

Mutirão C - 5s - Eng. da Computação - Aula 1

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Table of Contents

- ▶ Visão Geral
 - ▶
- ▶ Primeiros passos
- ▶ Funcionamento
- ▶ Firmware
- ▶ Clock

Visão Geral

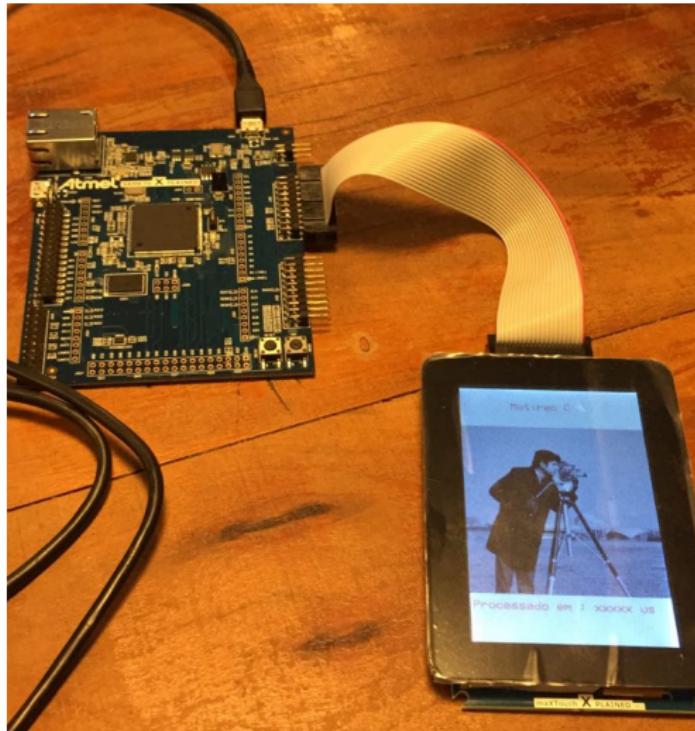


Figure 1: Resultado

Primeiros passos

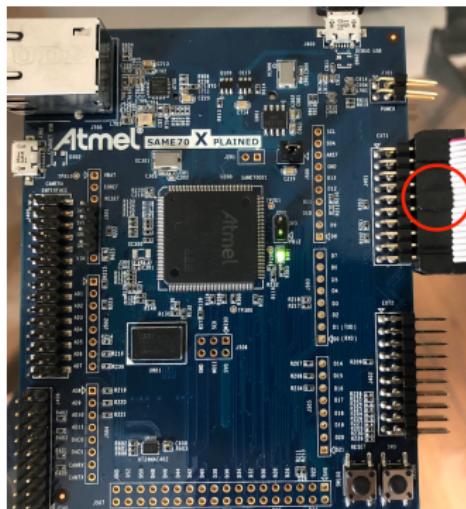
Clonando

Clonem o repositório :

<https://github.com/Insper/mutiraoC/DayOne/SAME70-MutiraoC>

Primeiros passos, conectando.

- ▶ Tome cuidado ao manusear a placa, não coloque ela sobre outros materiais.



Primeiros passos, rodando o exemplo.

