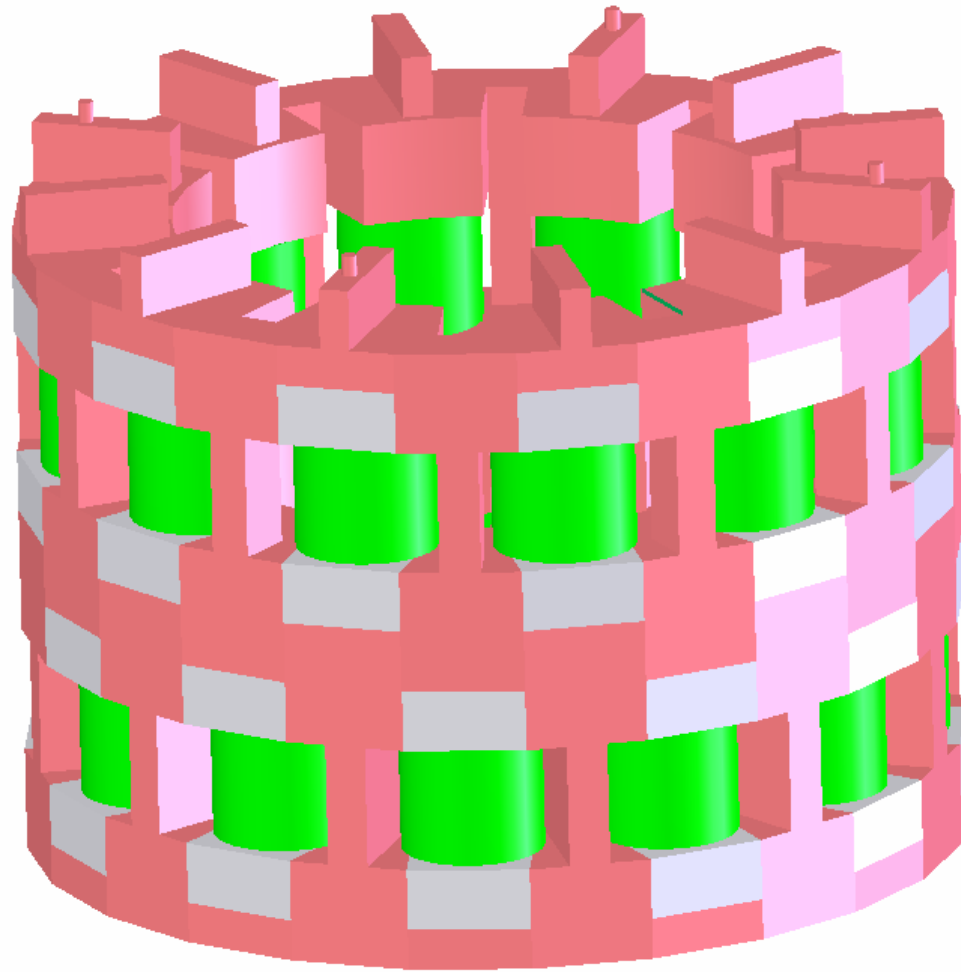
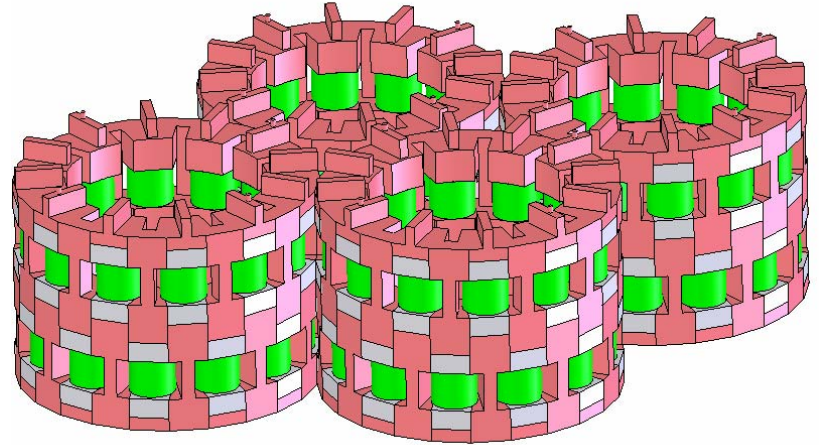


Catom Prototype 7



Goals

- Full catom orbiting
- Closed-loop control
- Basic ensemble motion



Major Features

- Electromagnets for locomotion
- Electronics to drive electromagnets
- Conductive rings for power sharing
- IrDA hardware for p-p communications

