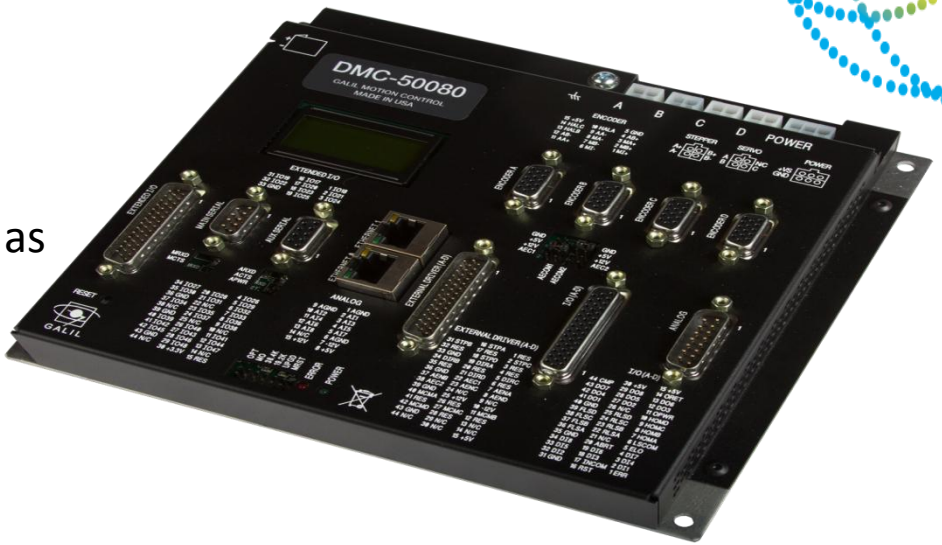
Australian Synchrotron

Turning bright ideas into brilliant outcomes

# An EPICS solution for Galil products that can provide a comprehensive, and high performance motor and PLC control system for use at synchrotrons and other research laboratories

