

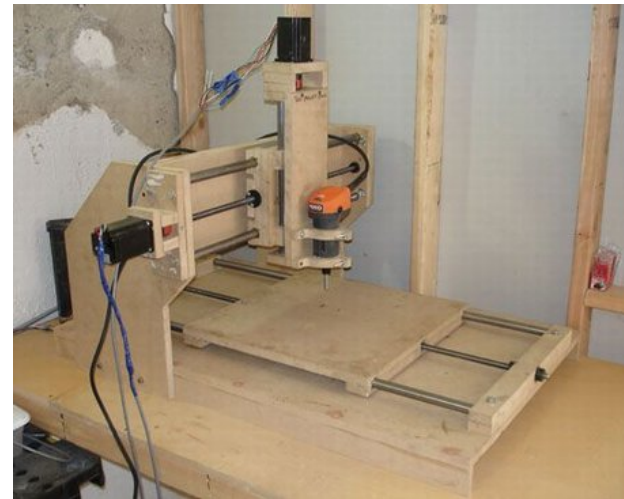
A decorative graphic on the left side of the slide, featuring stylized white and light blue floral and vine motifs against a dark blue background. The design includes a five-petaled flower, several leaves, and flowing, swirling lines that create a sense of movement and elegance.

CNC MACHINE

Jared Pringle, Ashton Snelgrove,
Willis Lutz, & Anh Luong

Synopsis

- CNC Machine
- 3 axis
- Accessible
- Fast
- Precise



www.surface-grinder.org

Stepper Motors

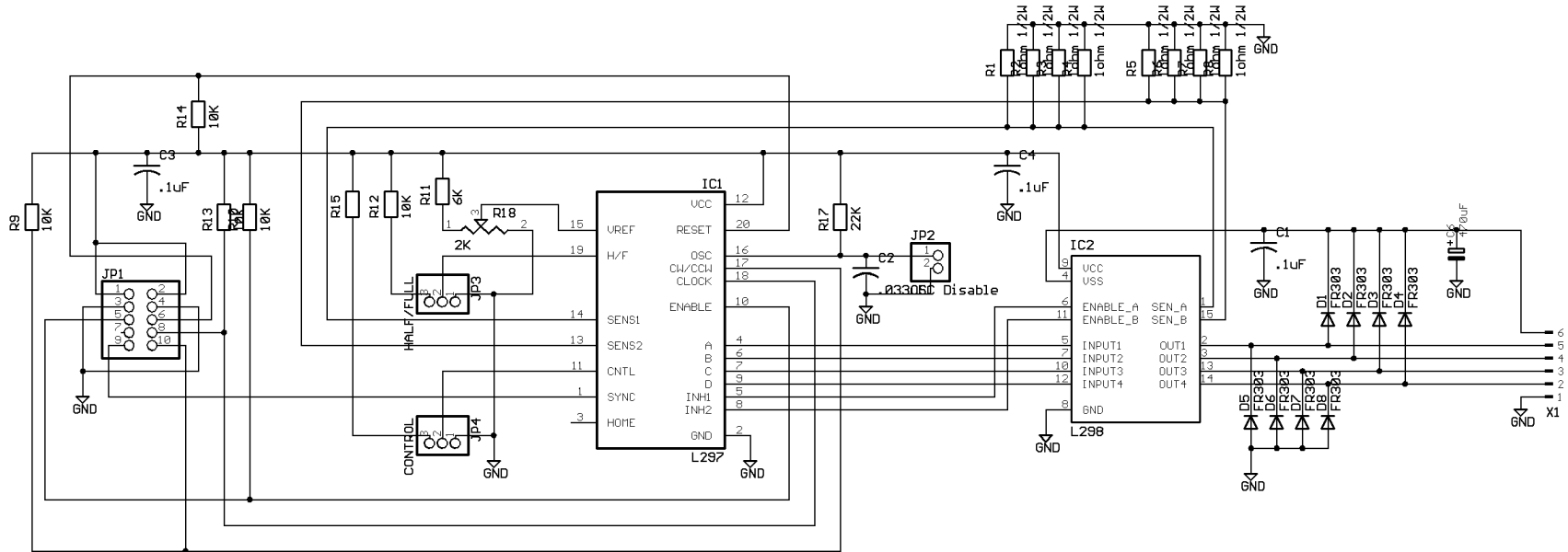
- Discrete vs. surface mount circuitry
- Specifications of motors
- Tolerance and torque