1. Conectar o USB do programador no computador



Figure 2: USB DEBUG

2. Abra o projeto exemplo (SAME70-MutiraoC) localizado no repositório do mutirão :

<https://github.com/Insper/mutiraoC/DayOne/SAME70-MutiraoC>

Atmel Studio

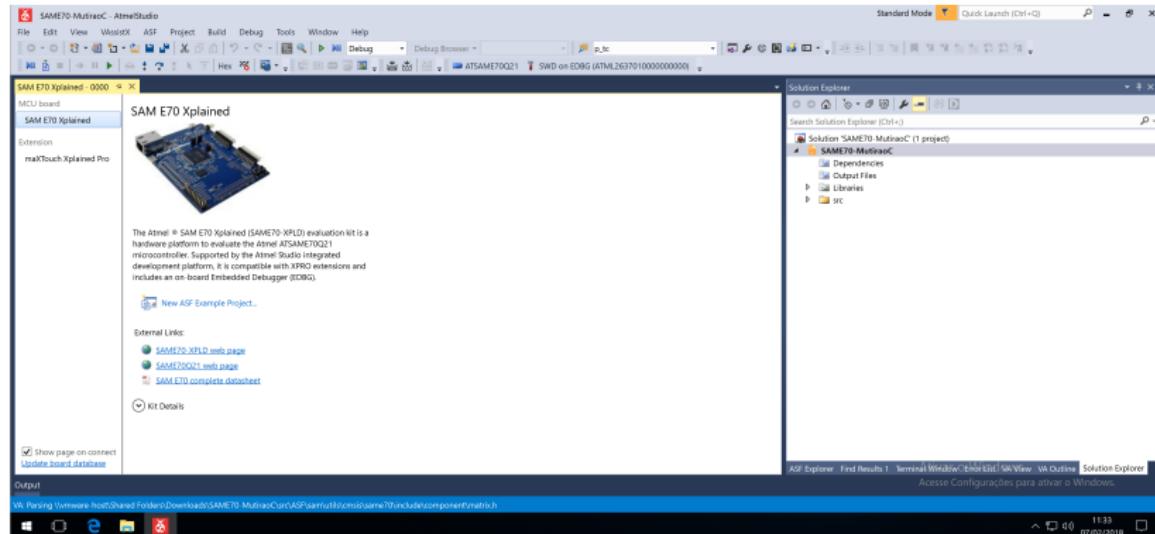


Figure 3: Atmel Studio

Programando

A etapa atual será a de embarcar o código exemplo no uC, para isso basta clicar em **Start Without Debug**



Figure 4: Embarcando

Botão

- Uma vez embarcado o exemplo, o LCD deverá exibir uma imagem. A primeira imagem que aparece é a imagem original sem nenhum tipo de modificação, ao apertar o botão **SW0** do kit de desenvolvimento uma função (**imageProcess()**) é chamada e a imagem original é processada e exibida.



Figure 5: SAEM70-XPLD SW0

F

Funcionamento

Como isso funciona ?

Em uma visão mais geral podemos analisar o sistema como um kit de desenvolvimento e um display LCD :

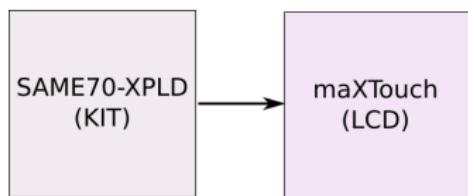


Figure 6: Diagrama simplificado

Sistema detalhado

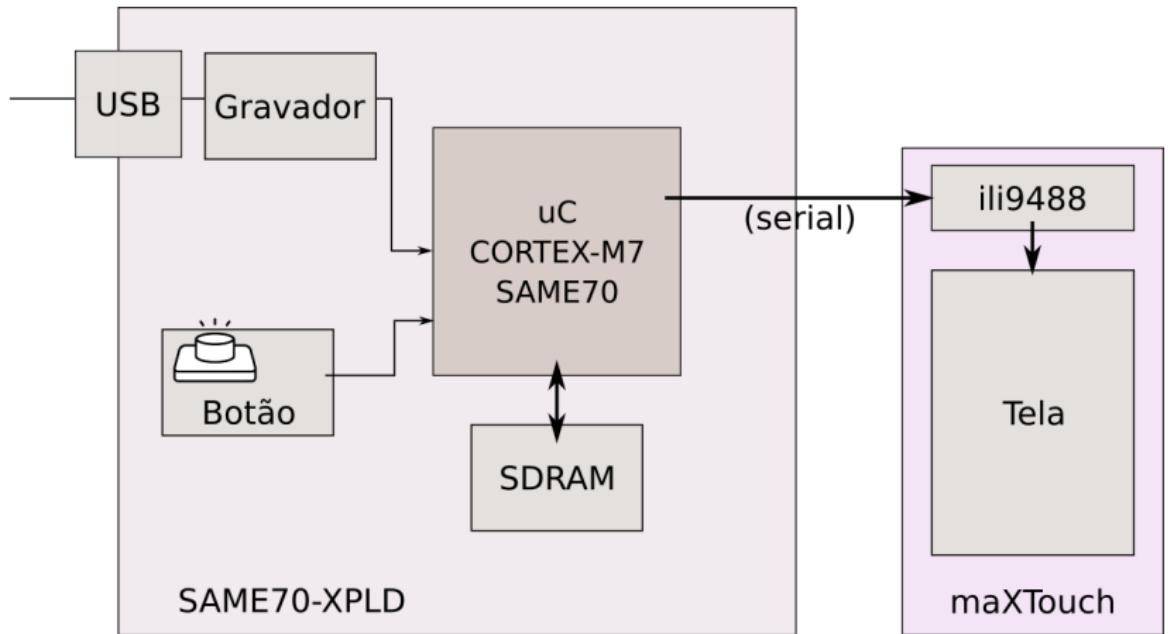
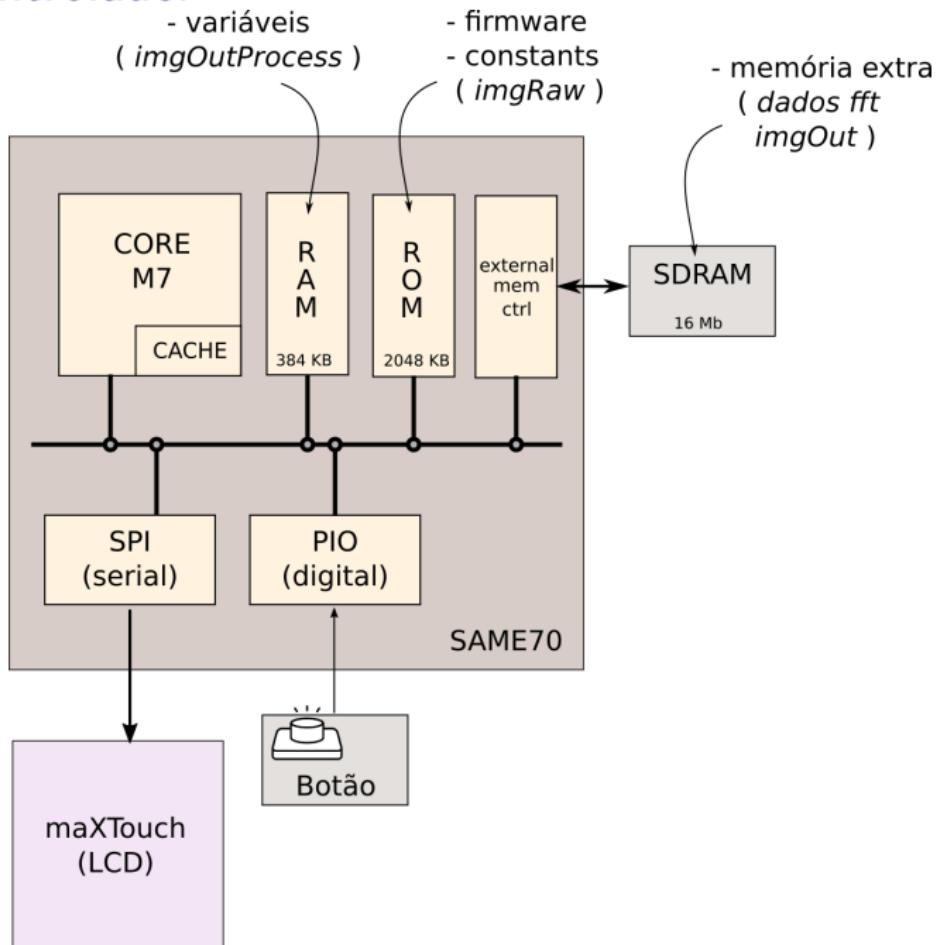


