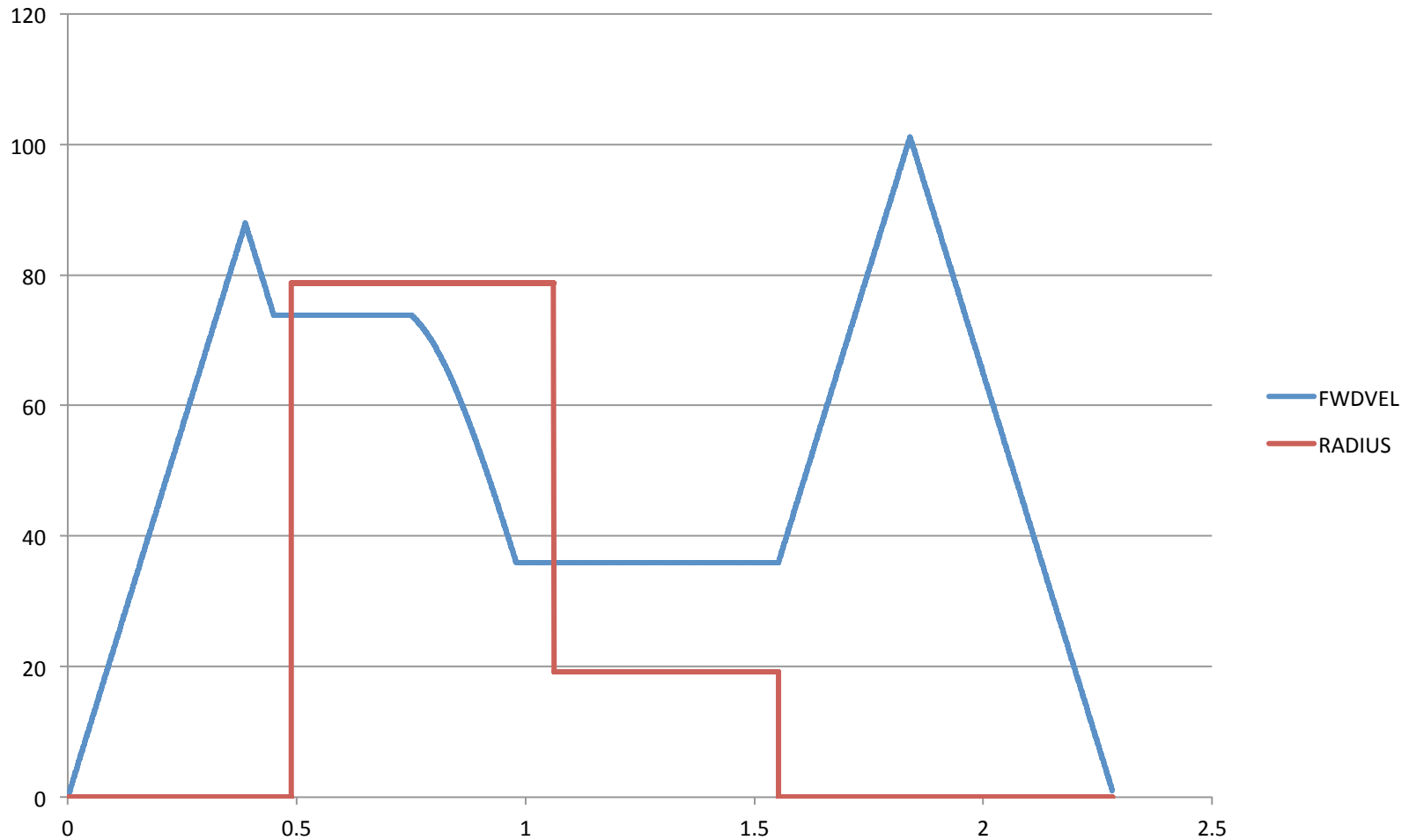
Constant Radius

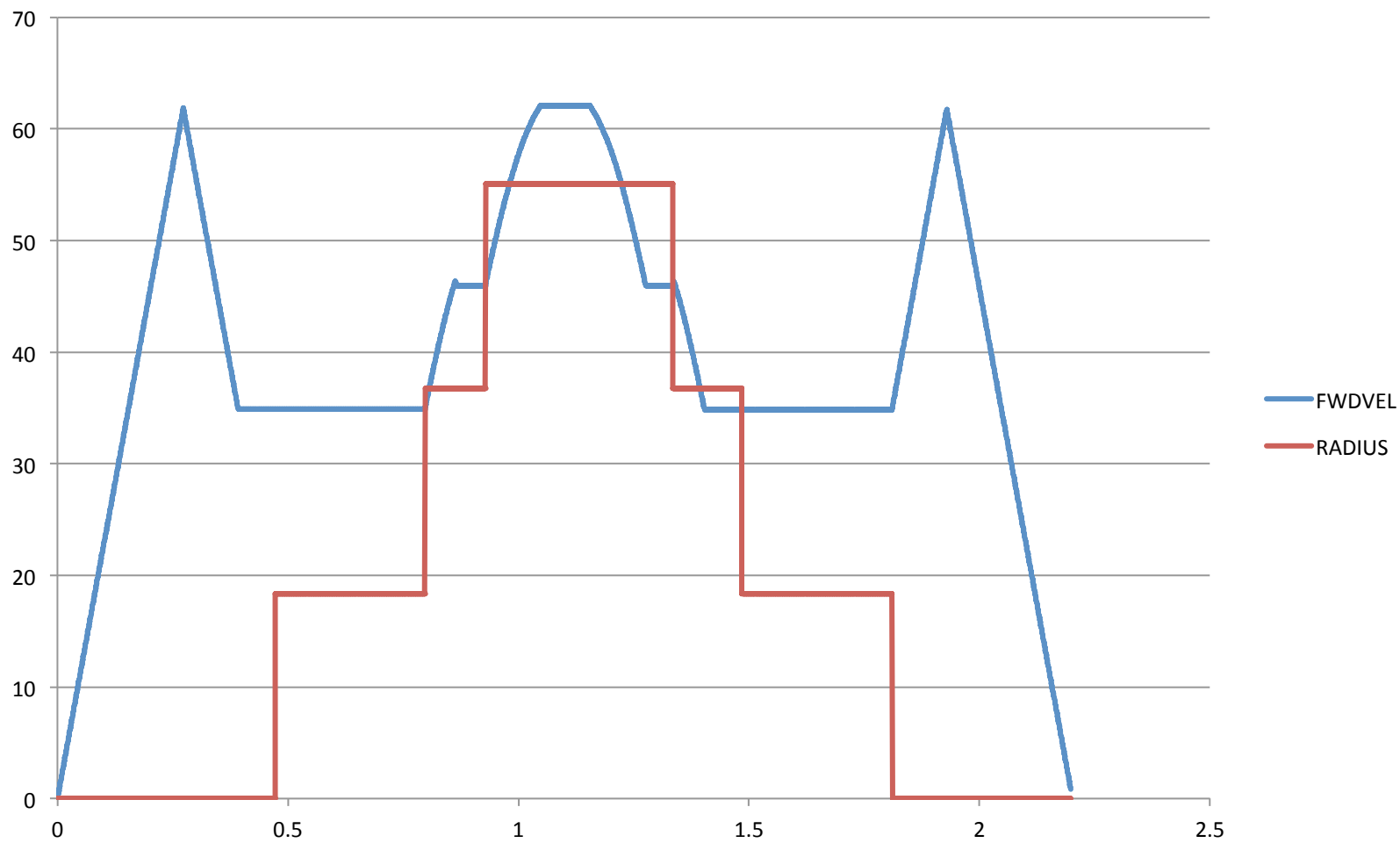


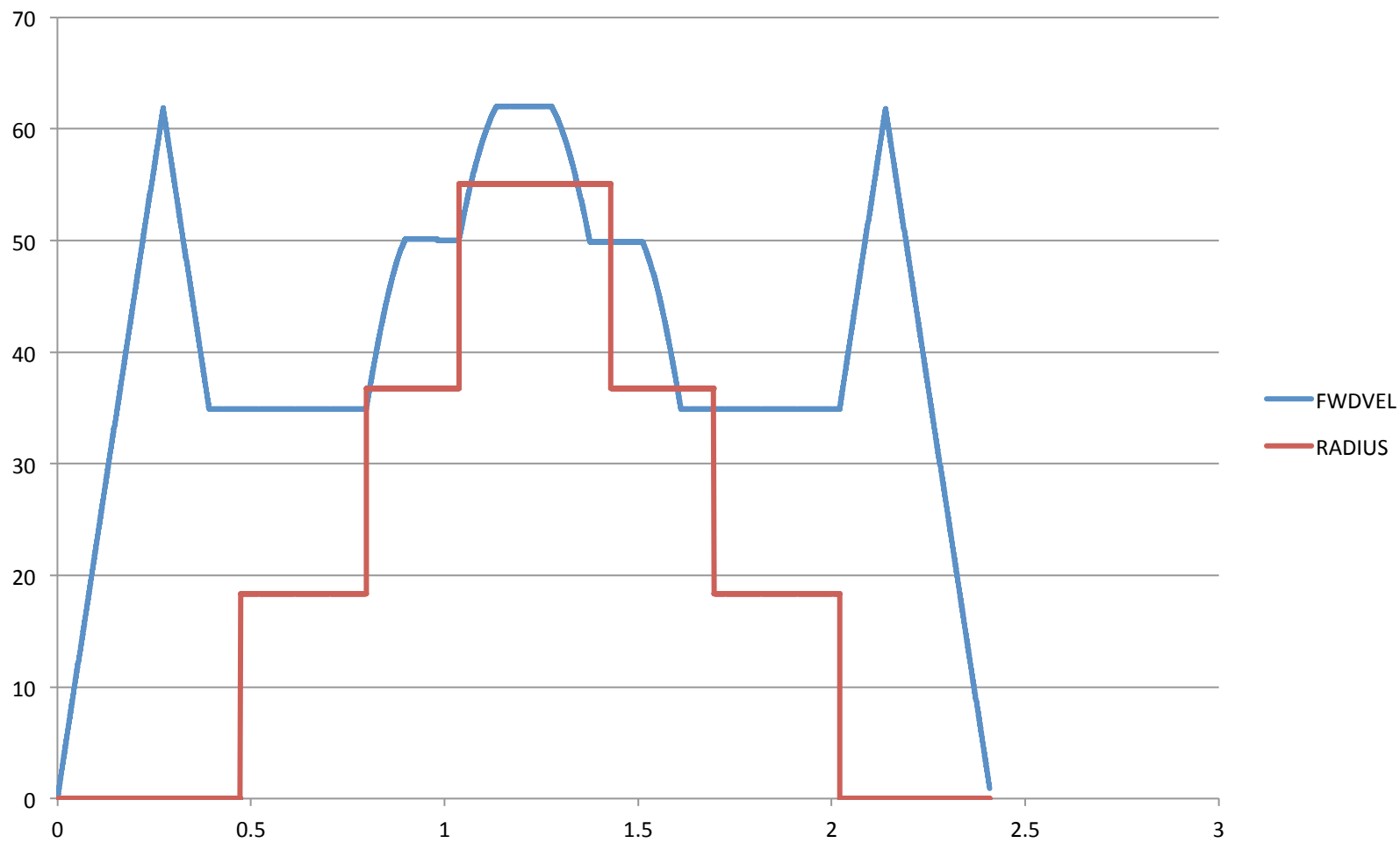
Velocity and Accel vs Time