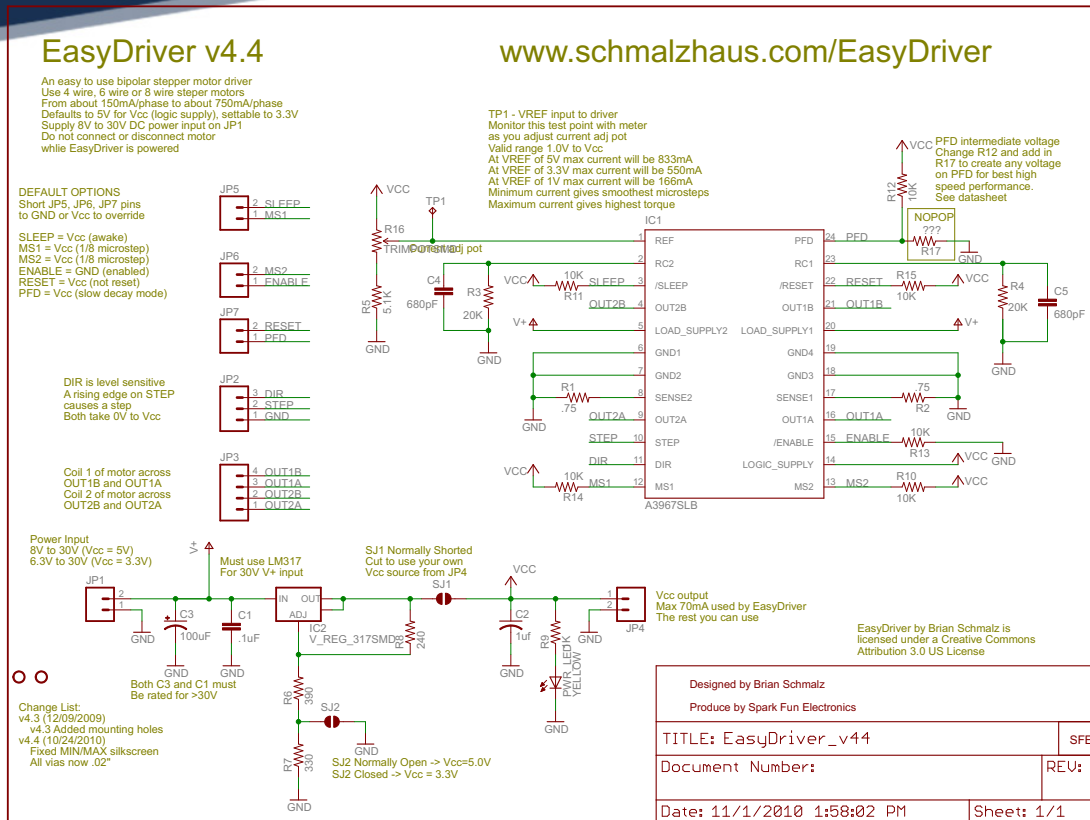
www.sparkfun.com

Discrete

L297/L298 Stepper Driver



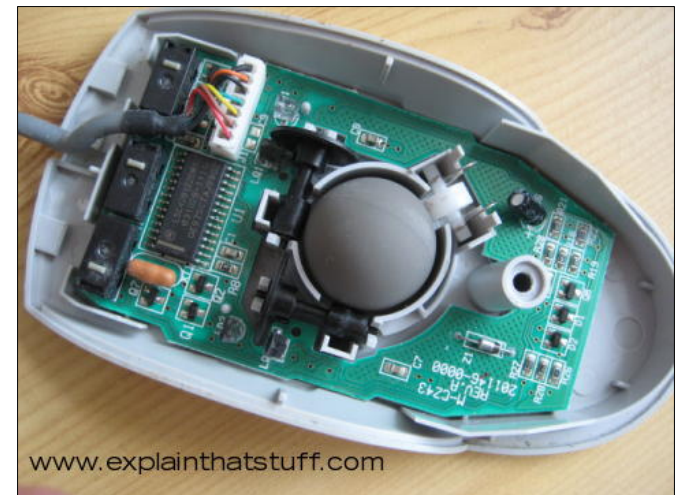
Surface mount



11/1/2010 2:11:19 PM D:\Projects\EasyDriver\EE\Driver\EasyDriver_v44\EasyDriver_v44.sch (Sheet: 1/1)

Positional Feedback

- Ball mouse positional tracking system
- System mount to screw rod
- Precision? Adjust accordingly





