ABSTRACT

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Research on the Feasibility of Applying Muti-rails EM Accelerator for Cargo Transportation & Sensors distribution

Abstract:

1) This project is aims to research on the feasibility of transport cargos (Data Storages) and distribute sensors (Focus on the one-time meteorlogy sensors) by using the electromagnetic rail Accelerator.

2) On the other hand, this project is also focus on the efficiency of muti-rail system which might be a fit structure to reduce maximum current distribution on the cross-section of the rails.

System Flow Chart:

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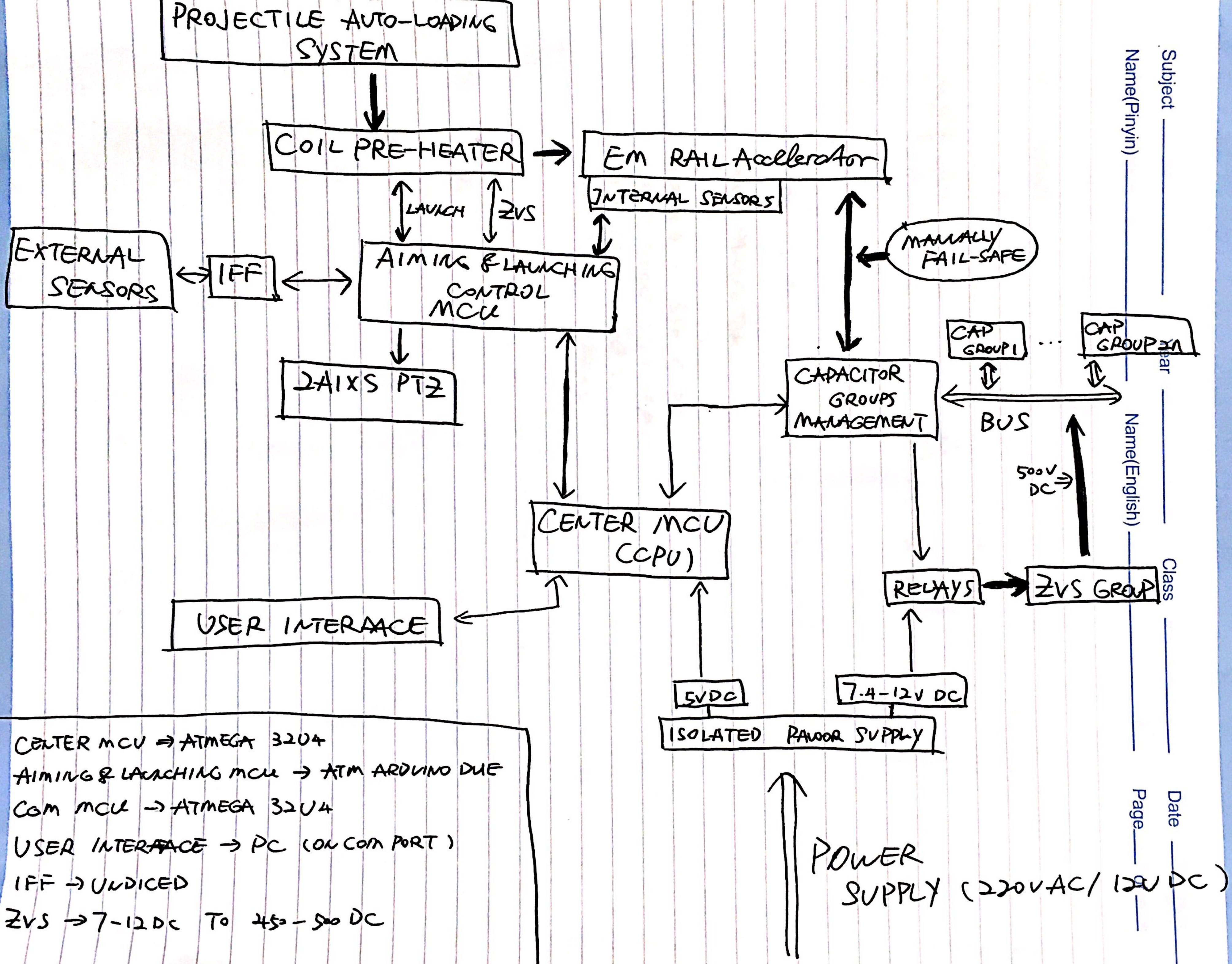

CENTER MCU ⇒ ATMEGA 32U4

AIMING & LAUNCHING MCU → ATM ARDUINO DUE

CGM MCU → ATMEGA 32U4

USER INTERFACE → PC (ON COM PORT)

IFF → UNDICED

ZVS → 7-12DC TO 450-500 DC

Schematic of the CAP GROUP

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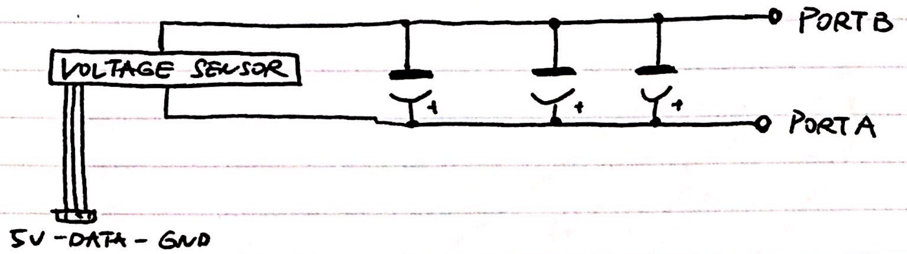
CAP GROUP :



CAP's ~~PRAD~~ PARAMETER :

VOTAGE : 550 V DC
CAPACITANCE : 2200 μF
MAX TEMP : 108 °C
CONNECTION : SCREWS

VD (VD - 010)

Theoretical Calculations.