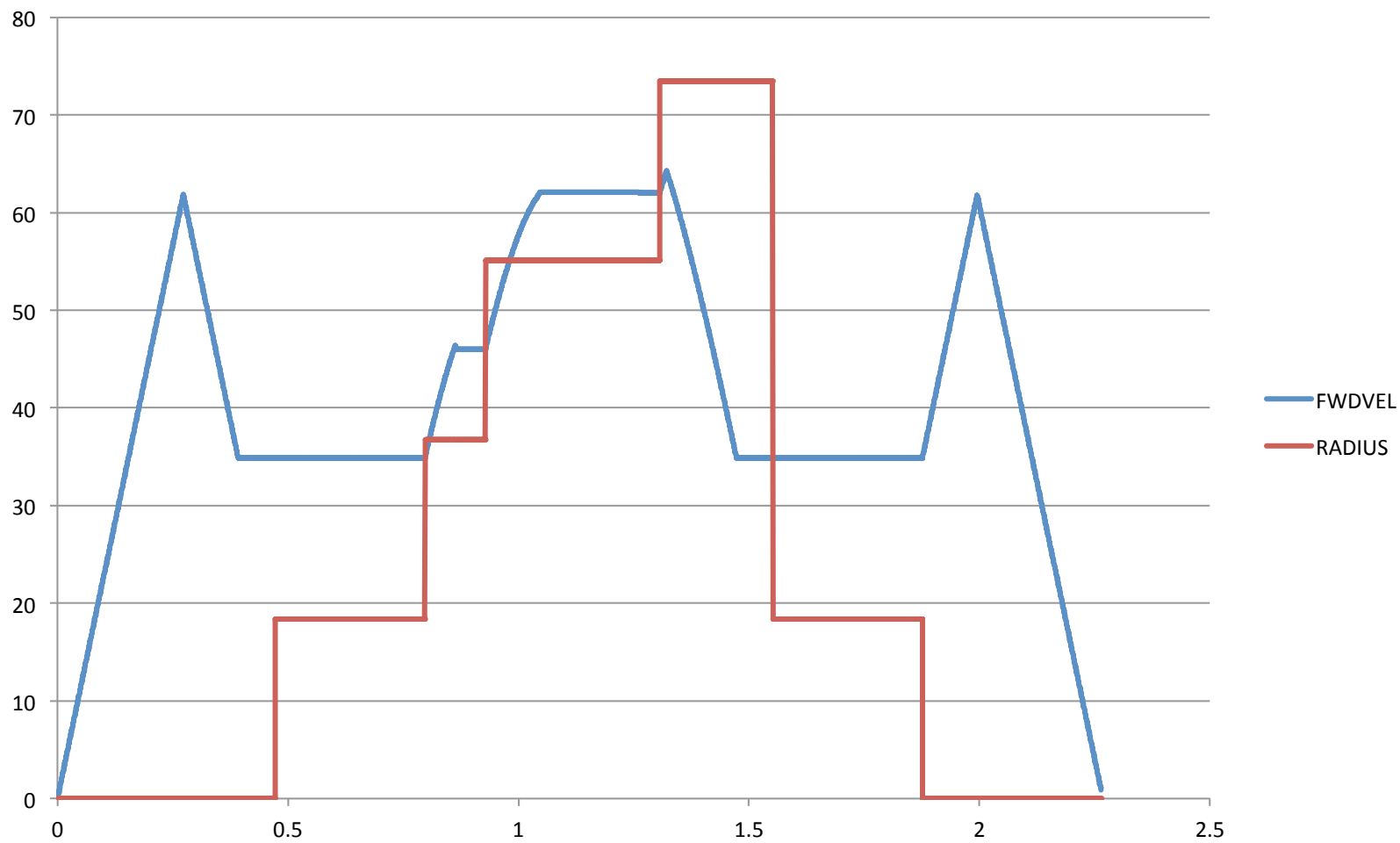


Large Radius to Small Radius









Jehu

Again the watchman reported, ...”And the driving is like the driving of Jehu the son of Nimshi; for he drives furiously.”

