Controllers for Astromechs
Ideas to Reality

Michael Erwin

WARNING: This presentation might spoil some of the magic of the Droid room.

Feel Free to Leave…

Overview

- First Astromech Controller
- Classifications of Astromechs
- Why Have Controllers?
- Design Consideration
  - Software
  - Hardware
- Prototyping
- Testing & QA
- Release
- Q &A

First Astromech Controller

Kenny Baker

- On set
- Tunisia

Main Classifications of Astromechs

- Static Astromechs
  - Sounds & Light FX
  - Simple Operation
  - IR and/or RF 6/12/24 + Channels
- Mobile Astromechs
  - Sound, Lights & other FX
  - Movement
- Autonomous
  - Interactive
  - Reality Strikes Back

Why Have Controllers?

- "Magical Interaction"
  - For Control of Course!
  - Puppetry
  - Interaction
- Sound Effects
  - Where is Ben Burtt when you need him?
  - George wants which sound? When?
  - Where is R2 suppose to go?
- Triggered Motorized Effects
  - Dome
  - Lights
  - Periscope
  - Life Form Scanner
  - CPU Arms

Uncle Don Bies
ILM Droid Wrangler

Droid RC Controllers

- Most Popular are Radio Control (RC)
- Off the shelf
  - Futaba
  - JR
  - Hitec
  - Spektrum

