

MOUSE DATA COLLECTION AND CALIBRATION

STEPHEN PITHOUSE

CE LAST TIME...

ING WHEEL ENCODER DATA ALONE TO TRACE THE PATH OF THE
BOT

OLLECTED DATA, BUT NOT YET USED IT TO OPTIMISE PERFORMANCE IN
ALITY

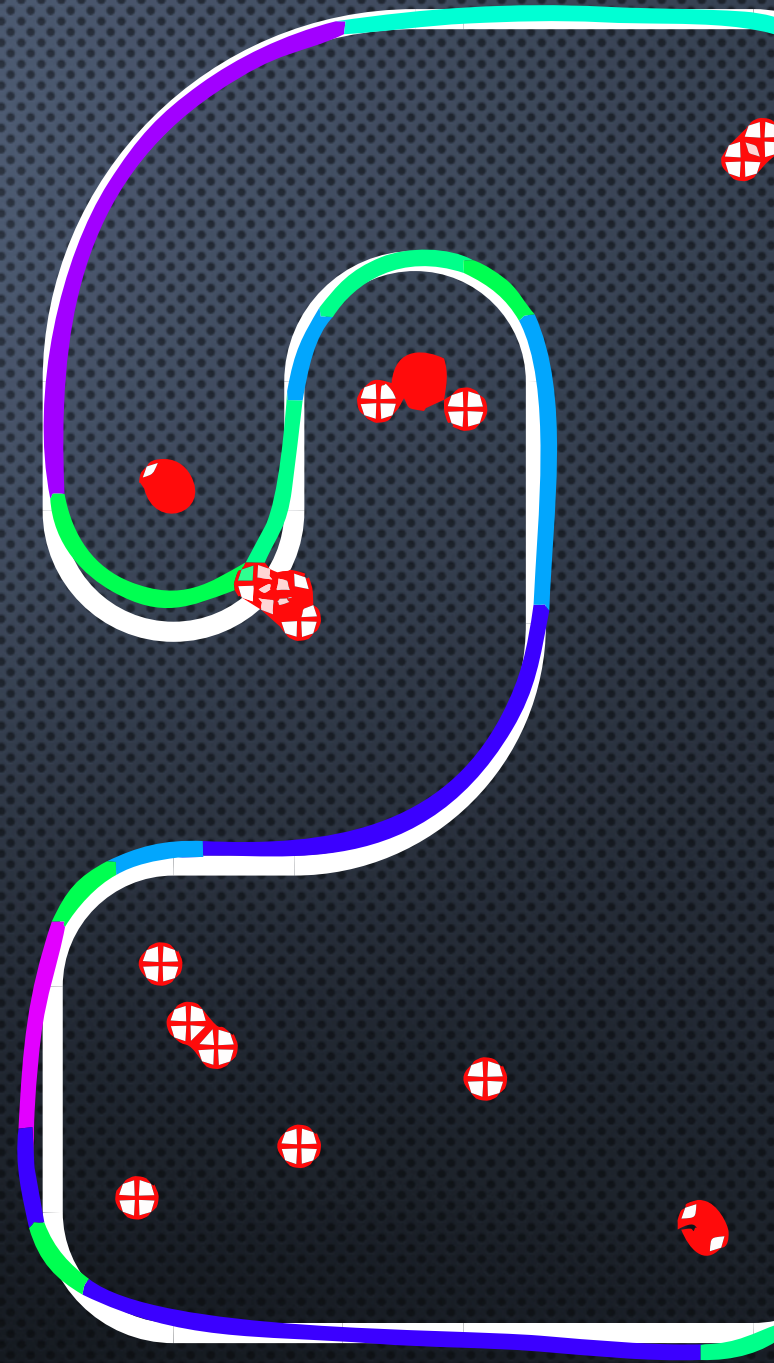
AS PROVED USEFUL IN OTHER WAYS...

CAN CALCULATE DISTANCE AROUND THE TRACK

CAN CALCULATE AVERAGE SPEED FOR A LAP

- USED IN TESTING TO OPTIMISE SPEED PROFILES
- CAN VARY THE TRACK SHAPE AND DETERMINE HOW LAYOUTS AFFECT THE PERFORMANCE

TS HAVE A LOOK AT ANOTHER LAYOUT...



