

Final project proposal

- ☒ I have reviewed the project guidelines.
- ☒ I will be working alone on this project.
- ☒ No significant portion of this project will be (or has been) used in other course work.

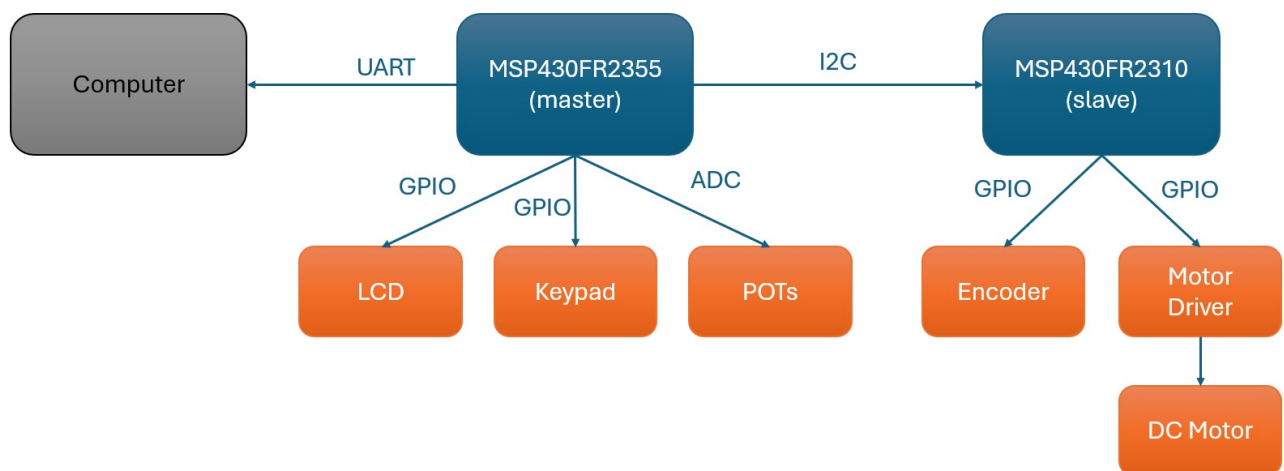
Embedded System Description

The project I propose essentially is a launchpad for controls concepts: the hardware has all components necessary for a complete testbed for control algorithms, and the software provides the necessary functionality for collecting data and interfacing with the system as well as implementing control algorithms.

Hardware Setup

The hardware consists of a master MSP430FR2355, a slave MSP430FR2310, a brushed DC motor, an encoder, a 4x4 keypad, POTs, an LCD, and heat-beat LEDs.

