

# Final project proposal

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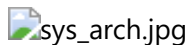
- ☒ I have reviewed the project guidelines.
- ☒ I will be working alone on this project.
- ☒ No significant portion of this project will be (or has been) used in other course work.

## 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.



## Software overview

### Master

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

### 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.

Discuss, at a high level, a concept of how your code will work. Include a *high-level* flowchart. This is a high-level concept that should concisely communicate the project's concept.

## 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.