Coil Change

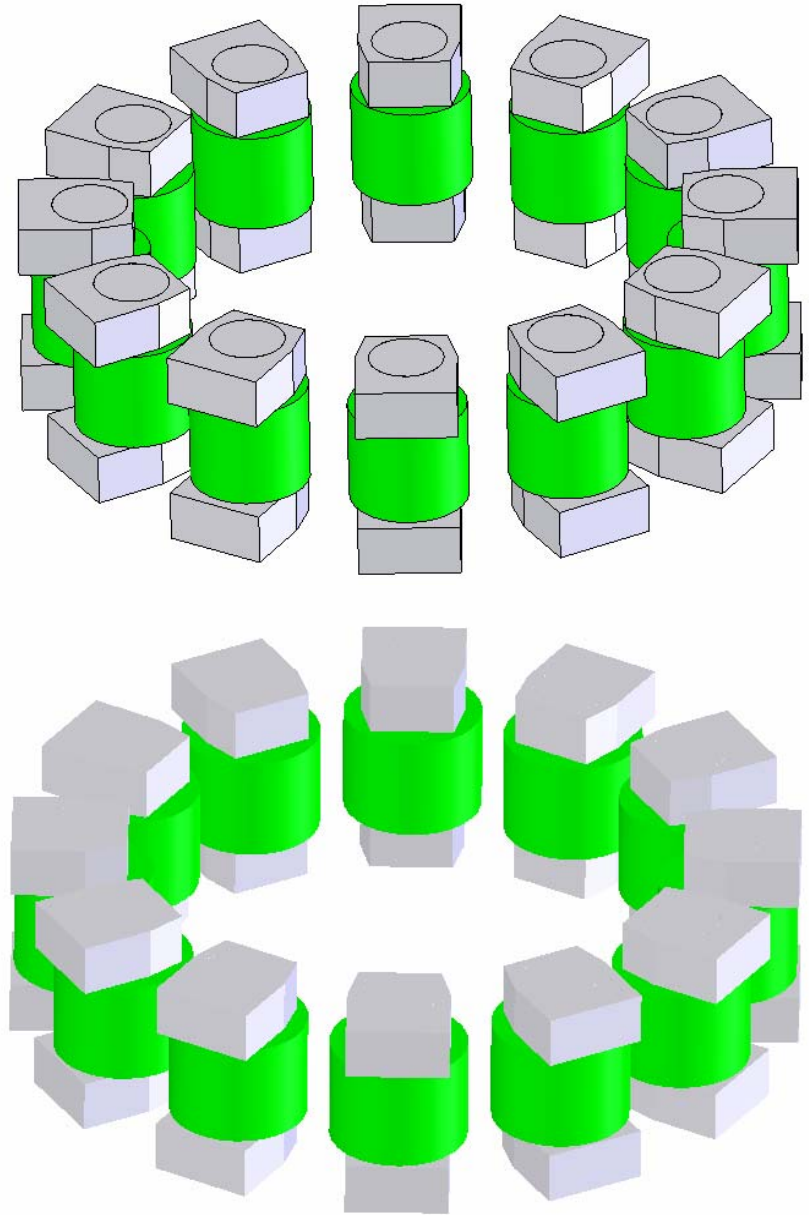
Old: 4.4mm ID
7mm OD

New: 4.4mm ID
8mm OD

33% less power for
same excitation

18 g heavier

* (Shorter instead?)



cp7-md

- 12 drivers per board
 - one board per magnet layer
 - no interface board
- H-bridge has dual external supplies
 - High Voltage, Low DC to get cations moving
 - Low Voltage, High DC to hold them together
- Basic protection logic (also lowers # pins)
- Constraint: $LVP < HVP$

cp7-ir

- 24 IrDA modules aligned with magnets
 - TxLED current resistor TBD
- IrDA lines into 2x 32:1 analog mux/demux
 - Can switch RX/TX ports independently
 - IrDA transceiver interfaces to UART
- Tri-state line buffers allow TX broadcast

cp7-pib

- Power rings TBD
 - based on Burak's previous work
 - two per catom, one catom must be tethered
- Power regulation – VCC, HVP, LVP
 - At 3x, custom circuit will be worthwhile
 - Phase issues
 - Constraints on # of electromagnets active
- Power monitoring, V/I sense

Other design decisions

- Using Atmel AVR's
 - Bootloaders straightforward
 - Different chips based on need
- Single communications bus
 - Programming over bus via bootloaders
 - Bandwidth constraints a problem?
- Connectors likely barebones
 - Minimum count for power, communications
 - Lone pins

Other Design Decisions, 2

- Additional connectors on boards for initial programming
- Laser-cut shunt alignment plates
 - Instead of a single plastic piece
 - Reduce weight
 - Make assembly more accurate

Next Steps

- Power circuitry
- Build/test one-off circuit prototypes
- Power Rings
- Finalize/manufacture mechanical parts
- Board layout / assembly