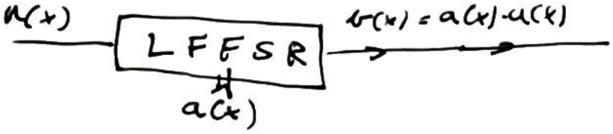
Info Code Előadás

Emlékeztető: SR architektúrák

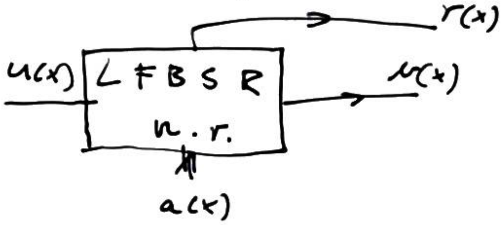
1) 

$v(x) = a(x) \cdot u(x)$

2) 

$v(x) = \frac{u(x)}{a(x)}$ $\deg(u(x)) > \deg(a(x))$

$a(x) \mid u(x)$

3) 

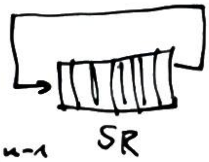
$u(x) = v(x) \cdot a(x) + r(x)$

Ciklikus eltolás

shiftelés után előre ugrik

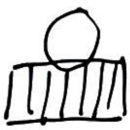
$\underline{c} \in C$ $\underline{c}' = S\underline{c} = (c_{n-1}, c_0, c_1, \ldots c_{n-2})$

vektor r. $\underline{c} = (c_0\ c_1 \ldots c_{n-1})$



pol r. $c(x) = c_0 + c_1 x + c_2 x^2 + \ldots + c_{n-1} x^{n-1}$

$c'(x) = c_{n-1} + c_0 x + c_1 x^2 + \ldots + c_{n-2} x^{n-1}$

4.)  $S_c(x)$

Lineáris ciklikus kódok $C(n,k)$

$\underline{c} \in C \rightarrow c' = S\underline{c} \in C$ (ciklikus)

Def: $\forall c, c' \in C \rightarrow \alpha\underline{c} + \alpha'\underline{c}' \in C$ (lineáris)

1 $\exists\, g(x) \rightarrow$ 1 $\deg(g(x)) = n-k$ 3. $\forall\, c(x) \in C\ \exists\ c(x) = g(x) \cdot u(x)$

2 $g_{n-k} = 1$ (főpolinom) 4. $g(x) \mid x^n - 1$

Technológiai impl

$$u(x) \longrightarrow \boxed{LFFSR} \longrightarrow c(x) = u(x)\,g(x)$$

$\uparrow$ $g(x)$ — kódolás

RS kódok előnyei = MDS + RealTime impl (HW arch)

$\underline{\underline{H}} \cdot \underline{c}^T = \underline{0}^T \qquad \alpha \in GF(q)$

$$\begin{pmatrix} 1 & \alpha & \alpha^2 & \cdots & \alpha^{n-1} \\ 1 & \alpha^2 & \alpha^4 & \cdots & \alpha^{(n-1)2} \\ 1 & \alpha^3 & \alpha^6 & \cdots & \alpha^{(n-1)3} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ 1 & \alpha^{n-k} & \alpha^{(n-k)2} & & \alpha^{(n-k)(n-1)} \end{pmatrix} \begin{pmatrix} c_0 \\ c_1 \\ \vdots \\ c_{n-1} \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ \vdots \\ 0 \end{pmatrix}$$

$$c(x)\big|_{x=\alpha^i} = c_0 + c_1\alpha^i + c_2\alpha^{i2} + \dots c_{n-1}\alpha^{i(n-1)} = 0$$

$$c(x) = \underbrace{\prod_{i=1}^{n-k} (x-\alpha^i)}_{g(x)} u(x) = g(x)\cdot u(x)$$

példa $\quad t = 2 \to n, k, q \to \alpha \in GF(q)$

$$\boxed{\text{arch}} \longleftarrow g(x) = \prod_{i=1}^{n-k} x - \alpha^i$$

$d_{min} = n-k+1$

$t = \left\lfloor \dfrac{d_{min}-1}{2} \right\rfloor$

$n-k = 2t$

$GF(7) \quad q = n+1$

$\downarrow \quad \alpha = 5$

$C(6,2) \quad \alpha = 3$

$$g(x) = (x-\alpha)(x-\alpha^2)(x-\alpha^3)(x-\alpha^4) = (x-3)(x-2)(x-6)(x-4) =$$

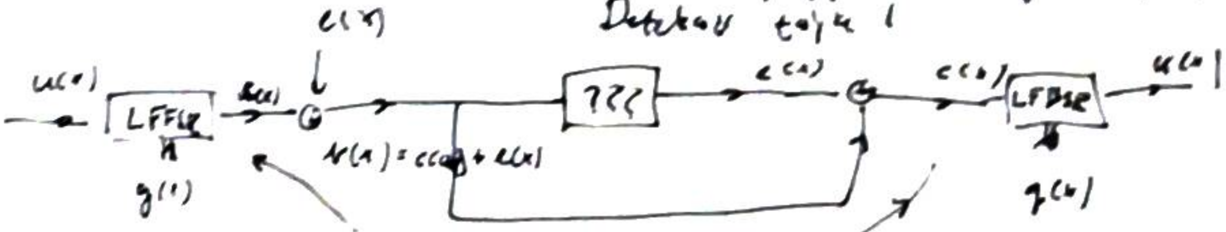
$$= (x+4)(x+5)(x+1)(x+3) =$$

$$= (x^2+2x+6)(x^2+4x+3) =$$

$= x^4 + 2x^3 + 6x^2 + 4x^3 + x^2 + 3x + 5x^2 + 6x + 4 = x^4 + 6x^3 + 3x^2 + 6x + 4$

