

Paddle Controller Electronics

Friday, March 23, 2018 10:49 AM

Goal: Identify options for paddle controller electronics.

Requirements:

- Utilize HCS12 processor (familiarity and availability of development toolchain)
- Communication via CAN
- Drive two 240W DC motors at 24V in both directions
- Drive one ~65W DC motor at 24V in both directions
- Capable of interfacing with three quadrature encoders
- Capable of sourcing 5V for various sensors
- Cost target: < \$100 CAD
- Minimal complexity

Option A - Semester 4 Project Boards

Pros:

- Available now
- Capabilities and limitations are well known
- Lots of spare I/O for additional sensors

Cons:

- Each board only capable of driving 2 motors
 - Requires two boards to drive three motors
- H-Bridge only capable of 1A per motor - **Not sufficient**

Option B - Custom Design

Pros:

- Derivative of Semester 4 project board
 - Most of design is well known
- Complete control over I/O and component selection
- All I/O on one board

Cons:

- Cost
- Long lead-time, cannot be manufactured in-house
 - High risk if redesign is required

Option C - Axman + Custom Design Expansion Board

Pros:

- Separate logic power (CPU) from high power (motors)
 - Less likely to have EMI issues due to layout
- Can be manufactured in-house with milling machine
 - Small footprint logic components contained to Axman board
 - Quick-turnaround if redesign required
- Low cost

Cons:

- Requires two boards

Evaluation of Options

Ratings:

0 = Does not meet requirement.

1 = Capable but suboptimal.

2 = Optimal.

Criteria	Weight	Option A	Option B	Option C
Meets technical requirements	10	0	2	2
Cost	5	2	0	1
Complexity	5	1	2	1
Lead Time	10	2	0	1
Ease of Manufacturing & Rework	10	0	0	2
Design Effort	2	2	1	1
Score		39	32	62

Result - Select Option C

Paddle Controller Block Diagram