SVG Interpreter

- Parse SVG images and convert them to G-Code vectors
- Create shortest-path algorithms between line segments
- Extra: Create a GUI that will take position and speed data from microcontrollers and display the data on a computer



Interface

Scalable Vector Graphics

- W3 Standard
- XML Format
- Inkscape – open source graphics editor

G - Code

- Standardized control codes for CNC control
- ISO 6983, RS-274D, other proprietary variations
- Commands are encoded as ASCII characters

Interpreter

Interpreting on PC

- Interpreting may be too complicated on microcontroller so it could be done on the PC
- Communicate lower level commands like motor step & direction



Machine Interface

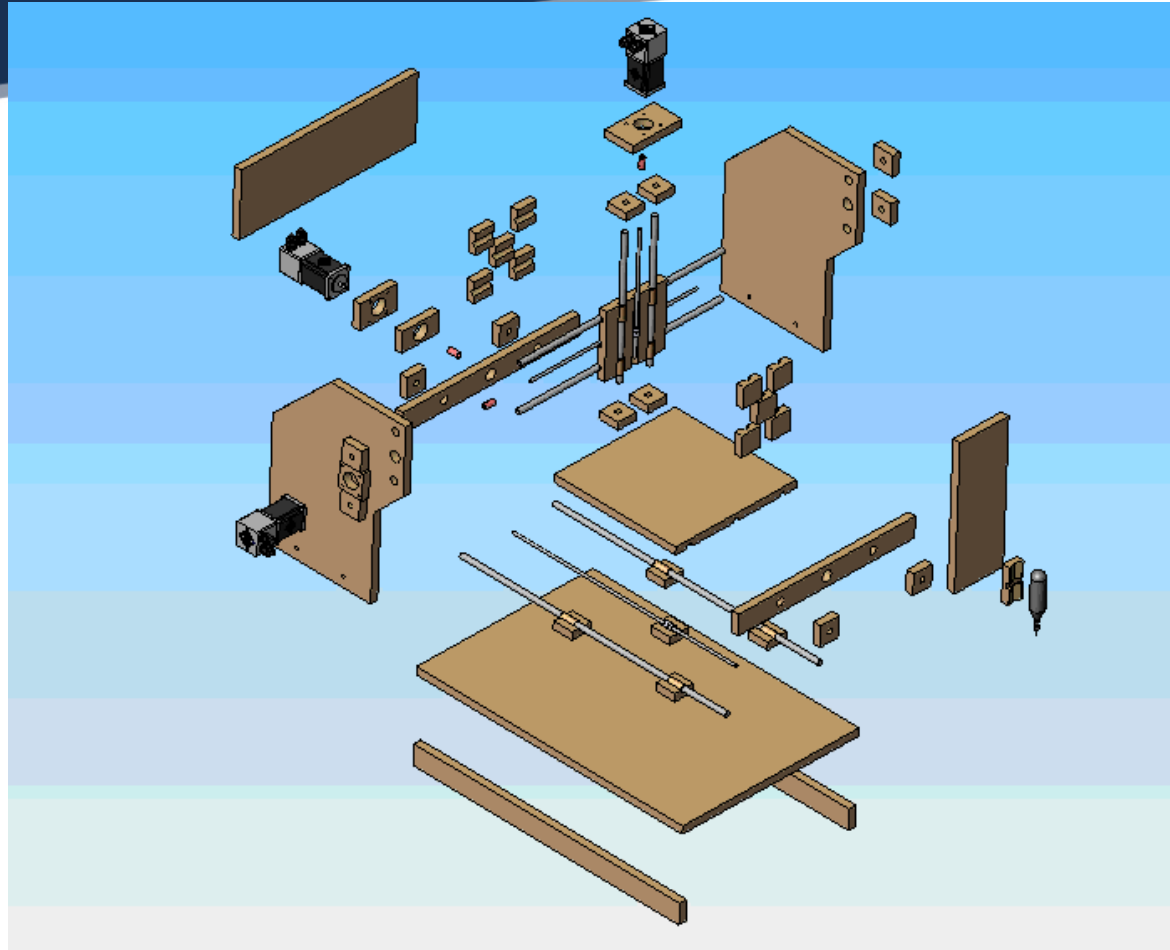
Interface: Microcontrollers

- RS -232 available on most microcontrollers & PCs
- Doesn't provide packet or data protocol