2 Kings 9:20

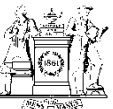
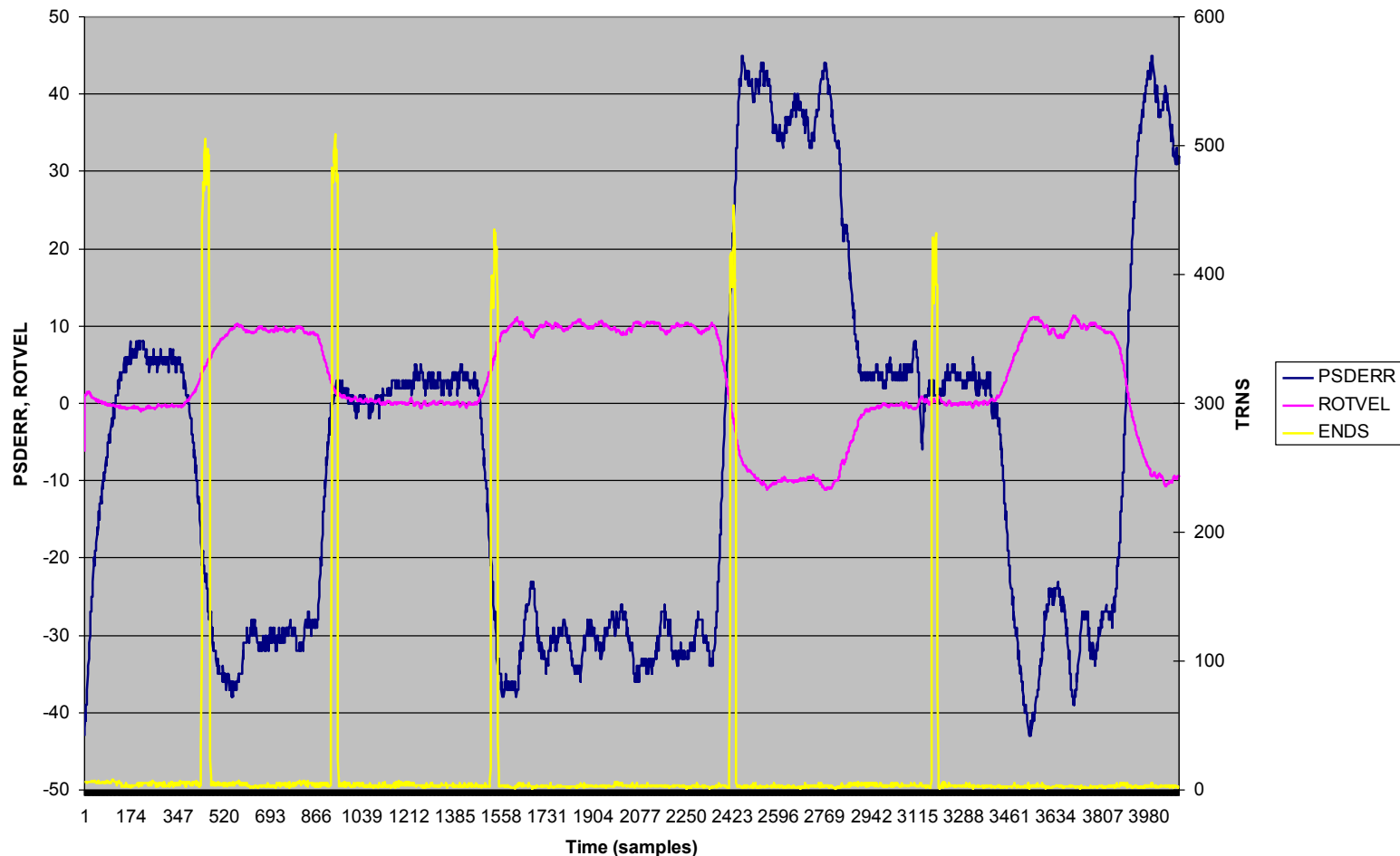


Hardware

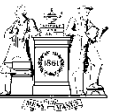
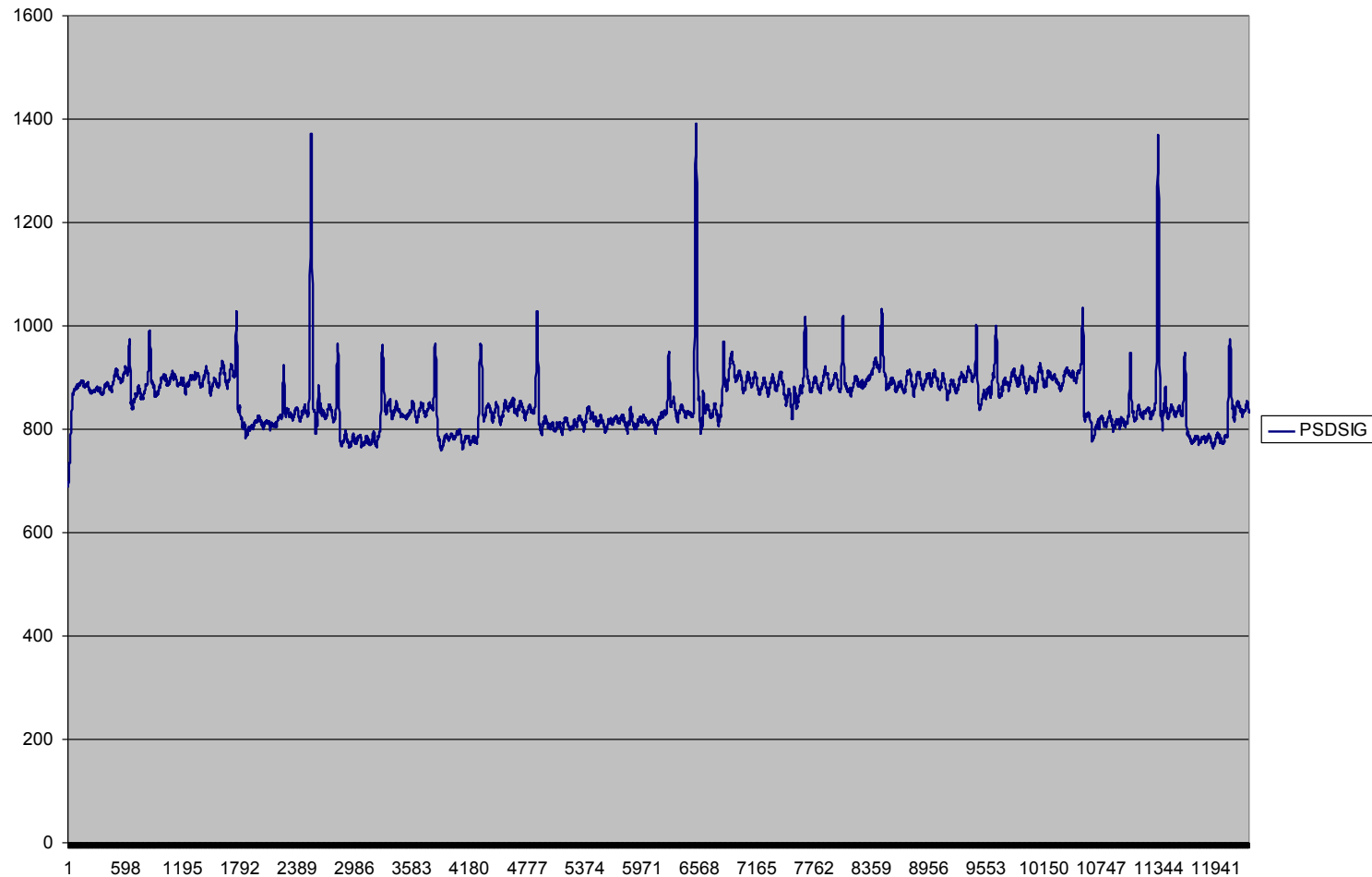
- PSD sensor with IR headlight
- DC motors with 512-line encoders
- Sensor for turn marker
- Sensor for Start/End marker
- 2-axis accelerometer
- Rate gyro
- dsPIC processor
- 32k byte serial NV RAM