DATA COLLECTED FROM TECHFEST 2016

Data Collected:

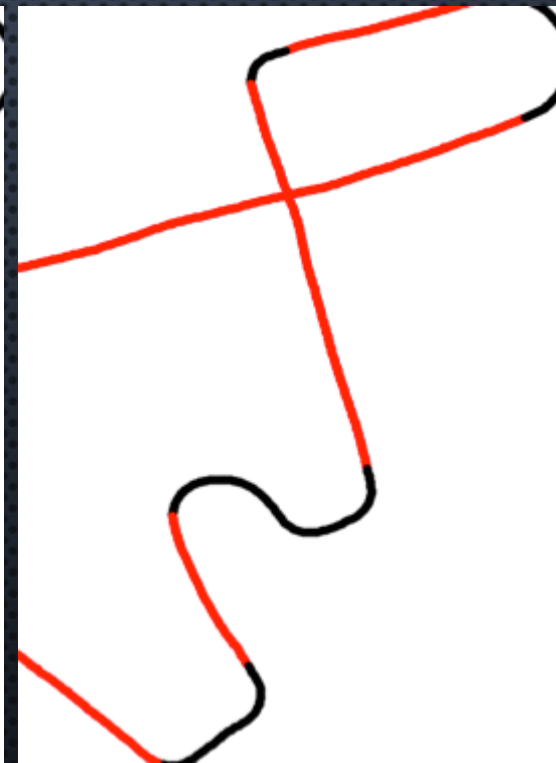
Track length: 11.5m

Lap time: 12.24 seconds

Avg. speed: 0.94m/s

Theoretical improvement with optimised straights alone:

Lap time: **8.15s** – with modest 1.7m/s straight line speed



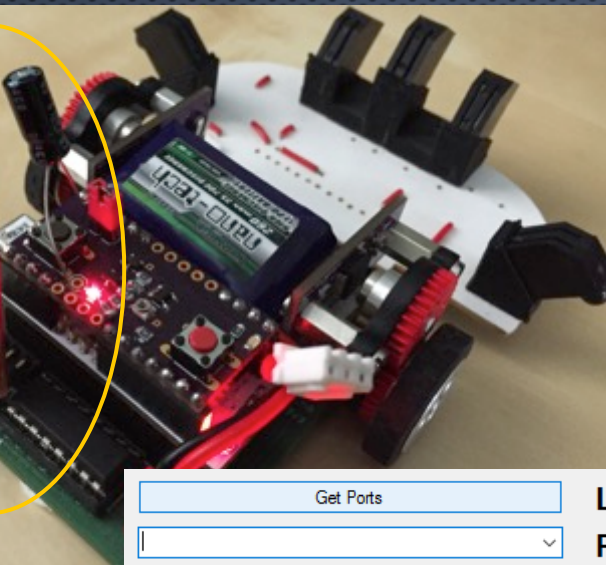
ING THE DATA...

COLLECTING DATA IS THE EASY BIT!

- USING THE DATA IN A MEANINGFUL WAY IS MORE CHALLENGING
- SIMPLY REPLAYING THE LAP USING CUSTOM SPEED PROFILES FOR THE CURRENT TRACK TYPE WOULD NOT WORK DUE TO WHEEL SLIP AND WOULD ONLY GET WORSE OVER TIME

INTEND TO USE 'REALTIME' ADJUSTMENT – DETECT WHEN DRIVING STRAIGHT, THEN USE STRAIGHT PROFILE FOR DISTANCE DETERMINED BY PREVIOUS LAP.