Machine Control

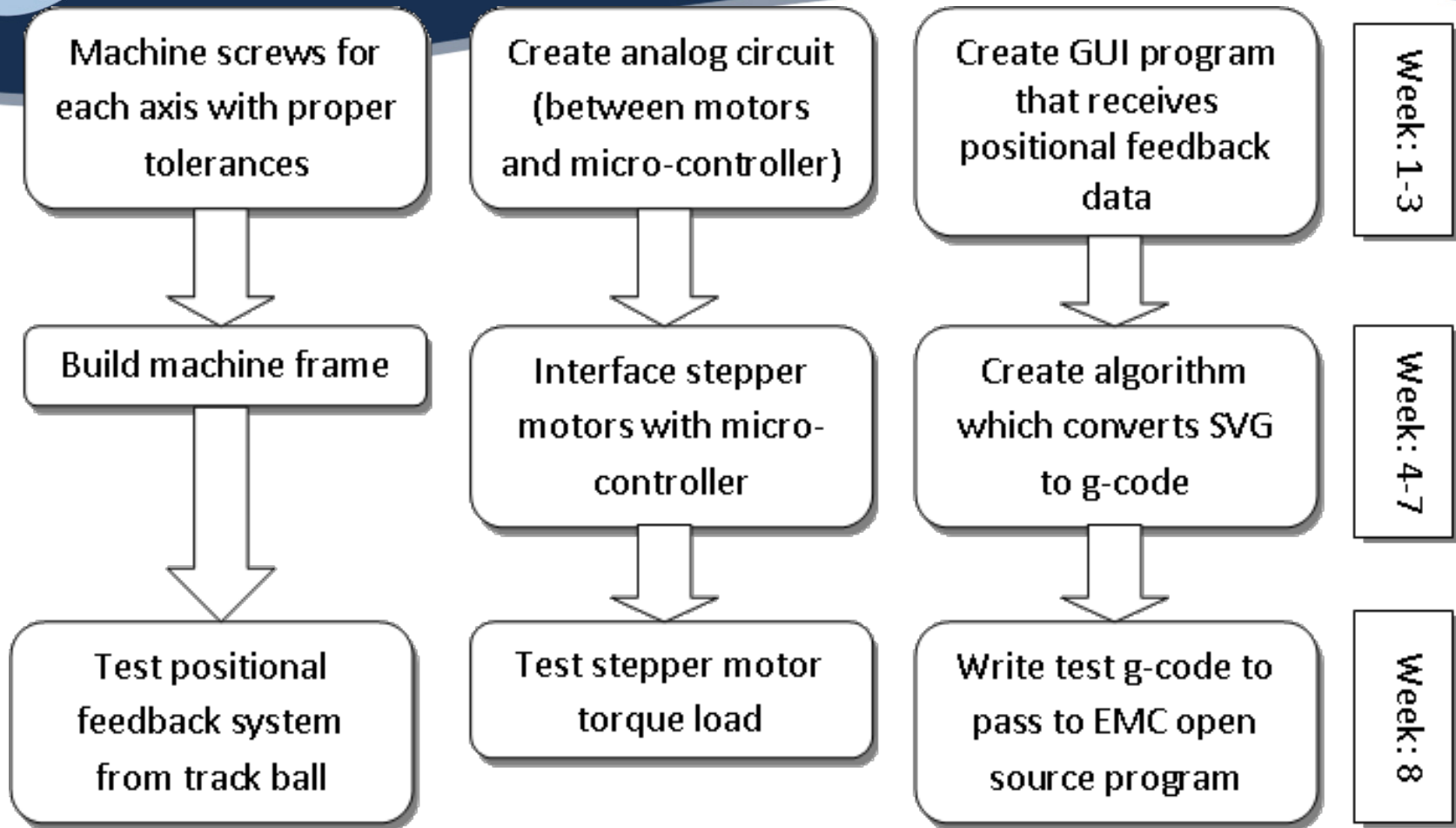
- EMC2 is open-source machine controller
- EMC2 is extensible and machine independent