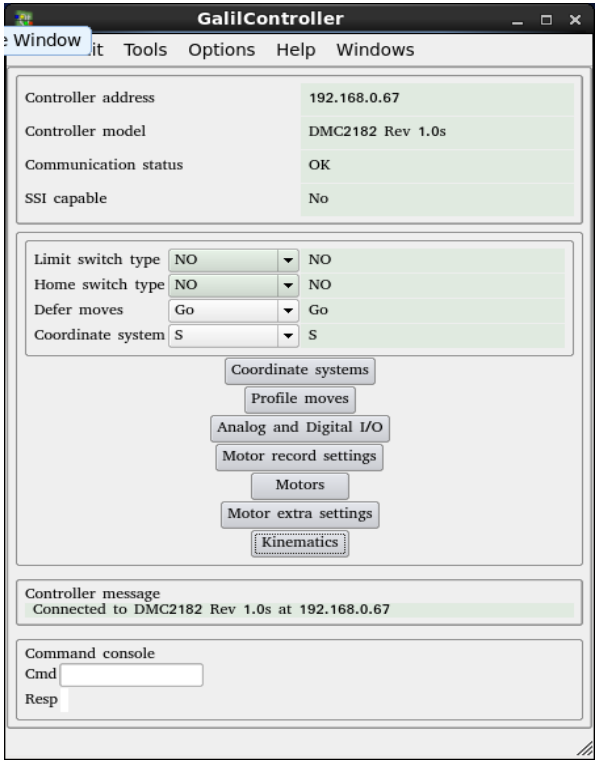
# EPICS Galil Driver 3-1

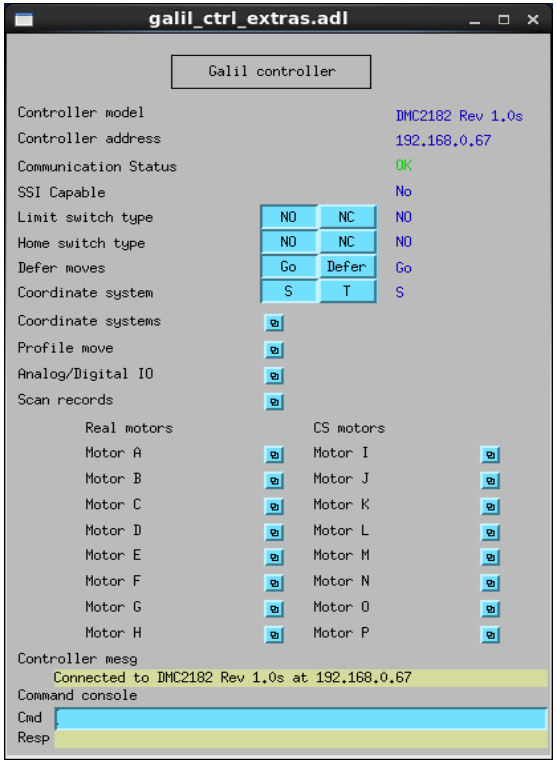
- Replacement for Galil 1-5
- ASYN model 3 architecture
- Connects to all Galil controllers
- Uses EPICS motor record
- Adds a litany of new features such as
  - Auto amplifier on/off
  - Auto brake on/off
  - Profile motion
  - Coordinate system motors
- Simple and intuitive to use
- Provides high performance and flexibility
- The easy way to meet your demanding requirements




# Bundled software

- Example IOC
- Autosave request files
- QE framework and MEDM screens
- QE screens are based on Qt and provide for a more intuitive experience
  - Especially true for the more complex functions (eg  Kinematics definition)



# Communications

- ASYN based communications
- Two connections per controller
  - TCP  Synchronous command/response
  - UDP Asynchronous stream
- Serial also supported
- Time between UDP packets
  - RIO PLC – 2ms
  - DMC-2xxx-8ms
  - DMC-4xxx-2ms
- Sophisticated connection management
- Manage controller code

# Low level programming

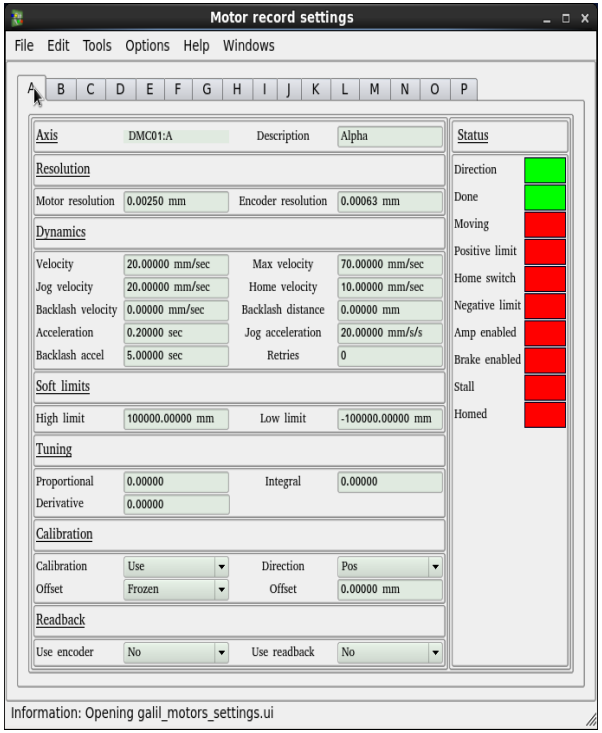
- Sophisticated code generator
  - Behaviour when limits activated, home program
  - Provided home program is feature rich and features can be enabled/disabled (eg. Use encoder index, jog after home to).
- Most cases require no code at all
- Supports construction of code from template
  - Header, axis1, axis2, .., footer
- Supports complete custom code and will manage it’s delivery to controller

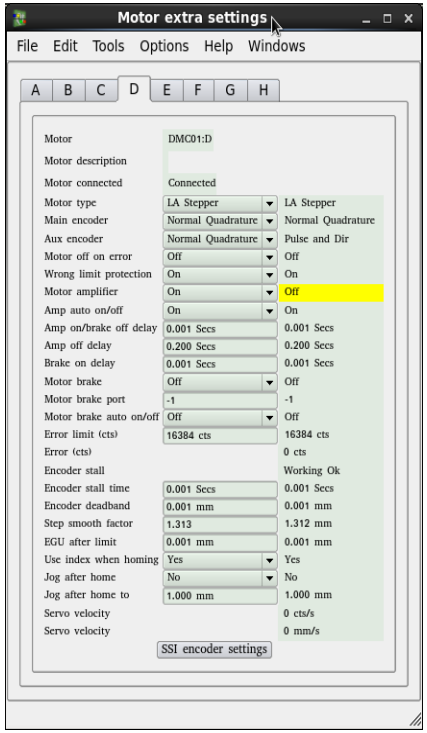
# RIO PLC control

- Cost effective option for general control  < $500 USD
- Dual ethernet
- Provides access to digital and analog IO
- Example IOC provides access to 24 Digital In/Out and 8 Analogs
  - ADC 16 bit option
- 2ms UDP updates