PSD Error, Rotation Velocity



PSD Signal Strength



Data Collected During Search

SAMCTR	FWDDIS	ROTDIS	RADIUS	INIVEL
779	90,252	146	0	0
1077	43,079	8,435	0	0
587	23,482	-4,160	0	0

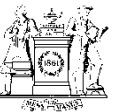
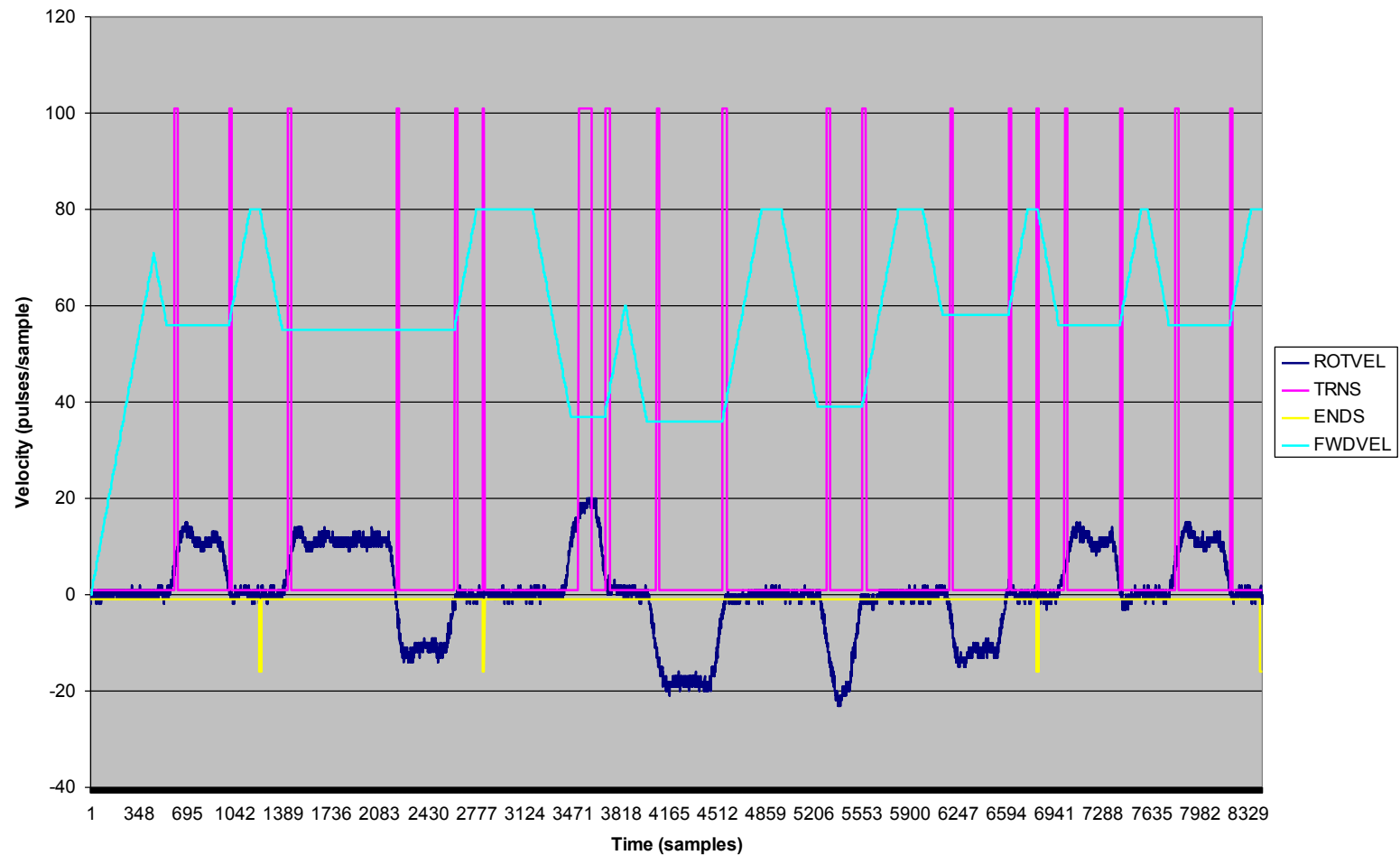


Velocity Profile Calculations

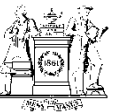
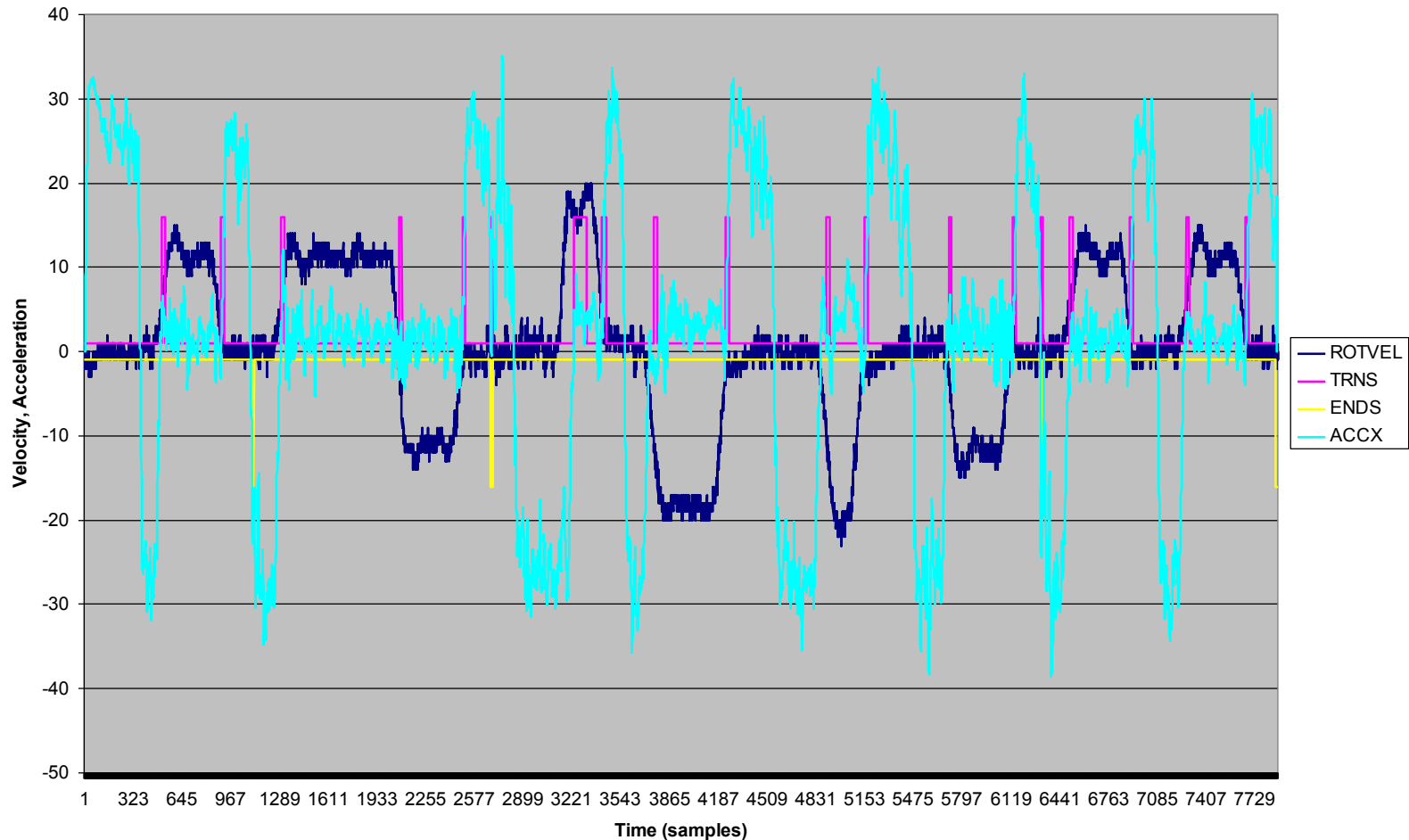
SAMCTR	FWDDIS	ROTDIS	RADIUS	INIVEL
779	90,252	146	65,535	0
1077	43,079	8,435	1,307	27
587	23,482	-4,160	1,445	29



