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Balança Medição Massa

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This is the acknowledgements section. You should replace this with your own acknowledgements.

Resumo

O projeto proposto é fazer uma balança utilizando um micro controlador, um sistema *Embeded.*

Uma célula de peso vai ser o sensor de conversão entre massa e diferença de potencial através de uma ponte *Wheatstone*, gerando um sinal proporcional.

Após obter este sinal será ligado a um amplificador **ADC** dedicado para este tipo de funcionalidade, com 24 bits de resolução, amplificação programável e taxa de transferência fisicamente programado, trata-se do integrado **HX711**, com um protocolo de comunicação que lhe é próprio. Depois esta comunicação serie vai ser entregue ao micro controlador.

A programação do **MCU**, o código as livrarias e ou drivers é para ser feito em linguagem **C**.

Código, Programação.

Conteúdo

Lista de Figuras

Lista de Tabelas

Acrónimos

API	–	Application Programming Interface
ASCII	–	American Standard Code for Information Interchange
ASN.1	–	Abstract Syntax Notation - One
ASR	–	Alcatel Service Router
ATM	–	Asynchronous Transfer Mode
CADREDE	–	Sistema de Gestão do Cadastro de Rede da PT
COTS	–	Components Of The Shelf
CPU	–	Communications Processor Unit
CRC	–	Cyclic Redundancy Check
CRM	–	Customer Relationship Management
CSMA/CD	–	Carrier Sense Multiple Access/Collision Detection
ER	–	Elemento de Rede
eTOM	–	Enhanced Telecom Operations Model
FAB	–	Fulfillment, Assurance & Billing
FCAPS	–	Fault, Configuration, Accounting, Performance, Security
FCS	–	Frame Check Sequence
FIFO	–	First In First Out
ROM	-	Read-only Memory
RAM	-	Random-access Memory
JTAG-DP	-	Joint Test Action Group
SWD-DP	-	Serial Wire Debug
IAP	-	in-application programming
ICP	-	in-circuit programming

1. Balança

Weighing scales are born of necessity. As trading developed during the Antiquity, merchants needed a way to assess the value of goods that could not simply be counted by the pieces, like irregular-shaped gold nuggets, for instance. The most ancient relics of a weighing scale have been discovered in the Indus River valley, near present-day Pakistan, and date back to around 2,000 B.C. Those first weighing scales were actually balances, using two plates attached to an overhead beam, itself fixed on a central pole. The measurement was taken by putting the object measured on one plate and weight-setting stones on the other, until equilibrium was reached.

This system can be very accurate, but it can also be easily cheated. Perhaps the most famous example of a rigged balance was the one used by Celt chieftain Brennus around 390 B.C. when he captured Rome and demanded a ransom of 1,000 pounds of gold. When the Romans complained about Brennus using fixed weights, Brennus famously threw his own sword on top of the weights and proclaimed “Woe to the vanquished!”

The weighing scale didn’t know any major technological improvements until the industrial era. It is only starting in the late 18th century that new ways to measure mass appeared that didn’t rely on counter-weights. The spring scale was invented by Richard Salter, a British balance maker around 1770. The spring scale, as the name implies, measures the pressure (or the tension) exerted on a spring to deduce the weight of an object. Spring scales are still fairly common today because they are very cheap to make, but they are not quite as accurate as the electronic systems designed and perfected during the 20th century.

The most modern body scales rely on electronics to measure the weight of their users. By sticking electrical resistances on deformable materials and running a current through them, it is possible to detect variations in the conductivity of the resistances that are correlated to the amount of pressure exerted on the material, and thus to deduce the weight of the person (or the object) standing on the scale. The most high-end body scales also act as impedance meters, and are able to calculate the ratio of fat mass and lean mass in the body. The impedance measurement is taken by generating a very small electrical current on the surface of the scale and measuring the resistance encountered by the current as it travels through the body. Lean mass is a better conductor than fat mass, so it is therefore possible to deduce the ratio of both in the body.

This groundbreaking find calls into question the assumption that early Levantine settlements were less technologically or economically developed than those found in present-day Turkey and Greece. In fact, the scale beam dates back to the early third millennium BC , predating those discovered elsewhere, while the location of the find at Tell Fadous-Kfraabida–believed to be a secondary Bronze Age urban settlement–may indicate that the technology was already widespread in the region at the time.

1 section

1.1 subsection

1.2 subsection

2 subsection

2. chapter

1 section

2 Material

Lista de Material		
Peça	Quant	Preço [uni]
Fonte de alimetação 12V 1A	1	3.87 €
Conversor DC-DC com voltímetro	1	7.75 €
ET BASE AVR Atmega128 Board	1	23.92 €
Test Input Board	1	3.71 €
Test Output Board	1	3.71 €
IDC Socket 10 way	12	0.31 €
IDC Header Straight 10 way	12	0.25 €
Flatcable	?	? €
20x4 LCD Module Blue	1	12.24 €
SparkFun Load Cell Amplifier HX711	1	13.04 €
50Kg Load Cell	1	12 €
	total	86.96 €

Tabela 2.1: Lista de material

Depois também tem-se despesas no equipamento para a programação do hardware que em principio só se gasta uma vez, isto é, se não se estragar. No caso do programador da Atmel o **ICE** pode custar até 185.55 €.

Também temos de ter em conta que os preços são **PVP**, que no caso se for preços comerciais são dez vezes inferior, e se for para produção em grande escala também tem descontos por quantidade.

3. chapter

Testing Code Area

Tables

Tabela 3.1: Armadillos

Armadillos	are
our	friends

Figures

Figura 3.1: Armadillo slaying lawyer.

Figura 3.2: Armadillo eradicating national debt.

A. Definições

Definição 1 *Capacitância*

$$
\begin{aligned}
Q_c(t) =& \int^t i(t) \quad dt \\
=& Q_c(0^-) + \int_{0^-}^t i(t) \quad dt \\
V_c(t) =& \frac{Q_c(t)}{C} \\
=& \frac{1}{C} \quad \int^t i_c(t) \quad dt \\
=& \frac{Q_c(0^-)}{C} + \frac{1}{C} \quad \int_0^t i_c(t) \quad dt \\
=& V(0^-) + \frac{1}{C} \quad \int_0^t i_c(t) \quad dt \\
i_c(t) =& C \quad \frac{dV_c(t)}{dt}
\end{aligned}
$$

Definição 2 *Indutância*

$$
\begin{aligned}
\psi_L(t) =& \int^t V_L(t) \quad dt \\
=& \psi_L(0^-) + \int_{0^-}^t V_L(t) \quad dt \\
V_L(t) =& L \quad \frac{di_L(t)}{dt} \\
i_L(t) =& \frac{\psi_L(t)}{L} \\
=& \frac{1}{L} \quad \int^t V_L(t) \quad dt \\
=& \frac{\psi_L(0^-)}{L} + \frac{1}{L} \quad \int_0^t V_L(t) \quad dt \\
=& i_L(0^-) + \frac{1}{L} \quad \int_0^t V_L(t) \quad dt
\end{aligned}
$$

Definição 3 *Resistência*

$$
\begin{aligned}
V_R(t) =& R \quad i_R(t) \\
i_R(t) =& \frac{V_R(t)}{R}
\end{aligned}
$$

Definição 4 *Valor Médio*

$$
X_{av} = \frac{1}{T} \quad \int_0^T X(t)dt
$$

Definição 5 *Valor Eficaz*

$$
X_{ef} = \sqrt{\frac{1}{T} \quad \int_0^T \overset{2}{X}(t)dt}
$$

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[1]

[1] Apontamento