# Standard motor control

- Motor record used for both real, and CS motors
- Standard motor records settings are available, but not all apply to CS motors (eg. use encoder if present)
- Additional features for real motors:
  - Wrong limit protection
  - Encoder stall definition

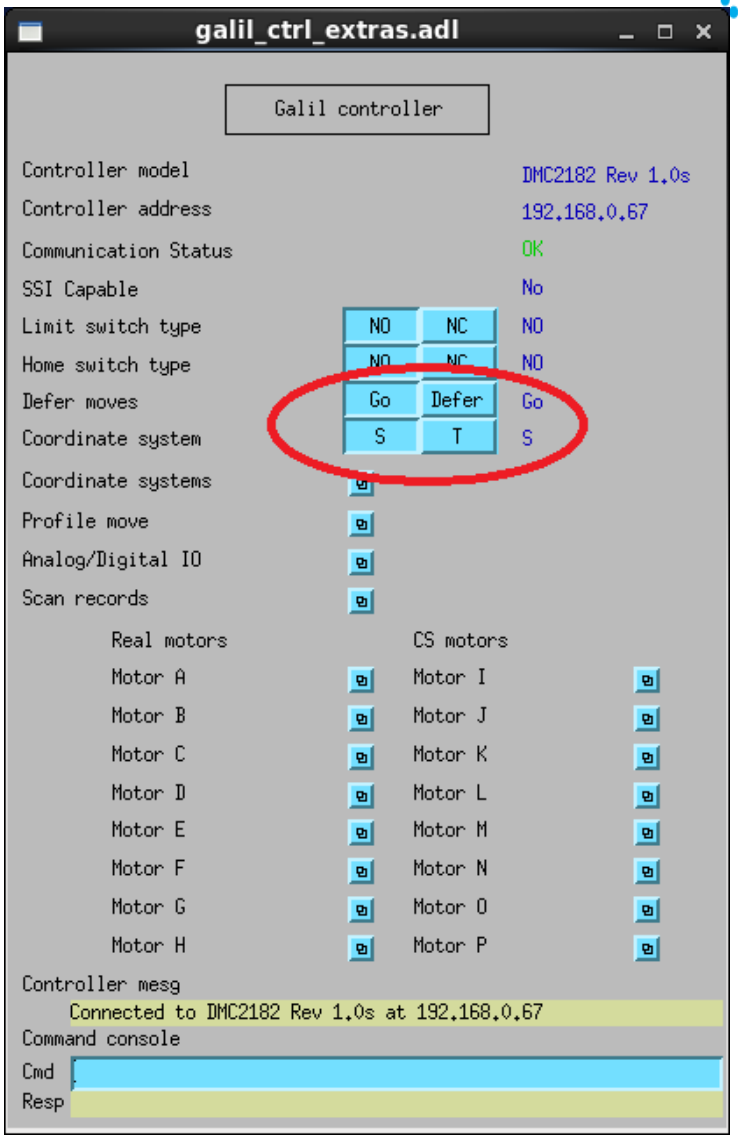


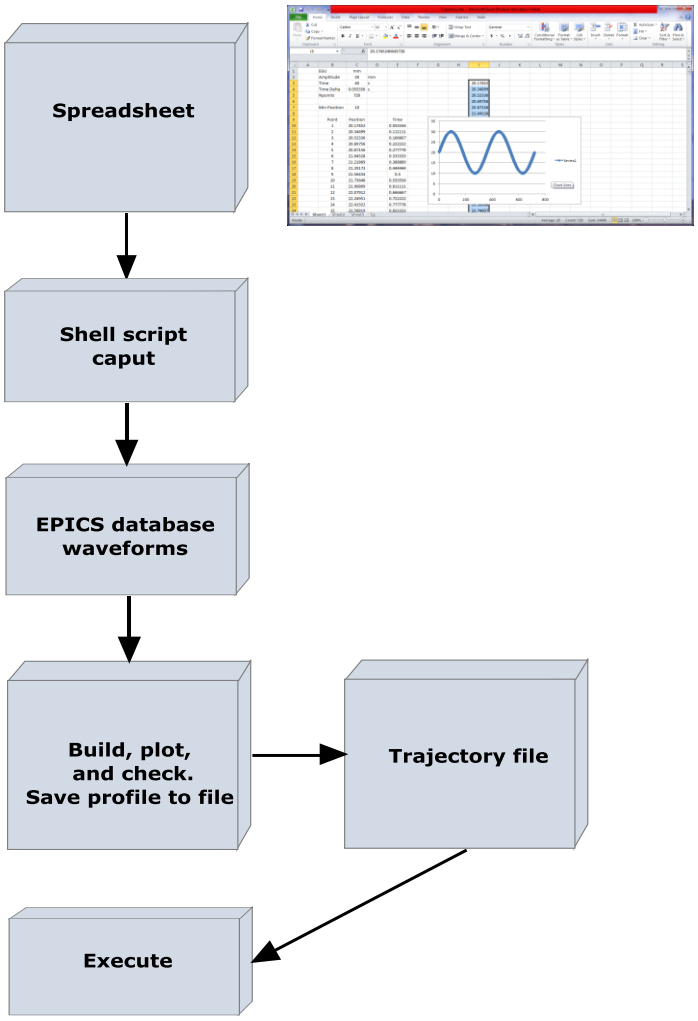
# Ad-hoc coordinated motion

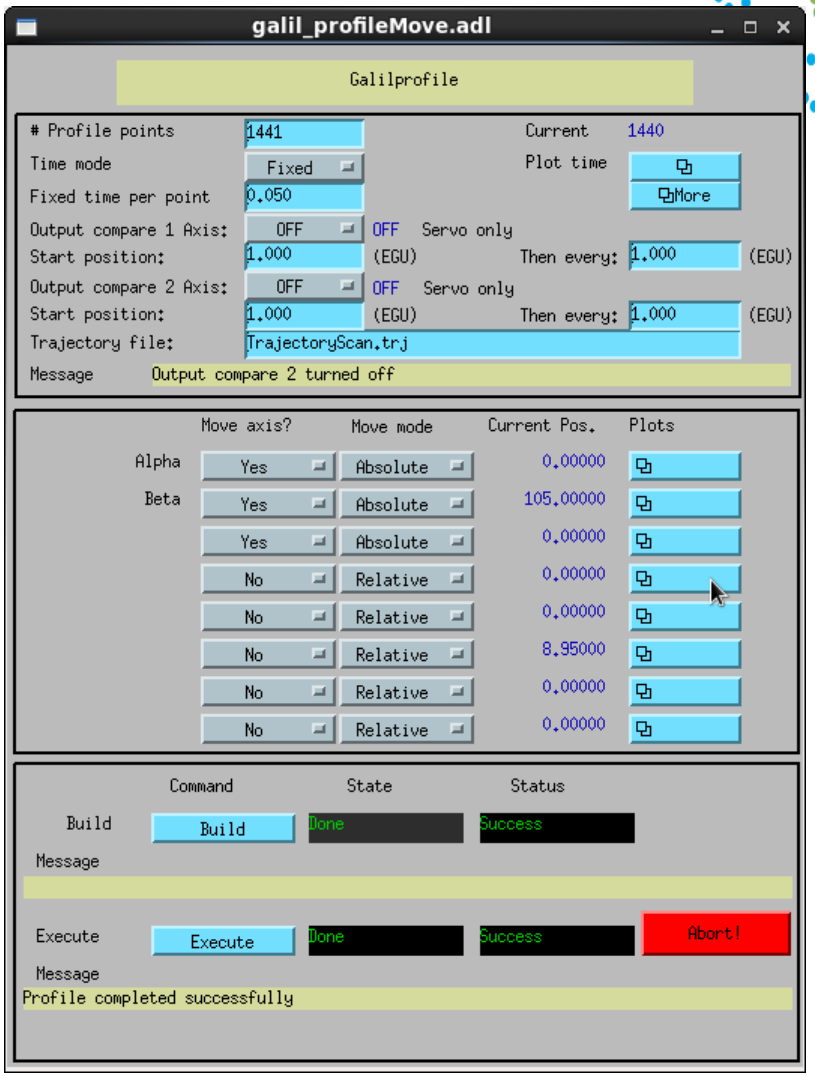
- Deferred moves facility
  - Select deferred
  - Select coordinate system
  - Move all motors
  - Select go