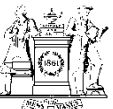
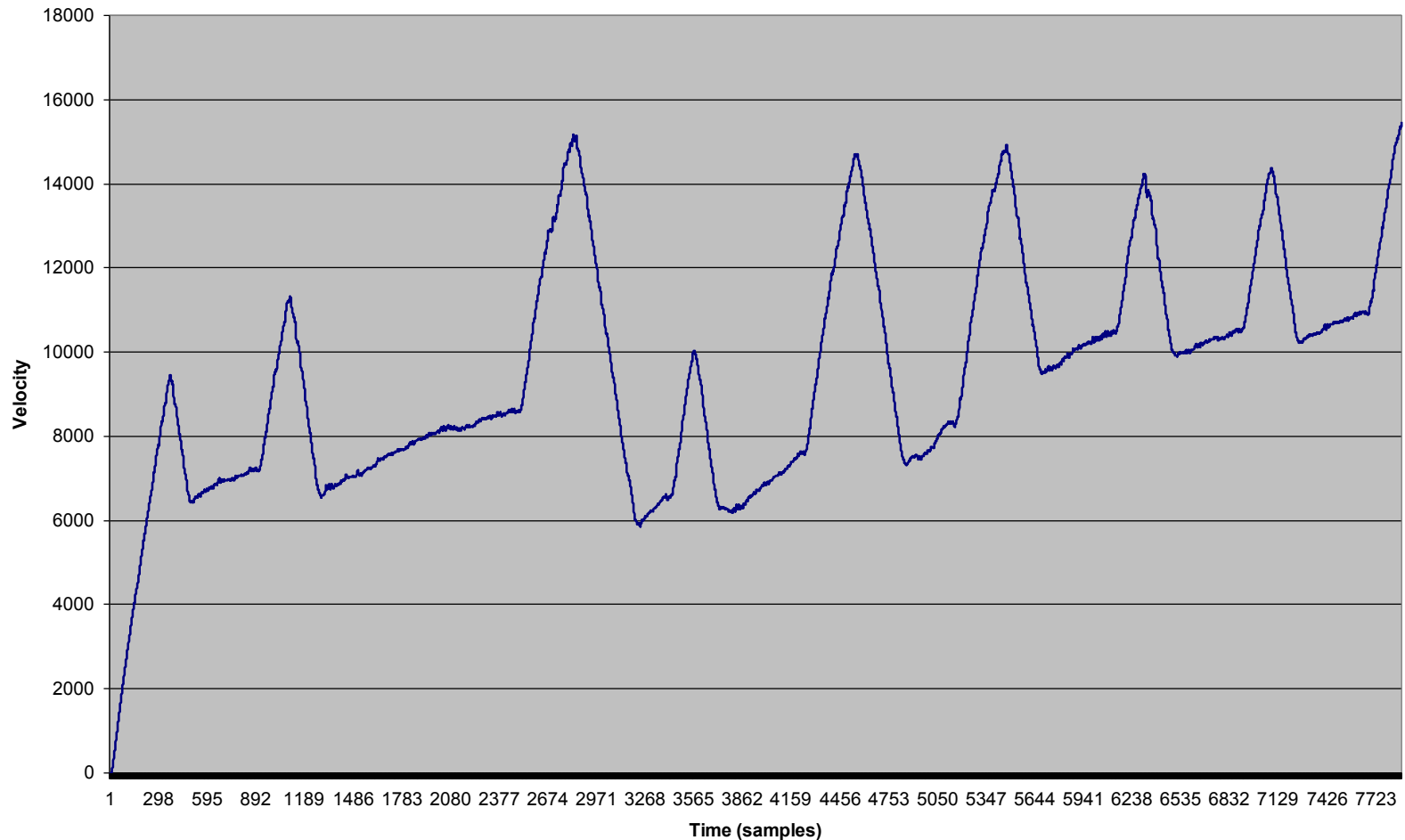
Velocity Profile