Frame

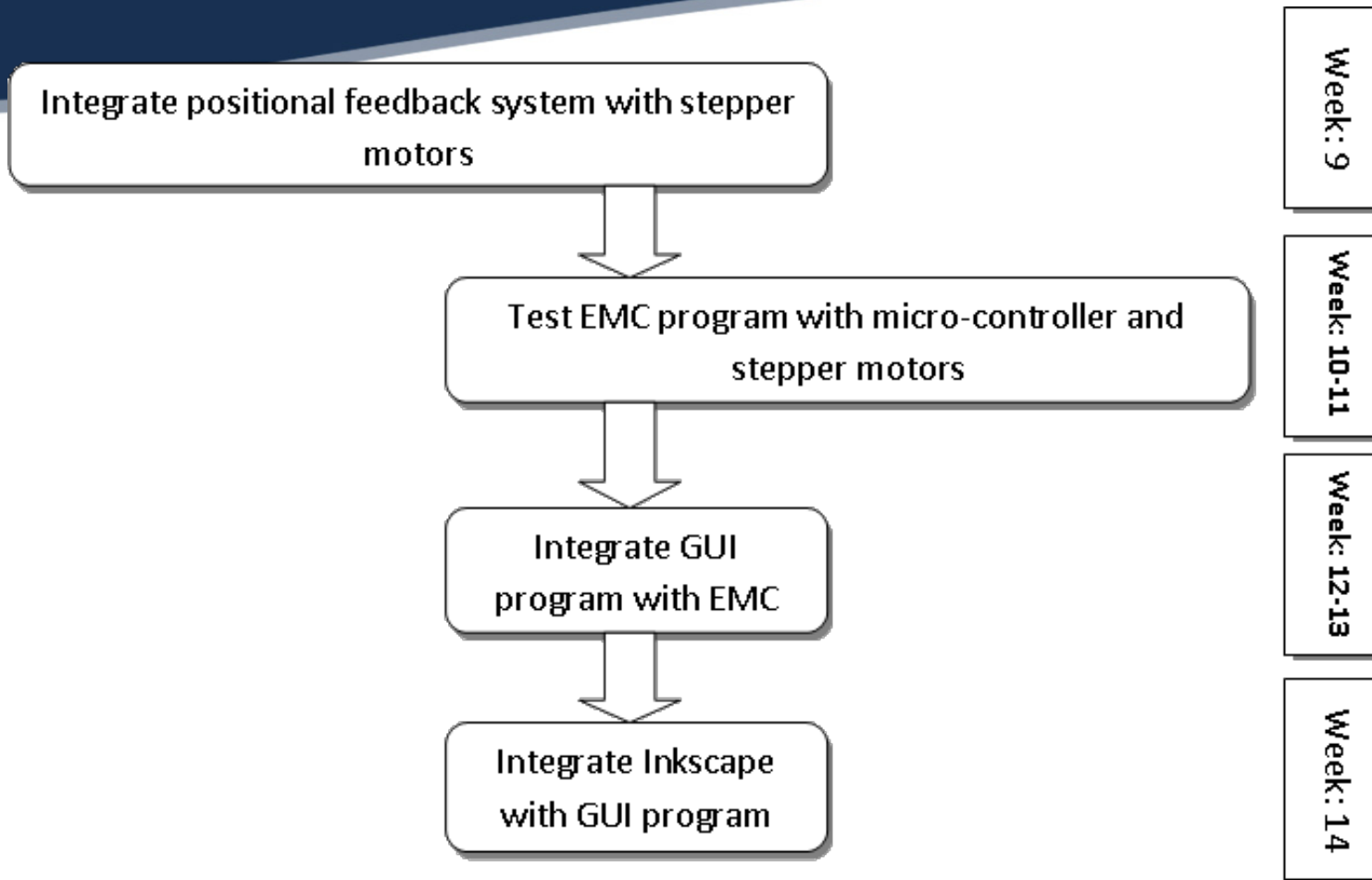


blog.onshoulders.org

Schedule Flow



Schedule Flow cont.



Point Person

Task	Lead
Analog Driver Circuit	Anh
Positional Feedback System	Jared
Frame	Will
Software	Ashton

Bill of Materials

Item	Vendor	Price - USD
3 Stepper Motors		Priceless
3 Micro-Controllers	Sparkfun	8 per unit for replacement
Positional Feedback System – Track Mice	DigiKey	10
Angle Iron		Free
Rails	Home Depot	7
Acme threaded rod	Machine Shop	20
Linear Bearings	Home Depot	20
Driver Nuts	Home Depot	5
Coupling	Home Depot	10
Transformer – 24 V 10 A		Free
L297, L298, discrete components (resistors, capacitors, etc...)		Free



Risks

- G-Code: It might be very complicated to convert from SVG to G-Code
- 3 Drivers: Danger of having part failures, need to be able to easily get replacement parts as needed
- 3 Motors: May not be precise enough; Could cost a lot of money for good enough motors



Fin

- Questions?