- Fast & efficient integration into the droids
- We need to drive 3 to 30+ servos or devices!

Simply put, it takes a lot of work and talent to make that interaction seem magical.

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Droid Builders are a little “Creative”

By the Builders for the Builders

- Hybrid Customized RC Controllers
  - Bolt on Additional Functionality
  - Video Screen
  - Unlimited possibilities

- Joystick Enhanced Device Input – J.E.D.I.
  - Scott Grey (AZSquib)
  - First real RC Astromech “Controller”
  - Uses RC Joystick “Strokes”
  - Allows for FX, Audio, Logics, etc.
  - JAWA Script Language

By the Builders for the Builders – cont.

- Bob Ross
  - DroidCON - May 2011
  - Luke's Droid Caller – Verbal Control
  - You've got to see it in action

Design Considerations

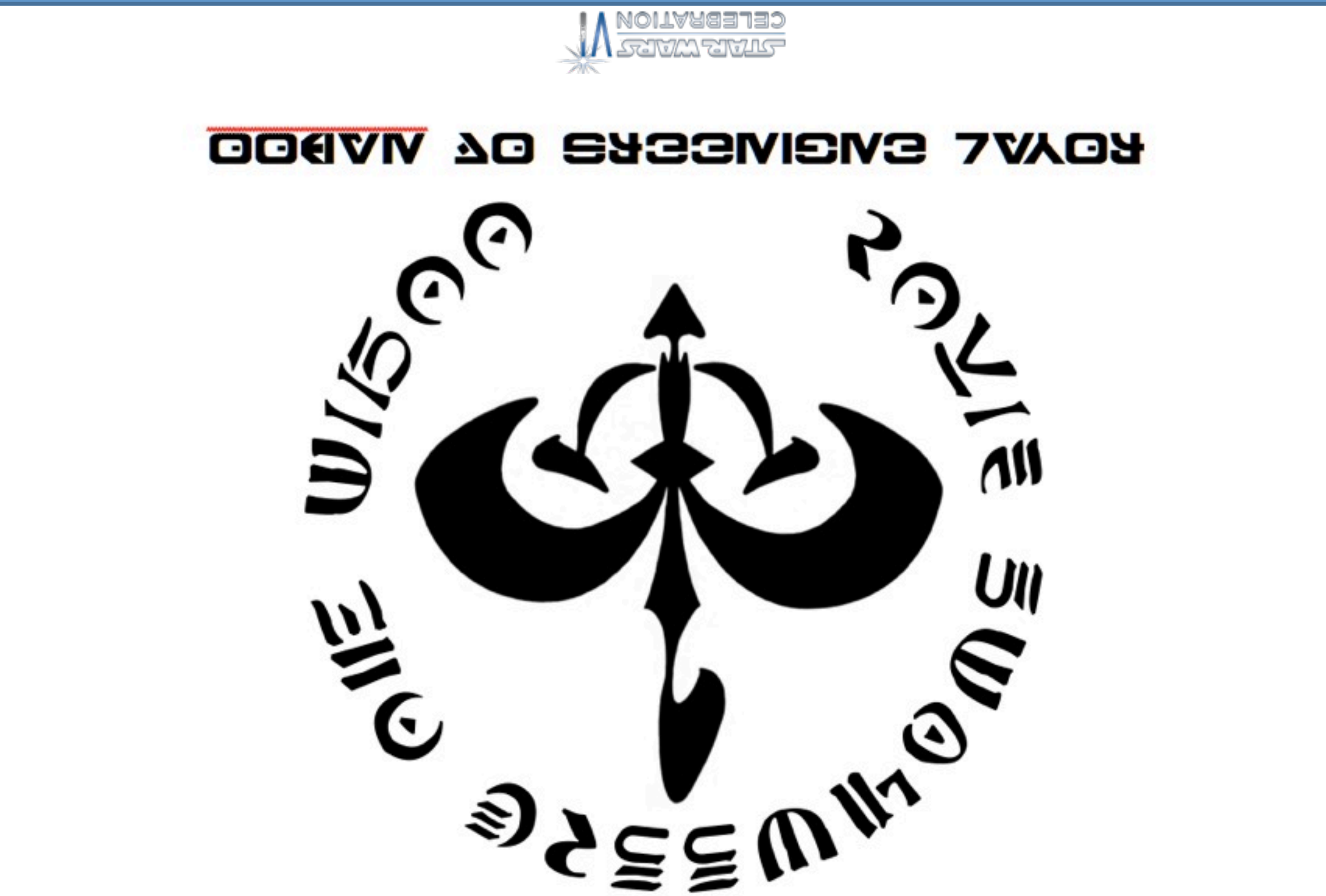
- Safe & Fault Tolerant
- Autonomous Features
- Easy to use
- Easy to build
- Modular, Expandable & Customizable
- Obsolescence Avoidance
- Open Source SW & OSHW
- Creative Commons v3 SA BY
- FCC Approved
- Must provide “Magical” feel vs. “Radio Controlled”
  - Rapid interaction with people
  - Easy to hide