PHYSICALLY COLLECTING DATA



Get Ports

Connect

Send

Record to CSV

Test Encoders

Motor speed test

Flash sensors

Sensor values

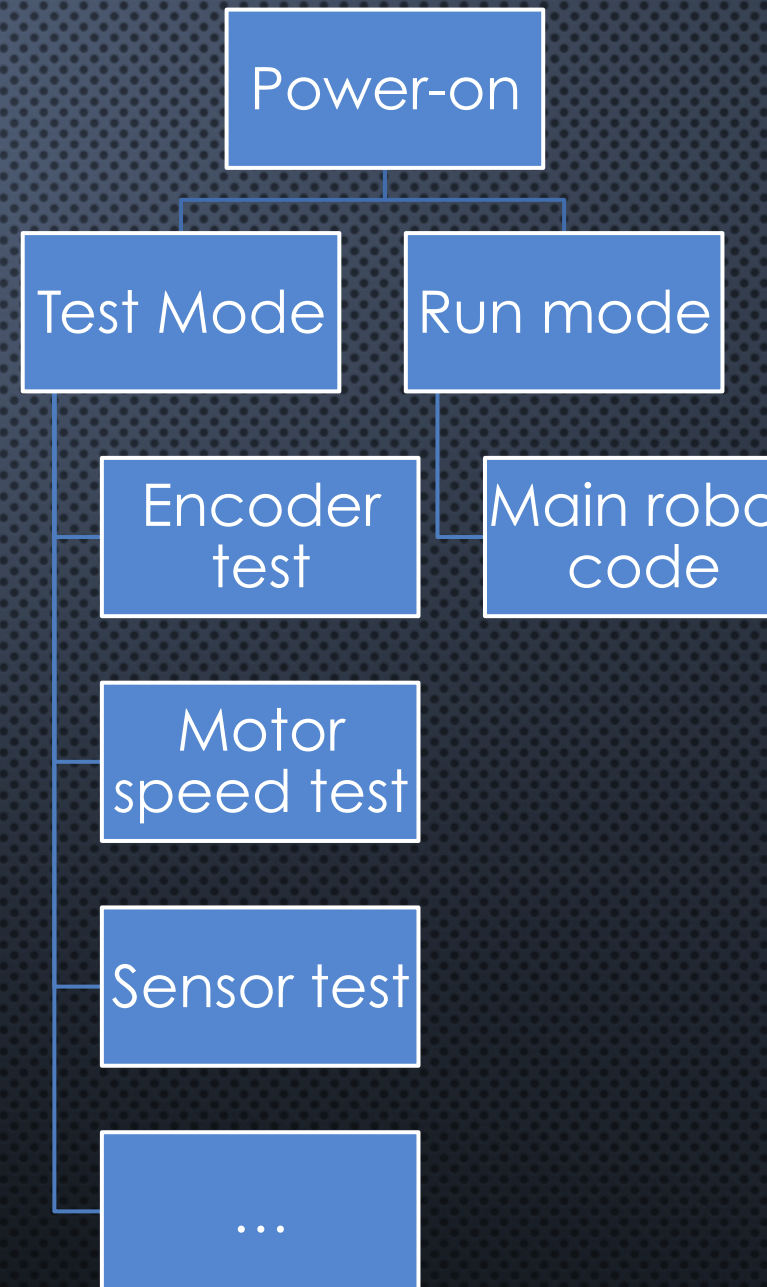
Wheel revolution

Disconnect

Clear History