  - Motion coordinated by hardware



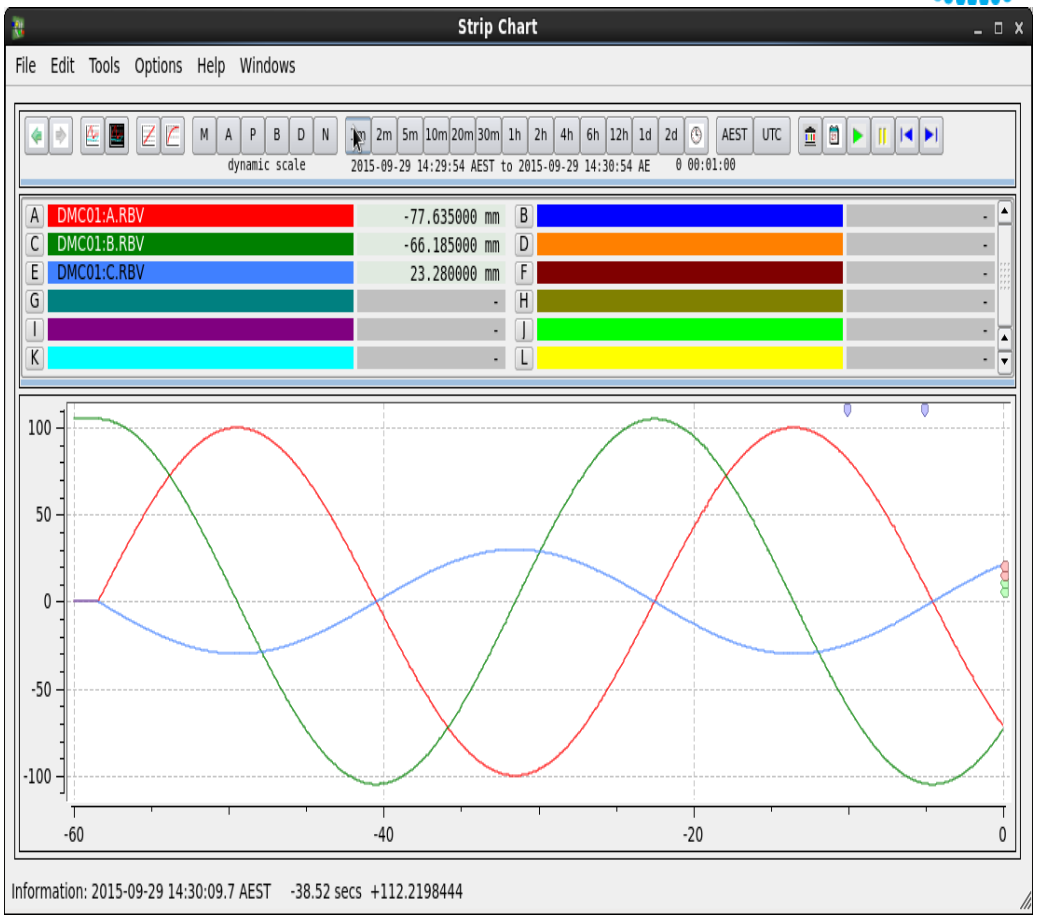
# Profile moves



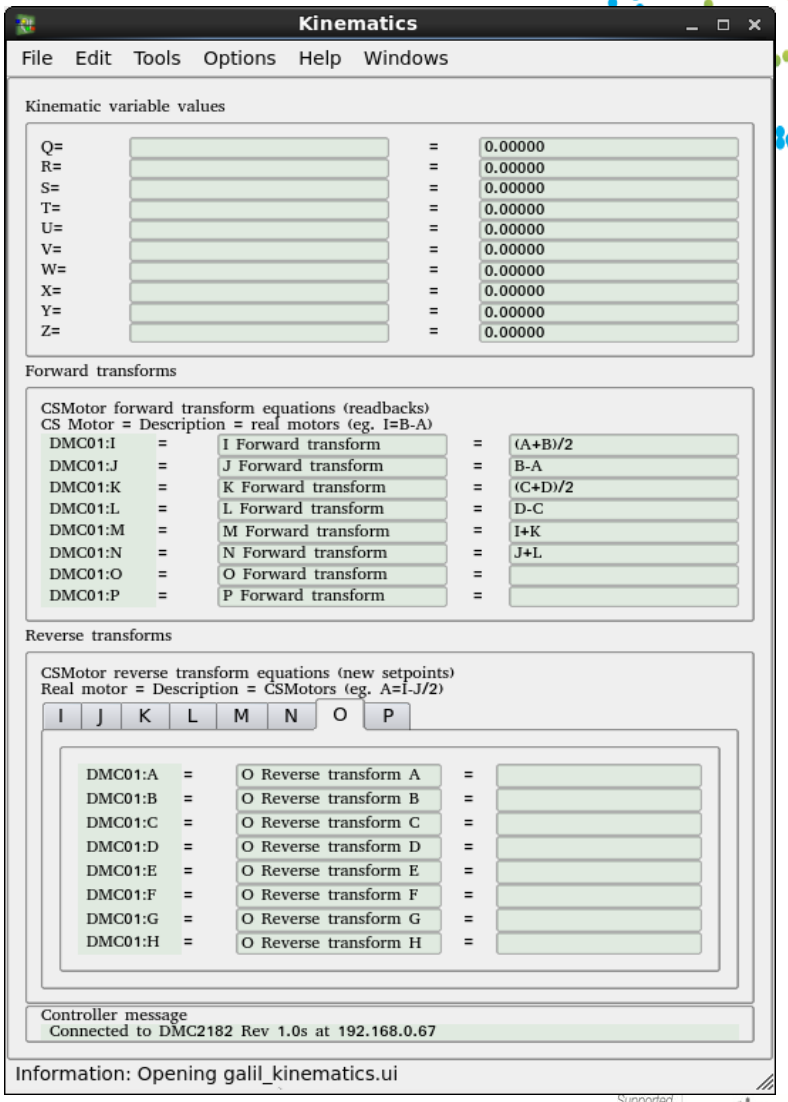
# Profile moves

- Available on 21x3 model and above
- From spreadsheet to delivery takes only minutes
- Tools provided to analyse the trajectory and ensure it's within constraints
- Relative and absolute modes
- Position compare can be used to trigger external detectors



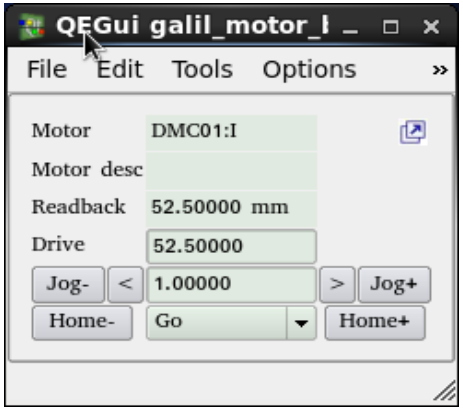
# Coordinate system (CS) motors

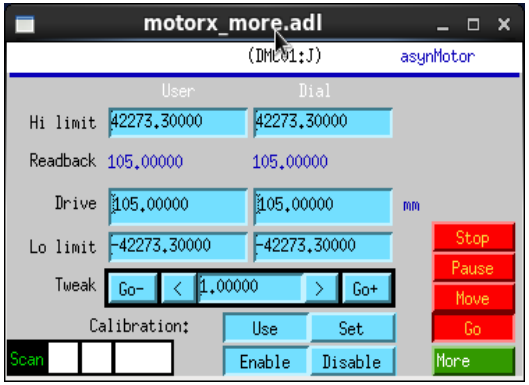
- 8 coordinate system motors per controller. Axis I to P.
- 10 variables for use in kinematics
- Coordinate system motors contain kinematic methods
  - Parse equations
  - Forward transform
  - Reverse transform
- Kinematics and variables all database adjustable whilst IOC running
- Multi-mode coordinated motion easily implemented
- Nesting allowed



# Coordinate system (CS) motors

- Mix closed-loop and open loop motors
- Mix different gear ratios, and resolution
- Limits reporting
- Underlying kinematics model could be used on any controller that supports coordinating groups of motors



# Conclusion

- Download http://motorapp.github.io/Galil-3-0/
- Demo at Motion Solutions Australia booth
- Questions?



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