Prototyping Re-Use

- Hi-Tec's Aurora 9
  - Touch Screen
  - Atmel 2560 16AU CPU
- 32 Buttons
- More buttons
  - 64 or 128?
- iPhone or iPad App
- Joystick
- Touch screen, buttons & joystick

Testing & Quality Assurance

- Can anyone build one?
- Does it take an engineer to operate?
- Can it be rock solid? Fault Tolerant?
- Remember the Design Considerations?
- Need a lot of testing from a variety of testers
- Those that inspired it, should test it!
- Investments Required - money & time


STAR WARS
CELEBRATION VI
ROYAL ENGINEERS OF NABOO
ENGINEERING CORPS

Announces the release of…

STAR WARS CELEBRATION VI

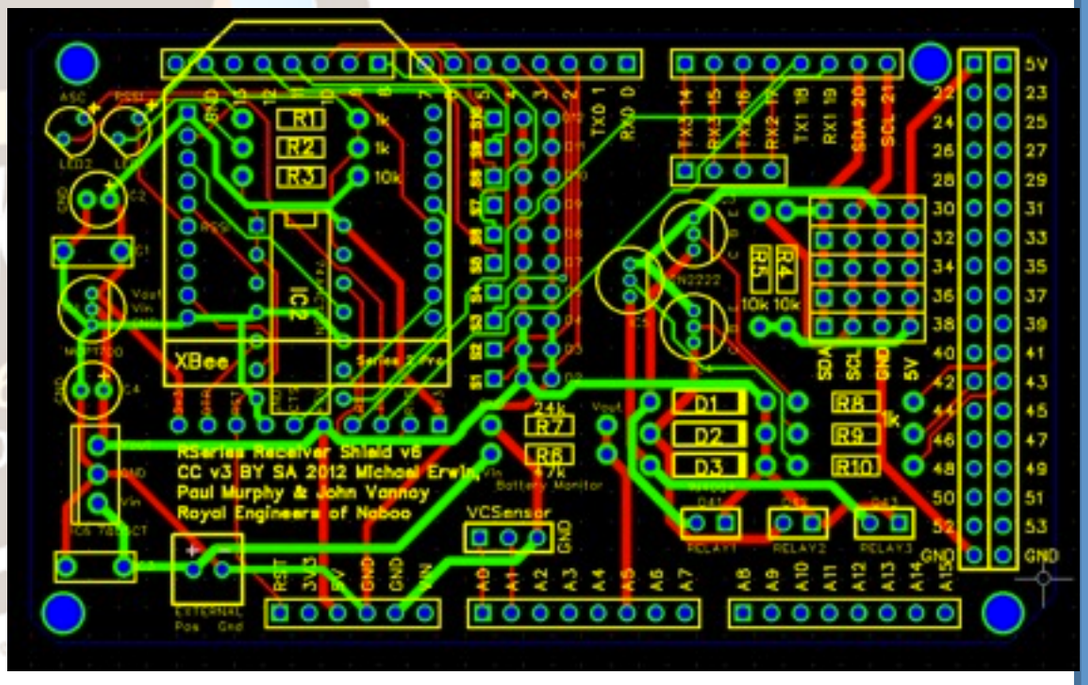
RSeries Open Droid Controller

- Arduino Mega 2560 Shield
- NunChuck Input (i2c)
  - Joy X & Joy Y (Motor Control)
  - Accl X (Dome)
  - zButton & cButton (FX)
- 2.8” TFT LCD Touch Screen (Optional)
- Micro SD Card Configuration (Optional)
- 4 Additional Buttons (Optional)
- 850, 2000, 6000 mAh Li-Po (Optional)
- Modular Charger - USB Micro!
- Battery Voltage Monitor
- Warning Buzzer
- Xbee 2 Pro 2.4Ghz
  - 1.5 Mile Range
  - FCC Approved
  - 1000s of Droids can co-exist

RSERIES

RSeries Droid Receiver

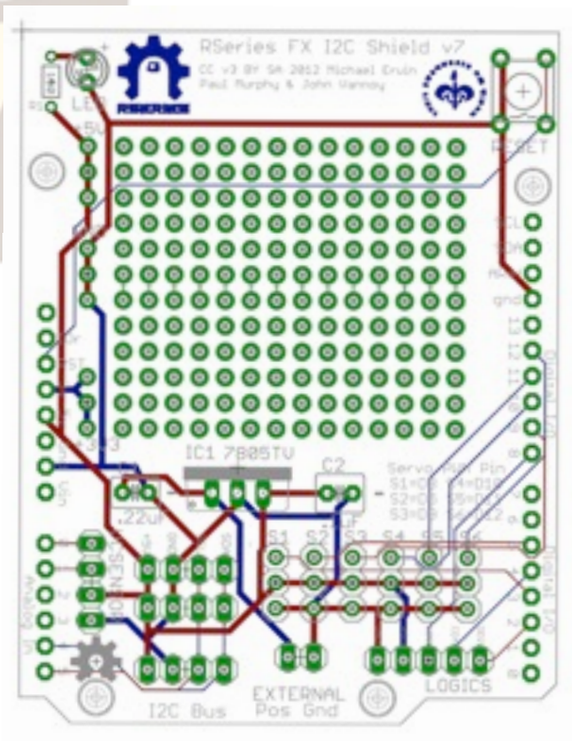
- Arduino Mega 2560 Shield
- 10 Servos
- Relay Control (3)
- i2c FX Bus Connectors (5)
- 2 Serial Ports
- VC Sensor Input
- Associate & RSSI LEDs
- 2 Onboard Voltage Regulators
- 3v3 Logic Shift Converter
- Power Supply Monitor
- External Power Input
- Xbee 2 Pro – FCC Approved
  - Doesn't require removal to program via USB



RSeries FX i2c Shield

- Arduino Uno Shield
- 6 Servos per Module
- Teeces 7219/7221 Logics Control
- 3 x i2c Bus (2 Headers, 1 Terminal)
- Voltage & Current Sensor
- On board 1.5 amp 5v regulator
- Prototyping Area
- External Power Input (<30 volt)
- Stackable with MP3 Modules, etc.
- 127 addressable i2c Module via SW
- This is the real power of the design!