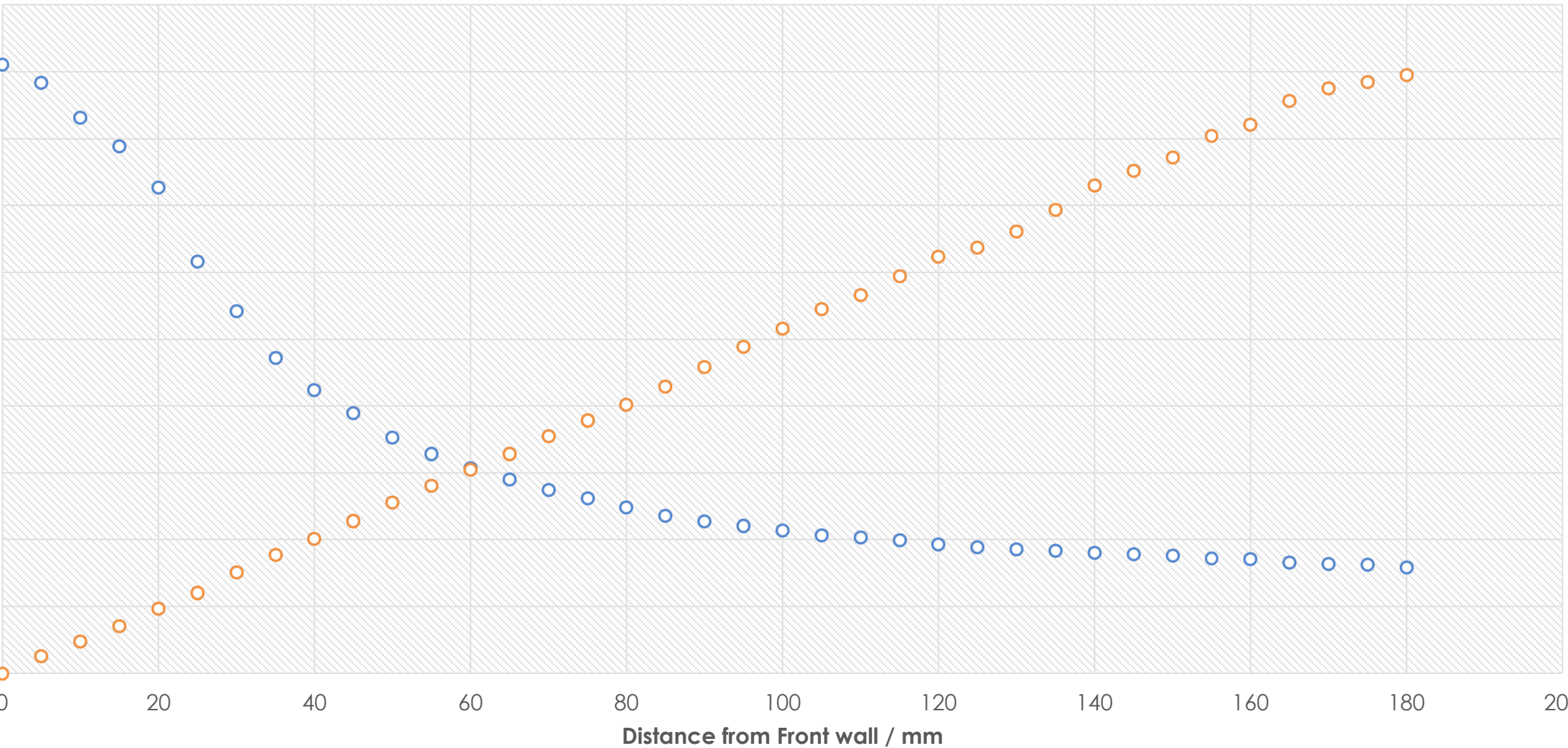
Connected?

Close



ZE SOLVER FRONT SENSOR

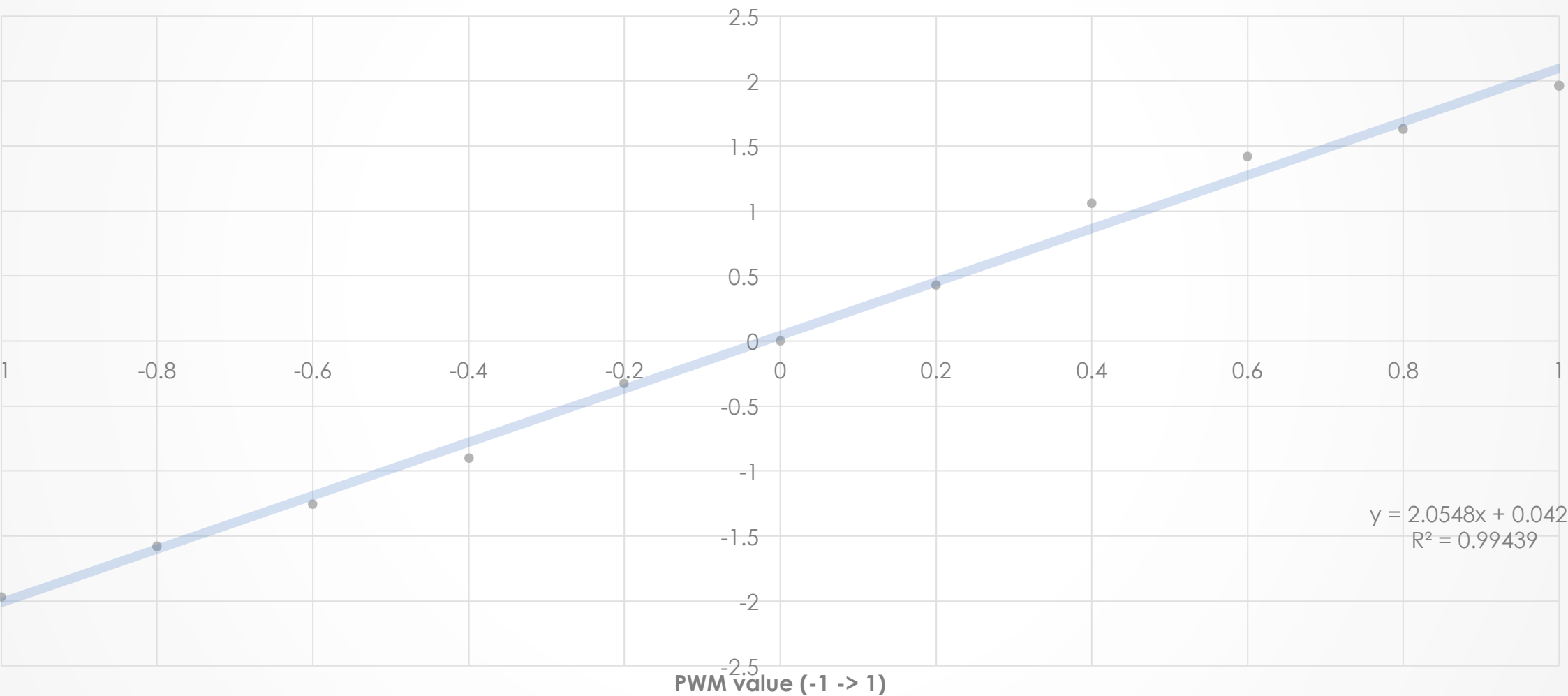
Graph showing conversion from raw data to distance using lookup table generated in frontCalib function