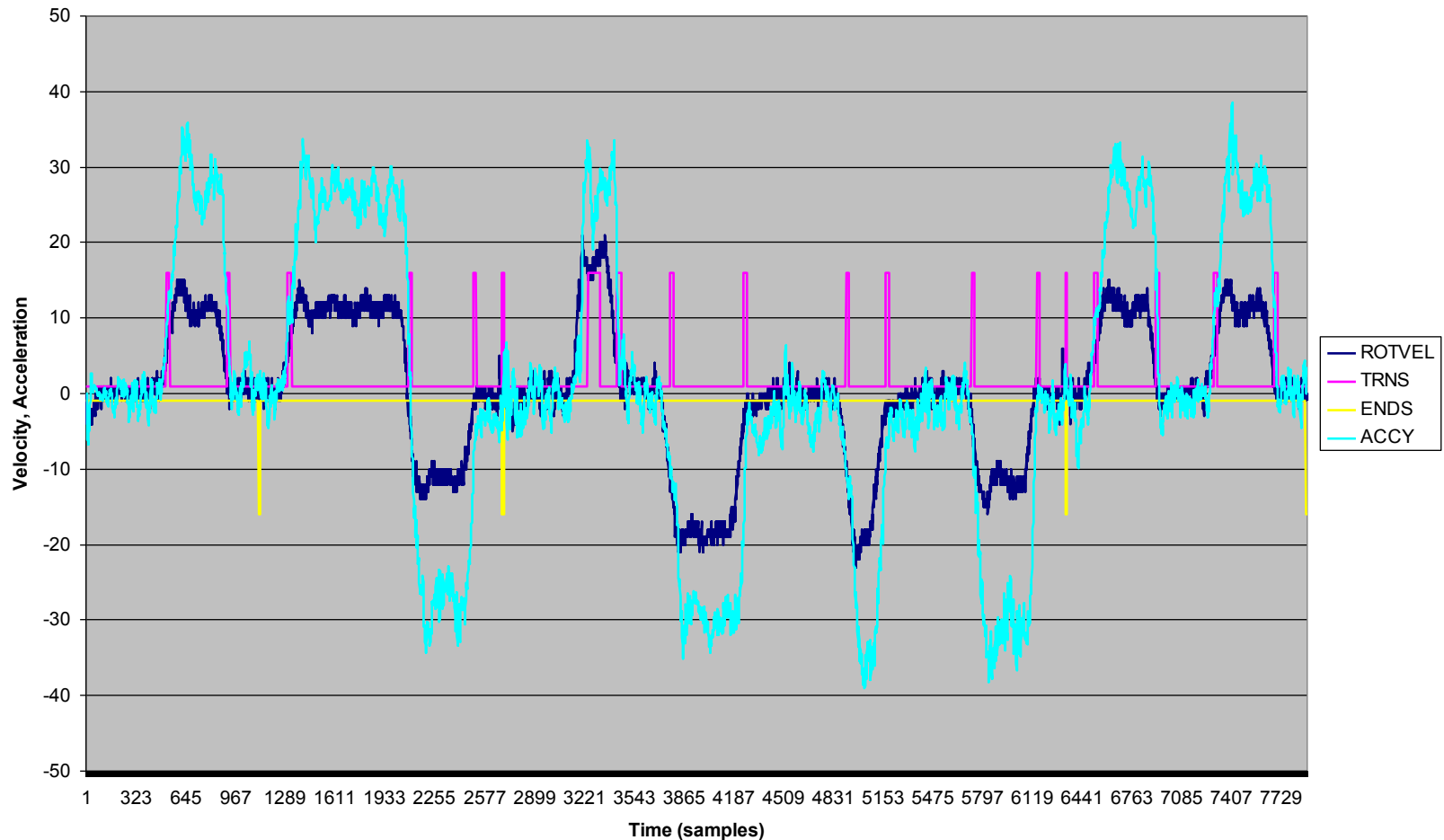
Forward Acceleration



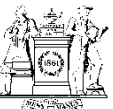
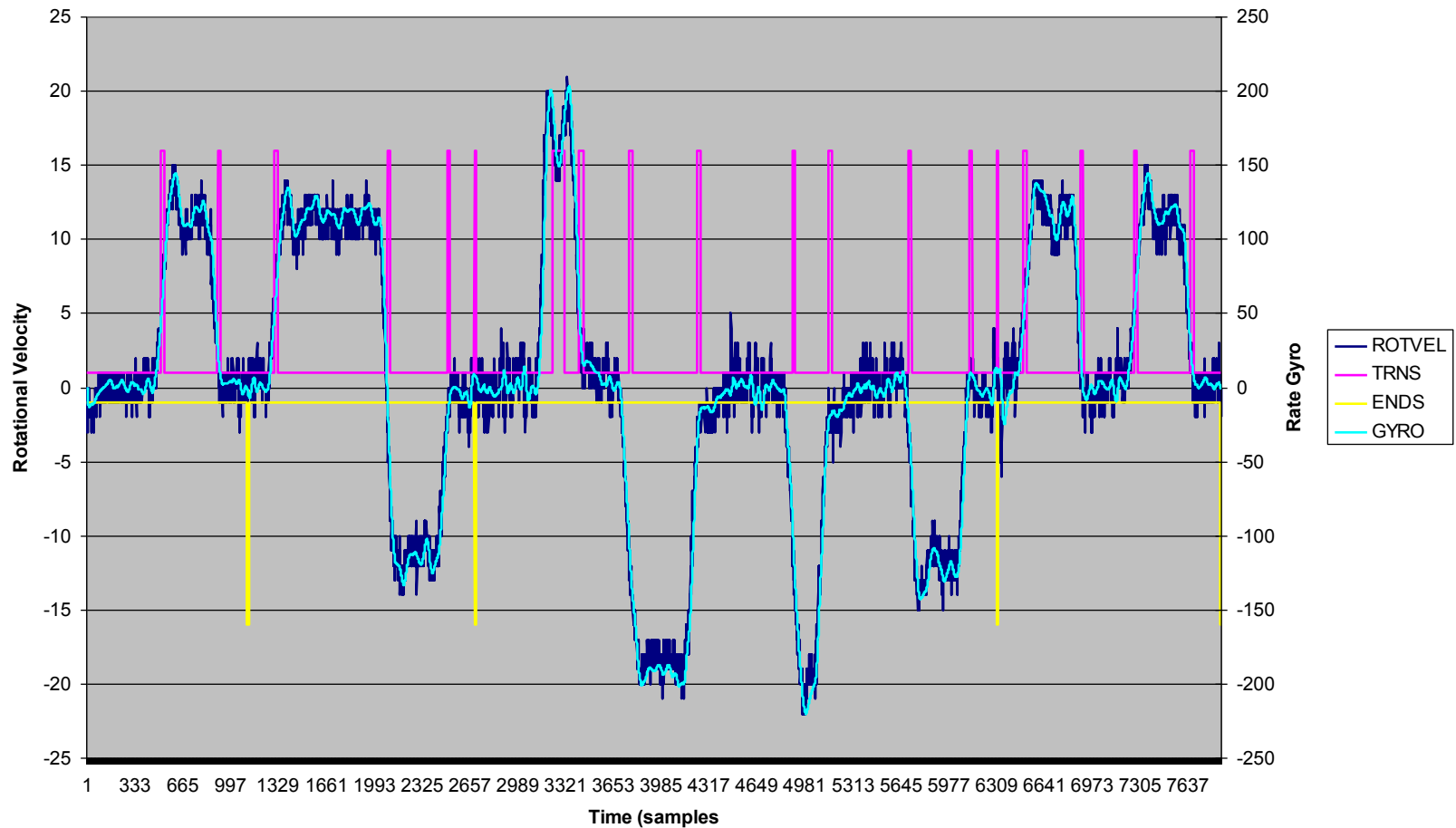
Integrated Acceleration

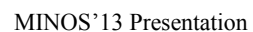


Lateral Acceleration

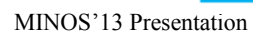


Gyro

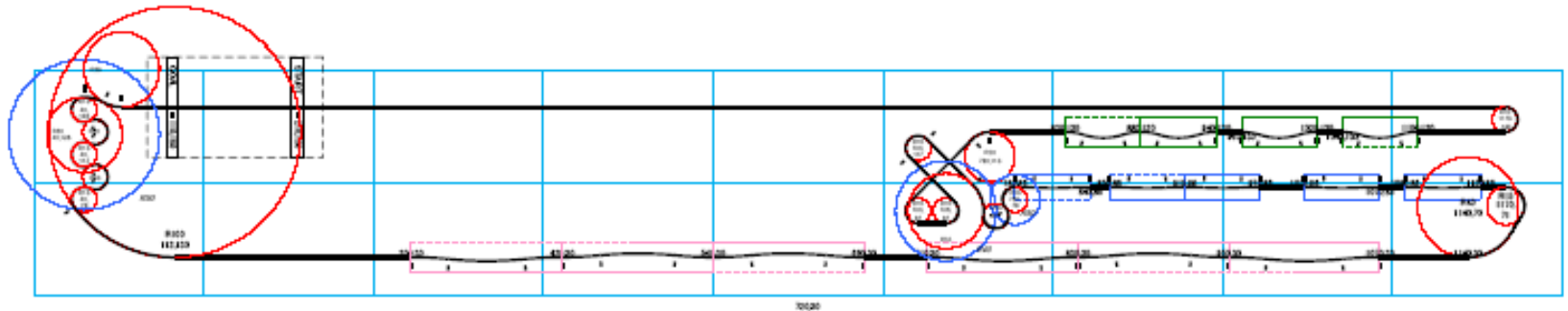




The diagram illustrates a simulated path for a robot on a soccer field. The field is marked with a blue grid. A thick black line represents the robot's path, starting from a 'START' box at the top center and ending at a 'GOAL' box at the bottom center. The path is a complex, winding line that avoids several red circles representing obstacles. Each obstacle is labeled with 'R' followed by a number and its coordinates (e.g., R20 90,390). A dashed line indicates the path's trajectory. A legend at the bottom left shows a black square for 'START' and a black square for 'GOAL'.