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Cap GRoup Parameters:

Votage : 500 V +

Capacitance : 2200 μF × 3 = 6600 μF.

Max Temp : 108°C

Rail Efficiency (20-40%)

$$\Sigma k = \frac{1}{2} \cdot C \cdot u^2 \cdot \sigma$$

C → 550V 16600μF

3×C = 550V / 19000 μF (ABOUT)

$$\Sigma k = \frac{1}{2} \times 19000 \mu F \times (550)^2 \times \sigma \times 10^{-6}$$

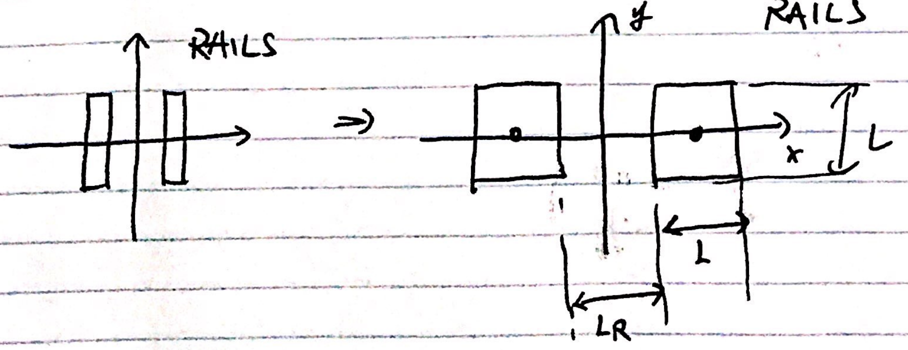
$$= 9500 \times 302500 \times 10^{-6} \times \sigma$$

$$\approx 2800\sigma \; (0.2 - 0.4)$$

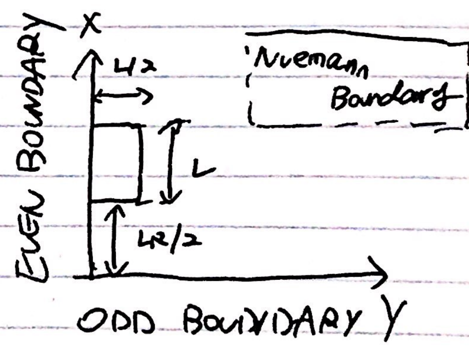
$$\approx 570 \sim 1140 \text{ Joules}$$

$$\boxed{\therefore \Sigma k = 570J - 1140J.}$$

BI-RAIL LIMIT ELEMENT ANLYSIS:



LEA METHOD



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EQUATIONS USED IN CALCULATION:

$$\begin{cases} \nabla \times H = J + \delta D/\delta t \\ \nabla \times E = -\delta B/\delta t \\ \nabla \cdot D = \rho \\ \nabla \cdot B = 0 \\ B = \mu_0 \cdot \mu_r \cdot H \end{cases}$$

$\Rightarrow$ FROM MAXWELL EQUATION

$F = \frac{1}{2} \cdot L' \cdot I^2$ ($L \Rightarrow$ INDUCTANCE GRADIENT)

$L' = 2E_m / I^2$

$\Downarrow$

$E_m = \frac{1}{2} \int B \cdot H \, dv$

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Blueprint of the rails and Suppressor:

i) Lounding Rails :

① ORIGINAL BLUEPRINT (OBP - 01)
② INDUSTRIAL BP (IBP - 01)
③ VISUAL DEMO (VD - 01)

ii) Suppressor (Fole / Olm Heat Eliminator) Rails :

① ORIGINAL BLUEPRINT (OBP - 02)
② INDUSTRIAL BP (IBP - 02)
③ VISUAL DEMO (VD - 02)

iii) L-S ISOLATOR :

① ORIGINAL BLUEPRINT (OBP - 03)
② INDUSTRIAL BP (IBP - 03)
③ VISUAL DEMO (VD - 03)

iv) Rail's supporting structure :

① ORIGINAL BLUEPRINT (OBP - 04)
② INDUSTRIAL BP (IBP - 04)
③ VISUAL DEMO (VD - 04)

v) Rail Framework (Front) :

① INDUSTRIAL BP (IBP - 05)
② VISUAL DEMO (VD - 05)

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vi) Framework (Rails) (Rear) :

① INDUSTRIAL BP (IBP-06)
② VISUAL DEMO (VD-06)

vii) General Arrangement Drawing :

① ORIGINAL BLUEPRINT (OBP-00)
② VISUAL DEMO (VD-00)