Figure 7: Diagrama detalhado

Microcontrolador



Firmware

main

```
int main(){

    uint32_t time;
    uint8_t  imageSelect = 1;

    // inicializa placa e seus perifericos
    initBoardMutirao();

    // exibe imagem original, tempo de processamento suprimido
    imgShow(imgRaw, 0);

    ...
}
```

SuperLoop

Aplicações embarcadas não devem nunca retornar do main.

```
while (1) {  
  
    // se buttonFlag = 1 existe alteracao  
    // no estado do botao  
    if(buttonFlag){
```

Clock

Energia em sistemas MOSFET

$$P = \alpha C V_{DD}^2 f$$

- ▶ alpha : fator de chaveamento (influenciado pelo código)
- ▶ C : capacitância
- ▶ V : tensão de operação
- ▶ f : frequência de chaveamento

Frequência de operação 4.5Mhz

src/config/conf_clock.h

```
// ===== Processor Clock (HCLK) Prescaler Options
//(Fhclk = Fsys / (SYSCLK_PRES))
//#define CONFIG_SYSCLK_PRES           SYSCLK_PRES_1
//#define CONFIG_SYSCLK_PRES           SYSCLK_PRES_2
//#define CONFIG_SYSCLK_PRES           SYSCLK_PRES_4
//#define CONFIG_SYSCLK_PRES           SYSCLK_PRES_8
//#define CONFIG_SYSCLK_PRES           SYSCLK_PRES_16
//#define CONFIG_SYSCLK_PRES           SYSCLK_PRES_32
#define CONFIG_SYSCLK_PRES           SYSCLK_PRES_64
//#define CONFIG_SYSCLK_PRES           SYSCLK_PRES_3
```

- ▶ Fsys = 300Mhz

Alterando para 300 Mhz

src/config/conf_clock.h

```
// ===== Processor Clock (HCLK) Prescaler Options      (Fhclk
#define CONFIG_SYSCLK_PRES           SYSCLK_PRES_1
//#define CONFIG_SYSCLK_PRES           SYSCLK_PRES_2
//#define CONFIG_SYSCLK_PRES           SYSCLK_PRES_4
//#define CONFIG_SYSCLK_PRES           SYSCLK_PRES_8
//#define CONFIG_SYSCLK_PRES           SYSCLK_PRES_16
//#define CONFIG_SYSCLK_PRES          SYSCLK_PRES_32
//#define CONFIG_SYSCLK_PRES          SYSCLK_PRES_64
//#define CONFIG_SYSCLK_PRES          SYSCLK_PRES_3
```

Programe e veja a diferença

Aplicações

Similar ?