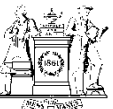
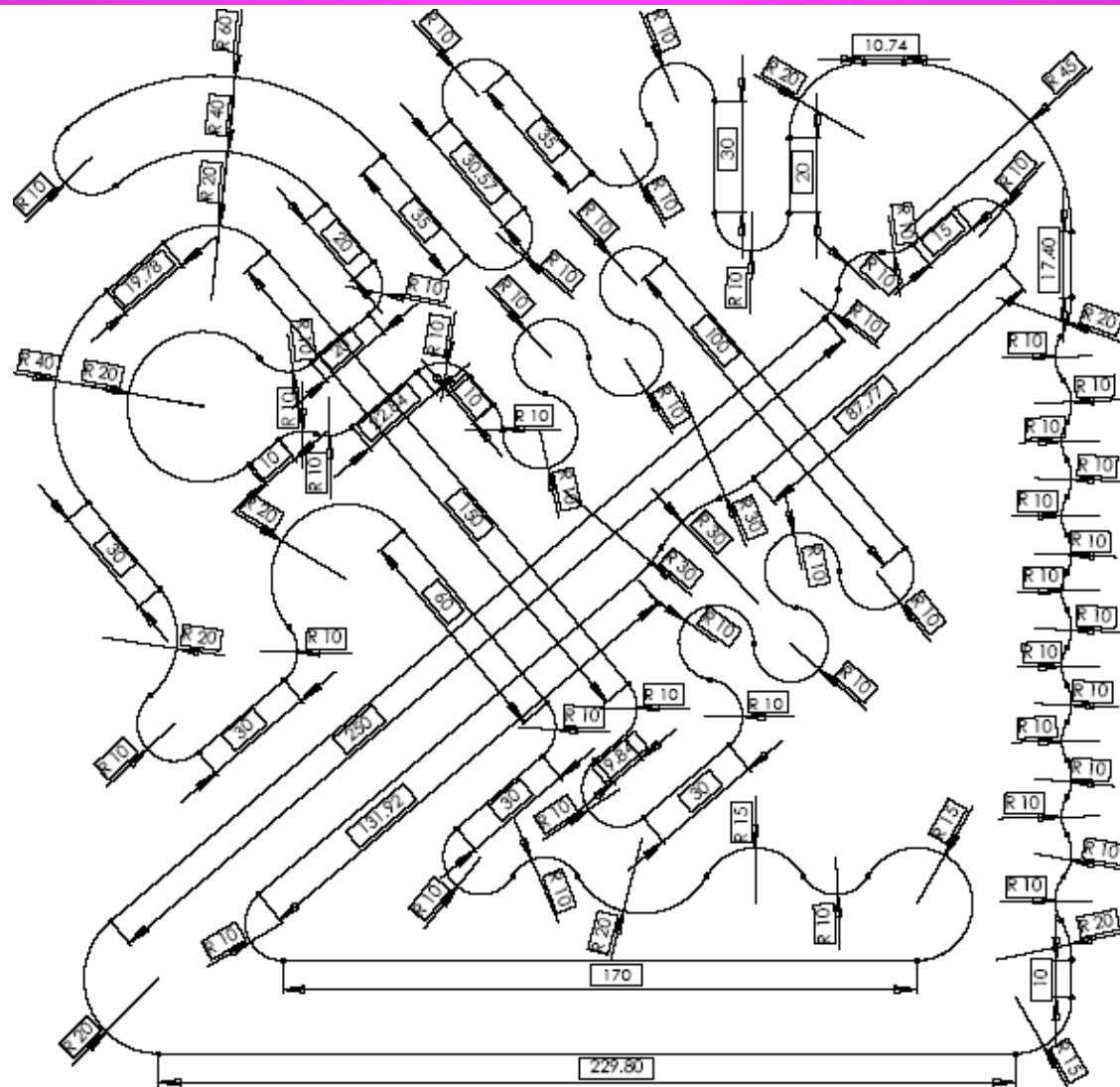
All Japan 2012 Final