COLLECTING MOTOR DATA

Graph showing motor speed for given PWM value

• left motor • right motor • Average — Linear (left motor) — Linear (right motor) — Linear (Average)



ING 'KNOWN' UNITS

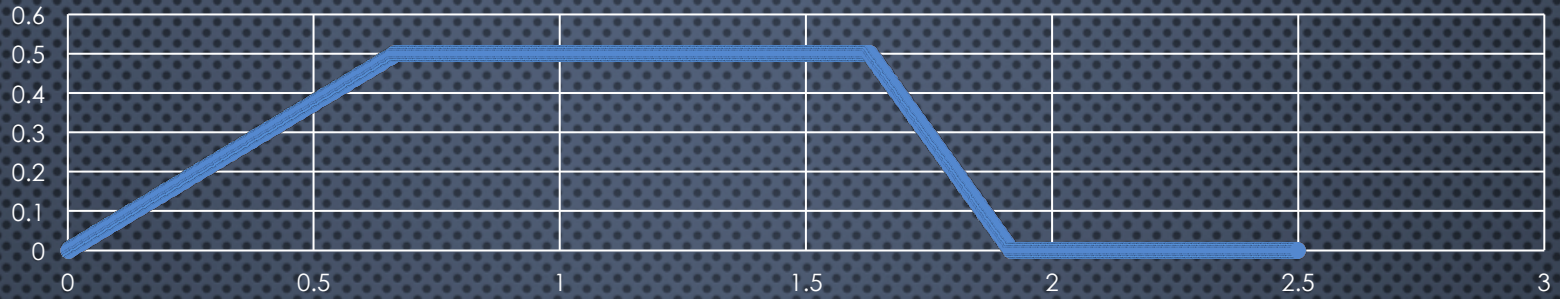
MY PREVIOUS ROBOT USED 'RAW' SENSOR AND PWM VALUES

CONVERTING TO SI UNITS – OR ANY UNIT WHICH IS A KNOWN QUANTITY SUCH AS DISTANCE OR SPEED, IT IS MUCH EASIER TO ACHIEVE DESIRED MOVEMENT AND DEBUG