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Wearables

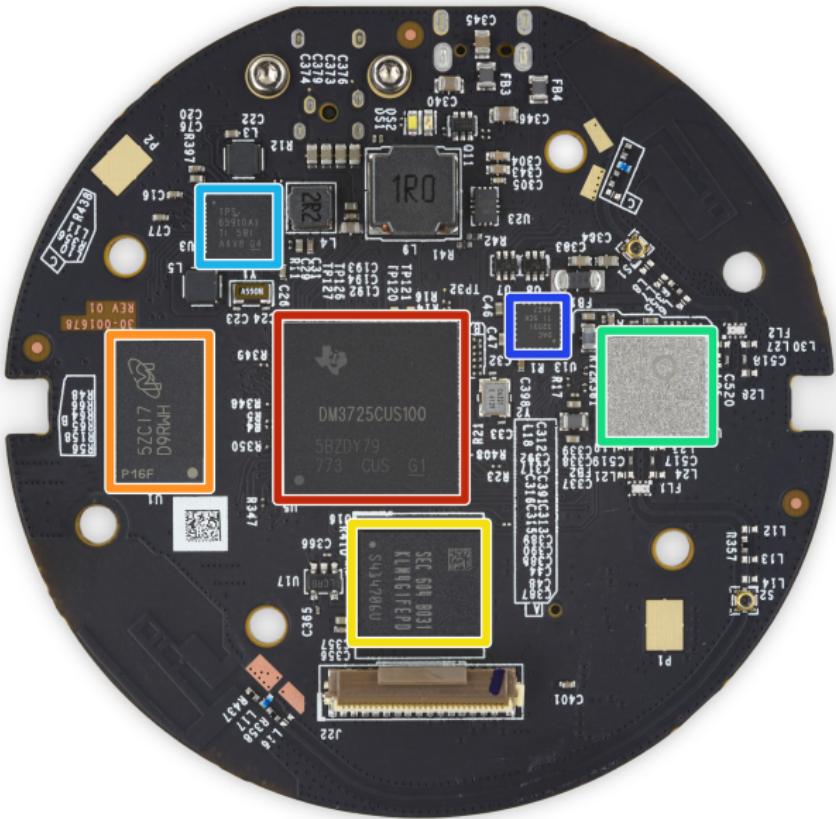
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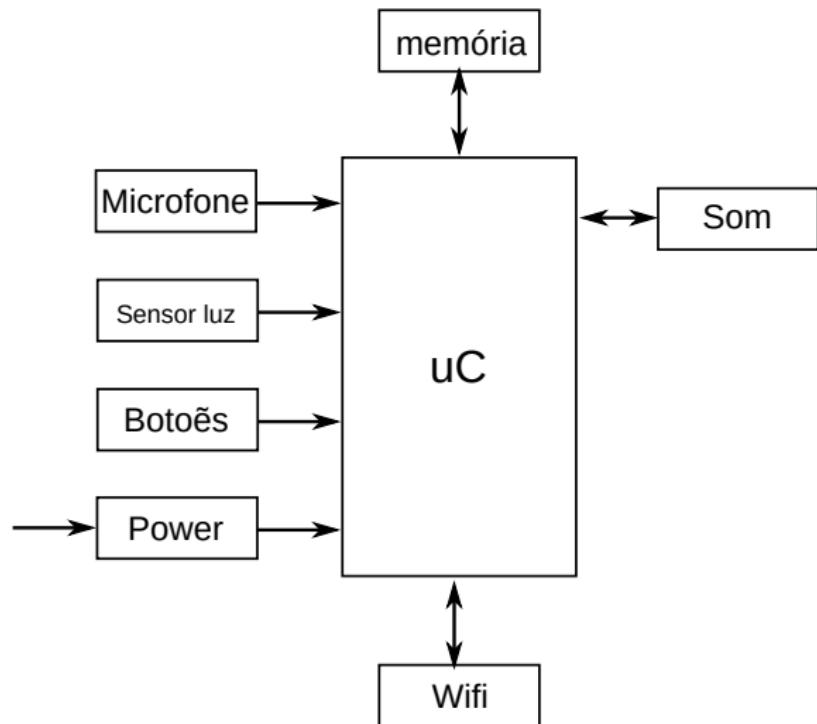
Exemplo 1. Amazon Echo Dot



Echo Dot



Echo - Diagrama



Echo - Diagrama detalhado