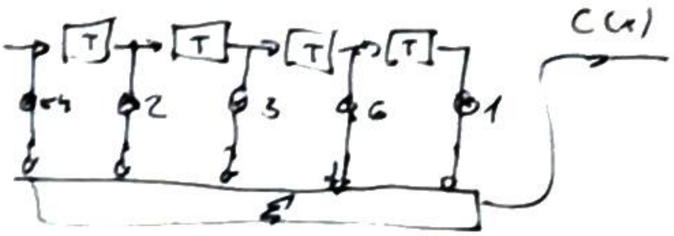
legnagyobb kitevőjű tag együttha-

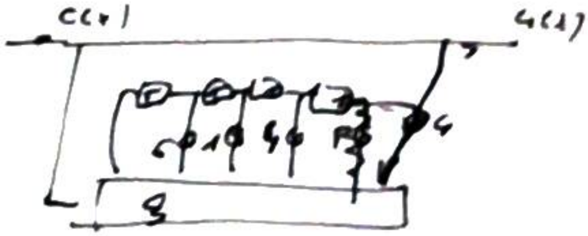
Detektor tájék.



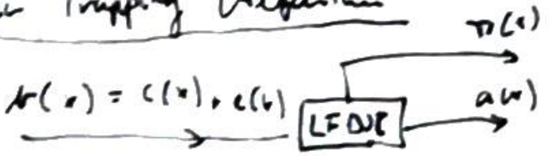
küld.: $c(x) = u(x)\, g(x)$

dekód.: $u(x) = \dfrac{c(x)}{g(x)}$





Error Trapping Algorithm



1.) $r(x) = u(x)\, g(x) + e(x)$

2.) $r(x) = a(x) \cdot g(x) + r(x)$

$u(x) = a(x)$

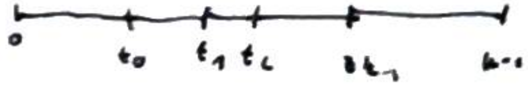
$e(x) = r(x)$

CSAK AKKOR, HA $\deg(e(x)) < n-k$

tehát

általános hiba hely

ciklik.



pl. $e(x) = e_0 x^{t_0} + e_1 x^{t_1} + \dots + e_{k-1} \cdot x^{n-1}$

ciklikus TEH

$n-k$ ≥ hosszú ...

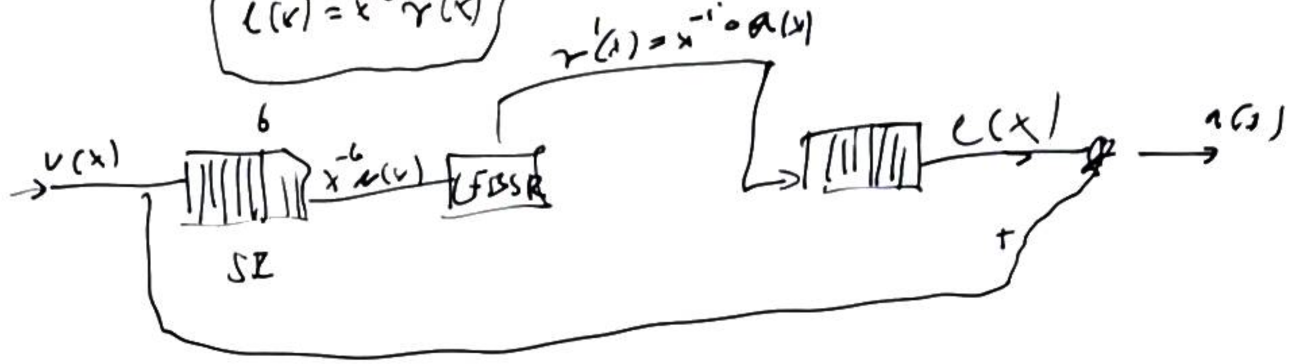
1.) $x^{-i_0} v(x) = x^{-i_0} u(x) g(x) + x^{-i_0} \cdot e(x)$ $\deg(x^{-i_0} \cdot e(x)) < n-k$

Meltmi

2.) $x^{-i_0} v(x) = a'(x) g(x) + r'(x)$

$$\boxed{x^{-i_0} e(x) = r'(x)}$$

$$\boxed{e(x) = x^{i_0} r'(x)}$$



Dekódoló blokk

i_0 meghat.

cél: $x^{-i_0} e(x) = r(x)$

$x^{-i_0} e(x) = b'(x) g(x) + r'(x)$

$x^{-i_0} e(x) - r'(x) = b'(x) g(x)$ pol. oszth.

Detekció nem (ETA)