System Architecture Diagram

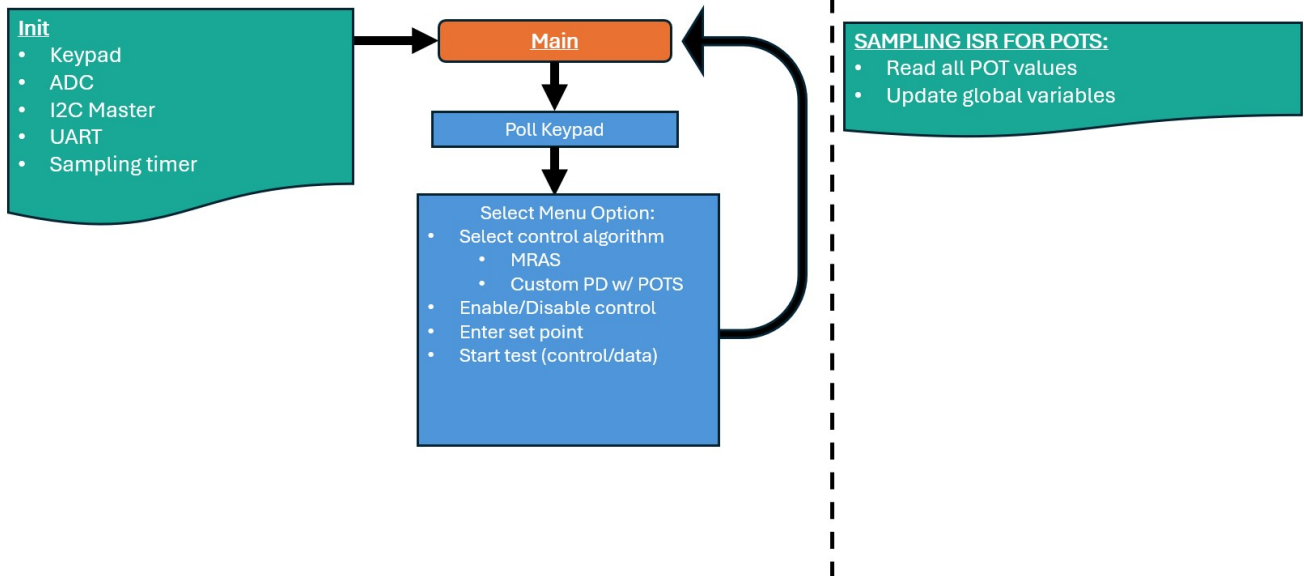


Software overview

Master

This will run a state machine used to select modes, send data, and communicated with the slave MSP430.

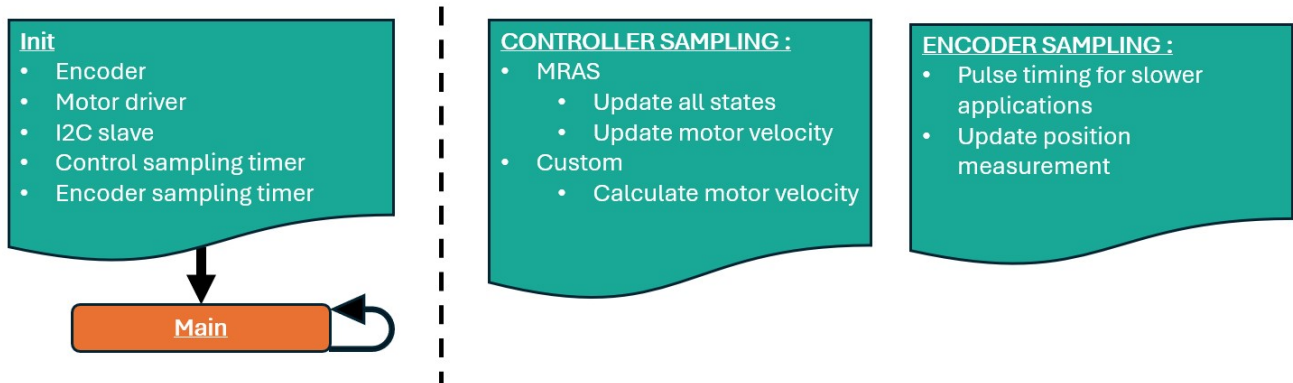
Flowchart (master)



Slave

This will run the routines to calculate position and velocity, control states, and control outputs, drive the motor, and communicate with the master MSP430.

Flowchart (slave)



Testing Procedure

A necessarily functional system will provide the framework for testing control algorithms with the hardware, data collection, and interface portions complete. An ideally functional system will also implement a model-reference adaptive system (MRAS) controller that allows the motor parameters to also be calculated.

Prescaler

Desired Prescaler level:

- ☒ 100%
- ☐ 95%
- ☐ 90%

- ☐ 85%
- ☐ 80%
- ☐ 75%

Prescalar requirements

Outline how you meet the requirements for your desired prescalar level

The inputs to the system will be:

1. Keypad
2. POT
3. Encoder

The outputs of the system will be:

1. Motor control
2. Heart beat LEDs
3. LCD display
4. UART to a laptop
5. Motor parameters a and b

The project objective is

Design a test platform for control algorithms and attempt to implement MRAS adaptive control.

The new hardware or software modules are:

1. Send logged data over UART
2. Encoder
3. Motor control
4. MRAS (state space with 8 vars!!)

The Master will be responsible for: menu navigation with keypad | data transfer to computer | adjust controller values | LCD

The Slave will be responsible for: MRAS algorithm | communicating with motor | reading encoder

Argument for Desired Prescalar

The software implemented would be notably more complex. The use of peripherals would be non-trivial (transmitting logged data over UART). The overall system (if functional) would be awesome.