RSERIES



RSeries Demo Time

3 Minute Movie File of 120 Mb goes Here!
Will demo on screen so everyone can see.

RSeries 24 Wire Slip Ring Interface

- Stand Alone
- DB25 Connector
- 4 x Audio Channels
- 6 Servos Bus
- 2 x i2c FX Bus
- 2 x Power Busses - Dual Side Feed @ 2 amps
- Servo Power Bus – Dual Side Feed Jumper Selectable
- Fits Dome Plate Slot Spacing

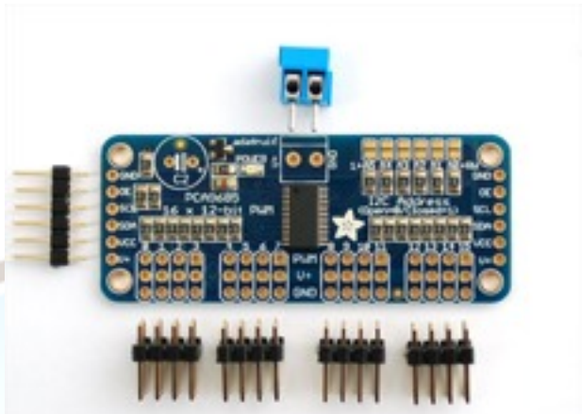
RSERIES

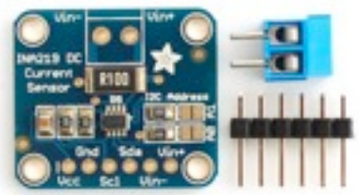
i2c Secret Sauce

- Multiple Masters
  - 127 Addresses
  - Master to Master Networking
- Allows for large servo #s
  - 125,984 to be exact
  - 1,035 a single i2c bus
- i2c Address Reservation List
- Easy Expansion & Functionality

i2c Compatible Devices

- Adafruit.com
  - DIY Kits
  - 16 Channel 12bit Servo
  - Real Time Clock
  - LCD, LED & VC Sensors
- Sparkfun.com
  - BlinkM RGB LEDs
  - Expansion Ports
  - EEPROM Storage
  - Cellular/GPS/SMS





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Additional RSeries Modules

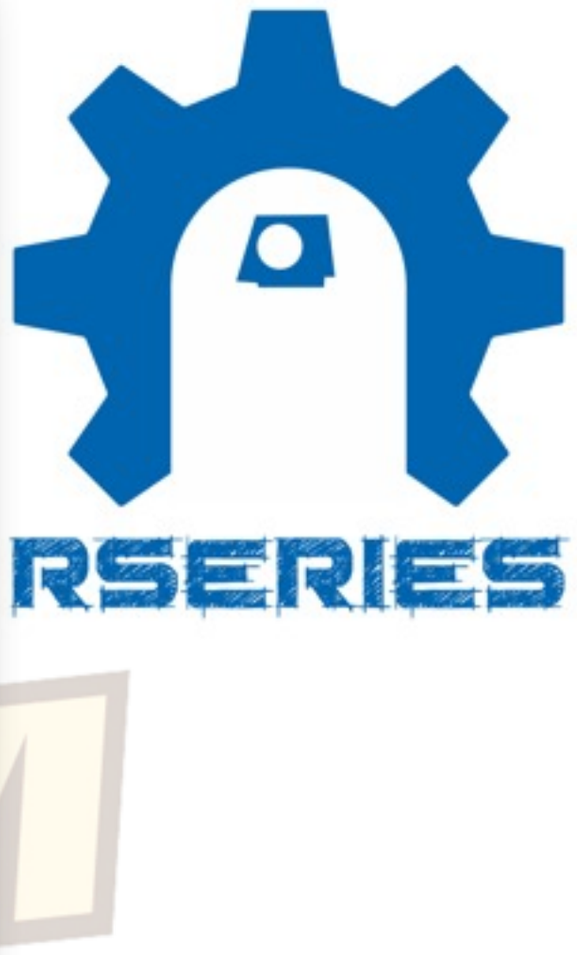
- Charging Bay Indicator Logics
  - Measures & displays battery stats
  - Fits Com8, JoyMonkey & A&A SK-10
- A&A SK-11 Data Port Logics
- Holo Projector GOBO
- Periscope Logics
- All files are available on Astromech.net
- Watch Astromech.net for future enhancements and new modules.

Thank the Maker for…

- Bob Ross, Scott Grey, Blake Mann & Ben Lewitt @ DroidCon 2011
- John Vannoy (Teeces)
- Paul Murphy (JoyMonkey)
- Guy Vardaman
- Chris James
- Brett Bourbin (Selgus)
- Greg Tracy (PixelFiend)
- Cory Pacione (Artoo-De-Dum)
- Dave Everett & R2 Builders Council

RSERIES

http://code.google.com/p/rseries-open-control/



Q & A

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