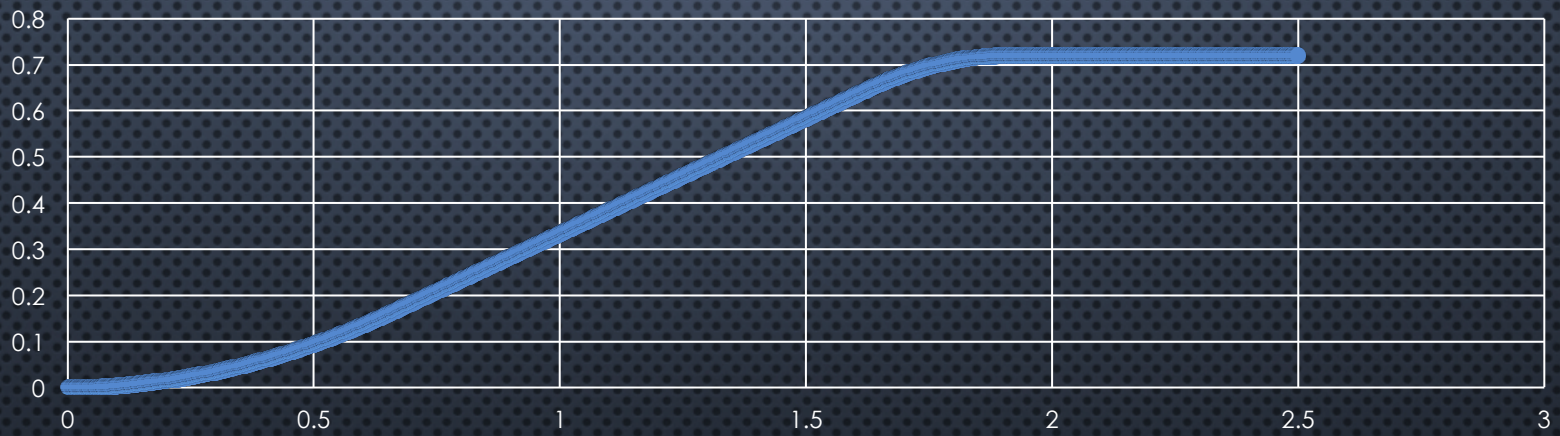
HAVE 3 ROBOTS WITH DIFFERENT DRIVETRAINS FOR DEVELOPMENT, THESE CAN RUN EXACTLY THE SAME CODE AS EACH OTHER, SIMPLY BY CHANGING A 'PARAMS' FILE AND ENTERING WHEEL DIAMETER, SPACING AND MOTOR SPEED – AS DETERMINED BY PREVIOUS GRAPH