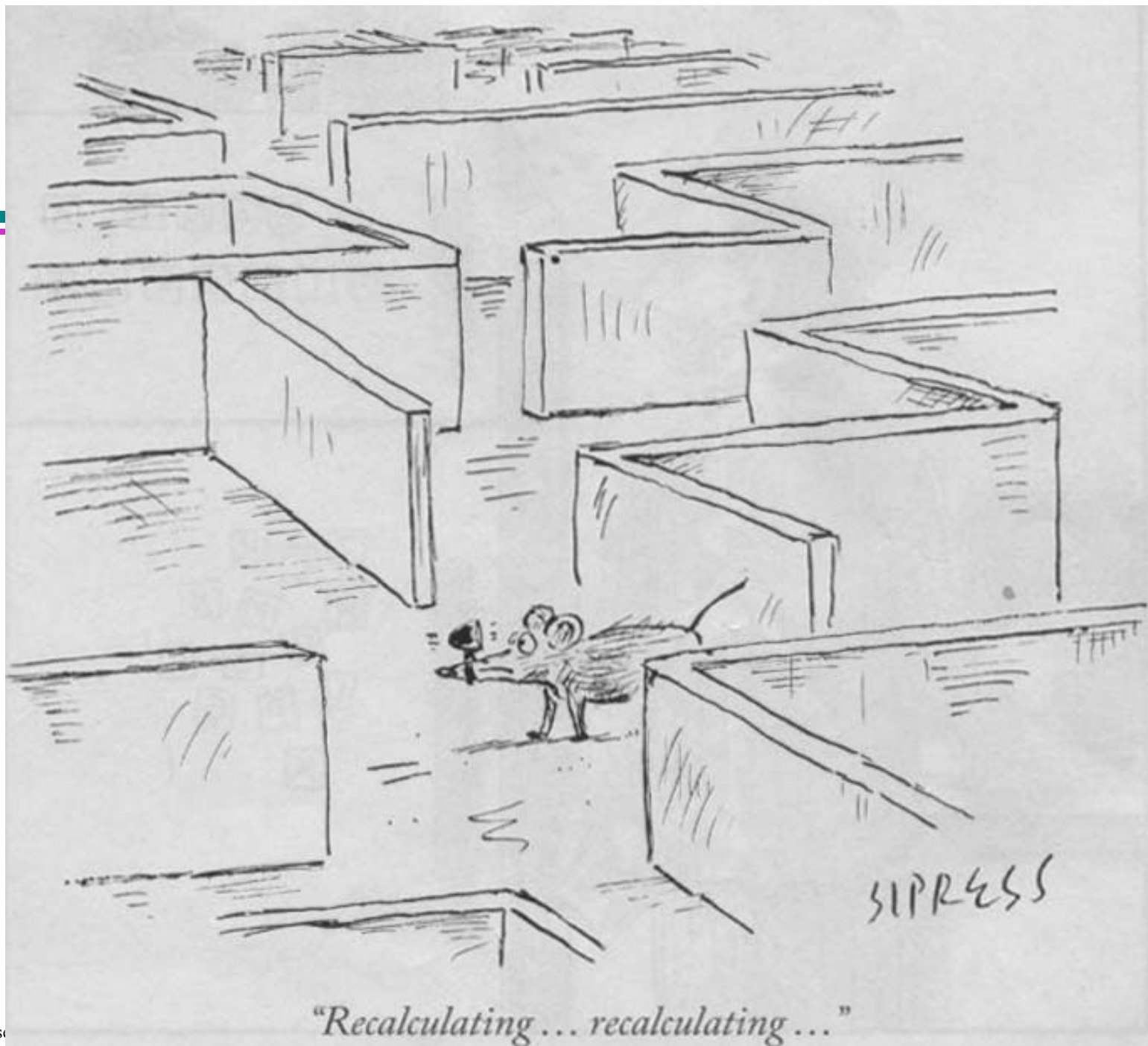


← 12.15 meters →

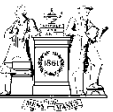
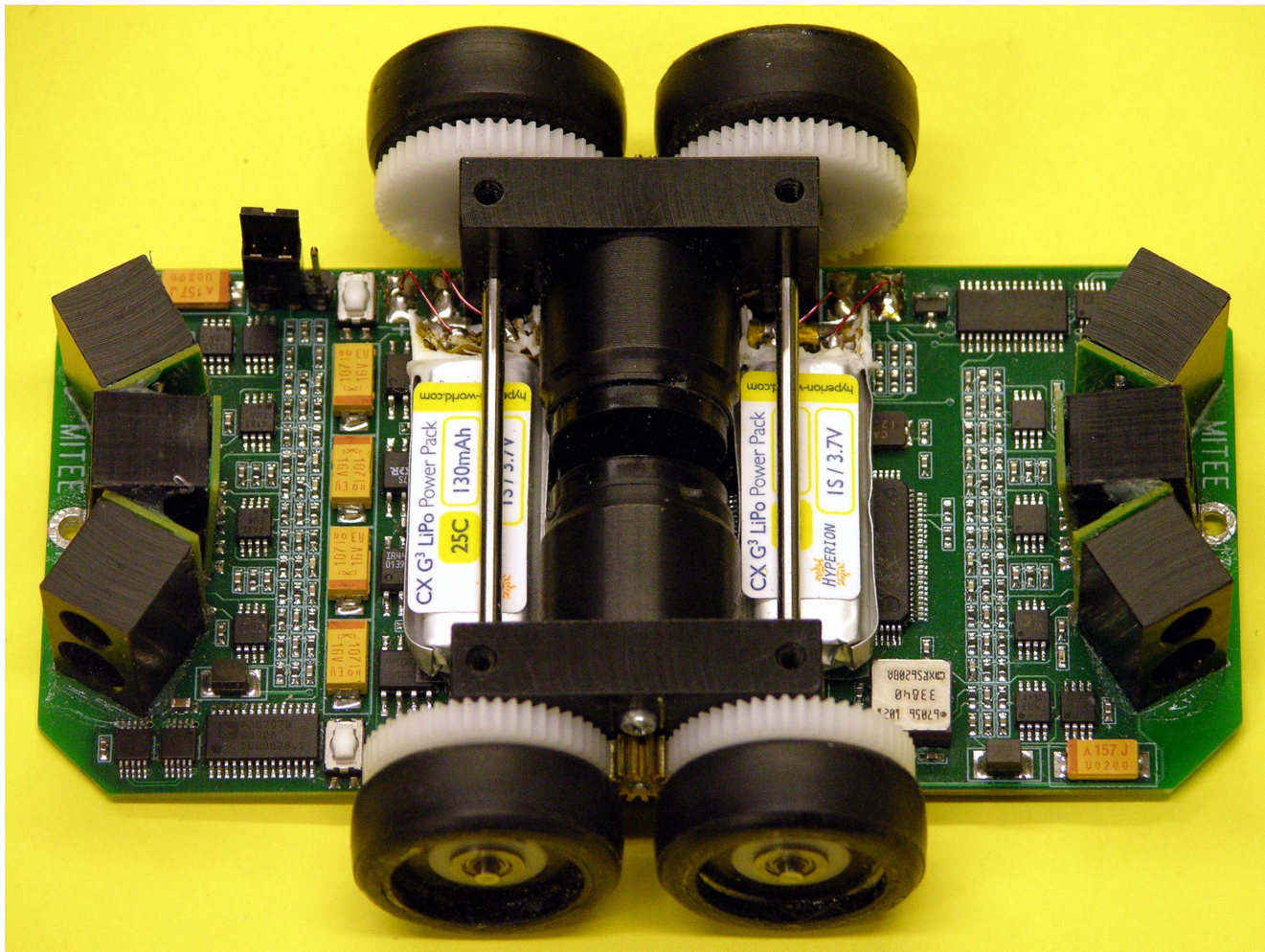


Lab Test Track (Taiwan)

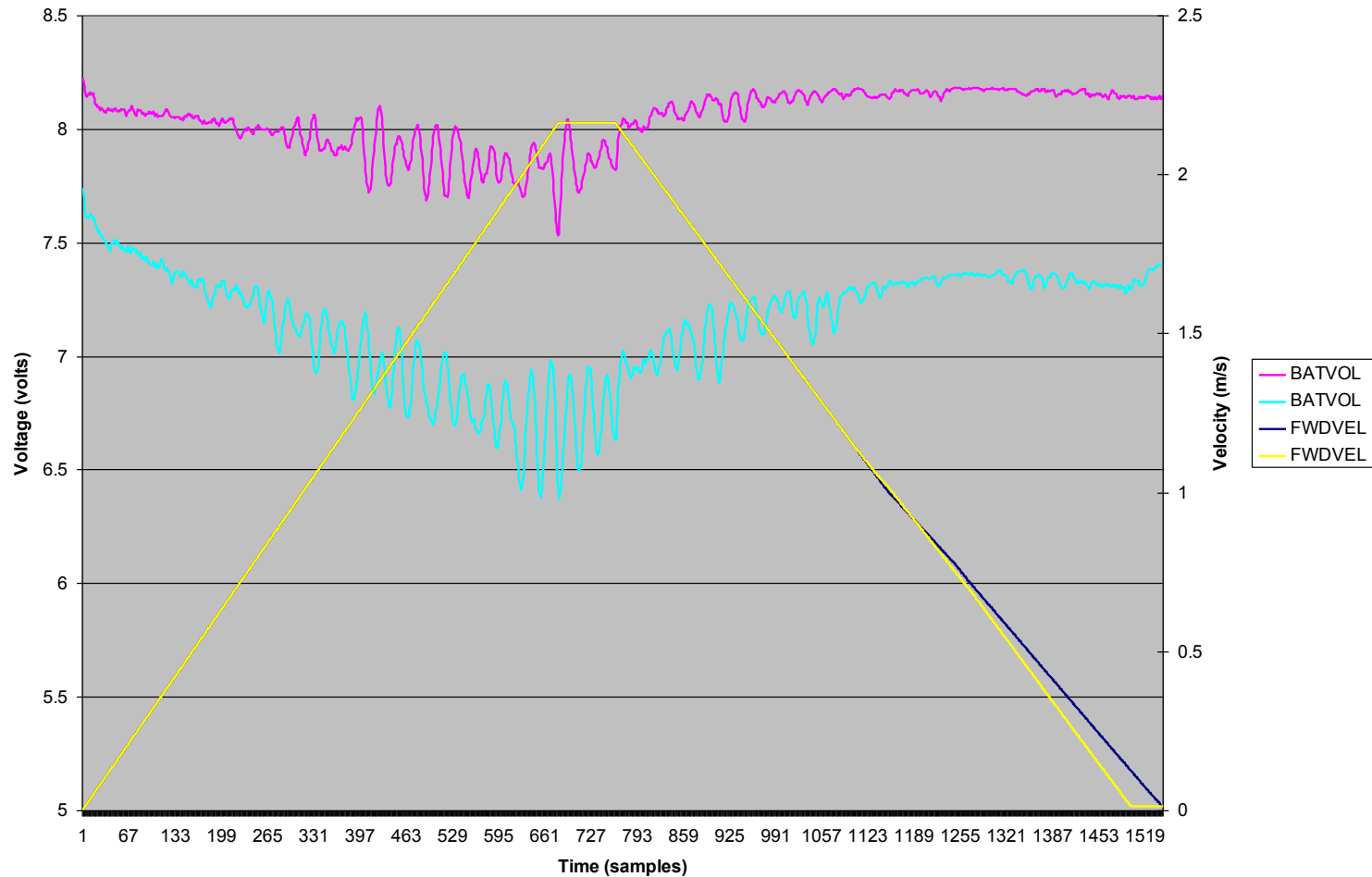




MITEE 13

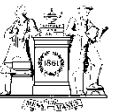


Benefit of New Battery



Notes

- Hardware
- PSD Sensor
- Test with Mikes line follower
- What does track look like
- Measurements of Japan Qualifying
- Inertial Sensors
- Interesting tracks



Velocity Profile