ED PROFILES

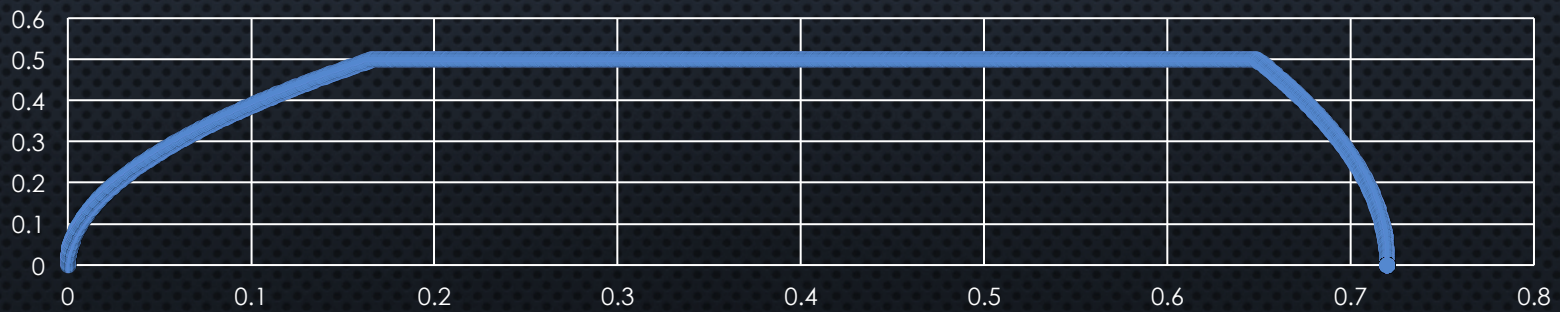
Speed vs. time



Distance vs. time

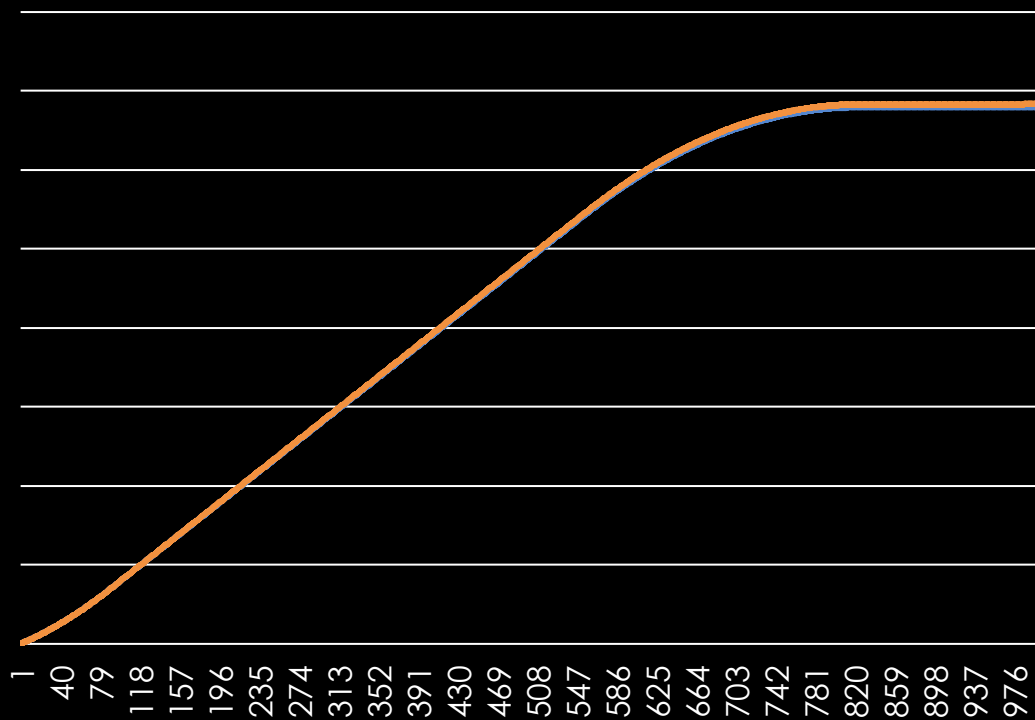


Speed vs. distance

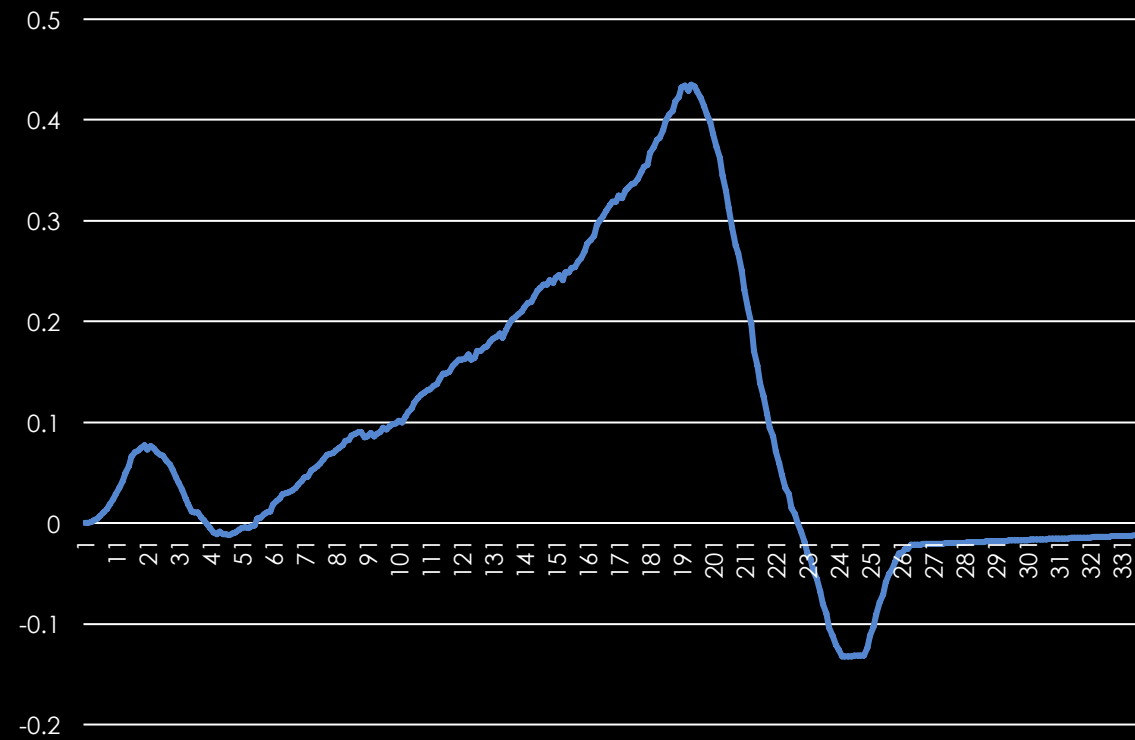


DATA COLLECTED WHEN FOLLOWING A SPEED PROFILE

Actual and Ideal distance over time



Left Motor Error



What was that about
Units?...