# Research Based on DCS in Sensor Networks

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tutor: Wen Hu

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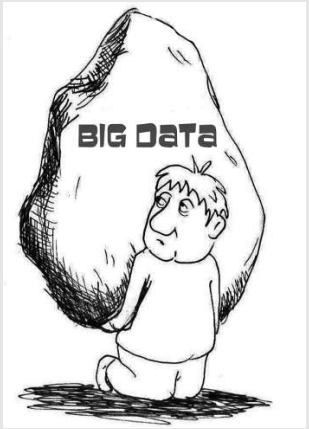
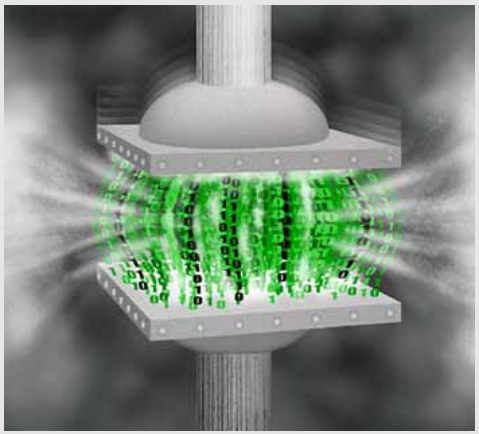
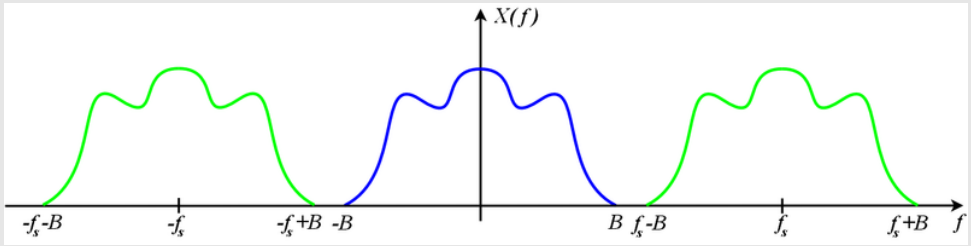
# Research Overview
## Background



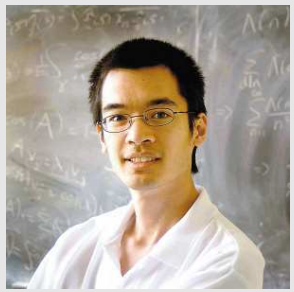
Harry Nyquist




Nyquist-Shannon sampling theorem

CS(Compressed Sensing)

Emmanuel Candes



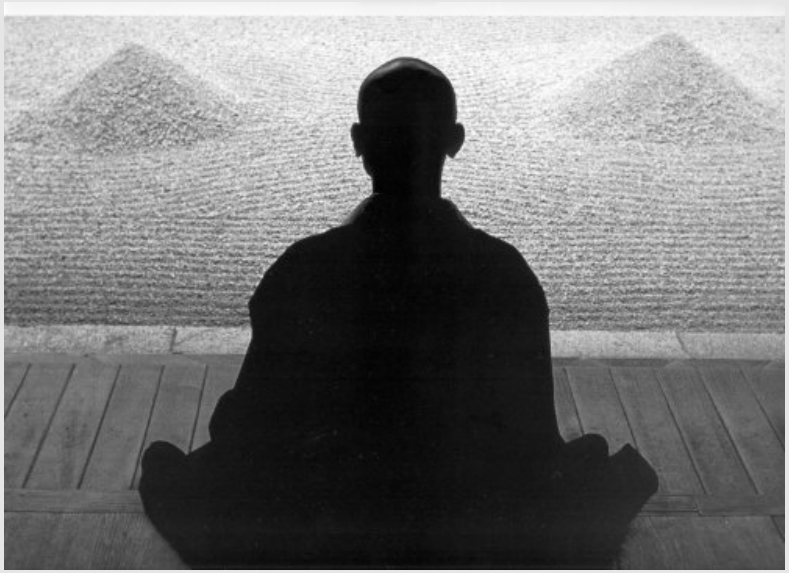
Terence Tao

David Donoho

Justin Romberg

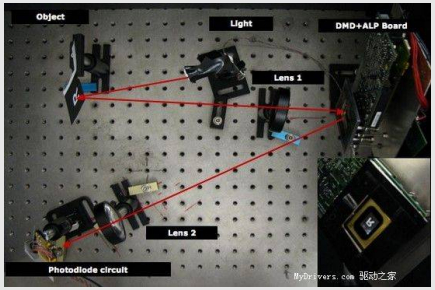
$$y = \Phi\Psi^H\theta \tag{1}$$

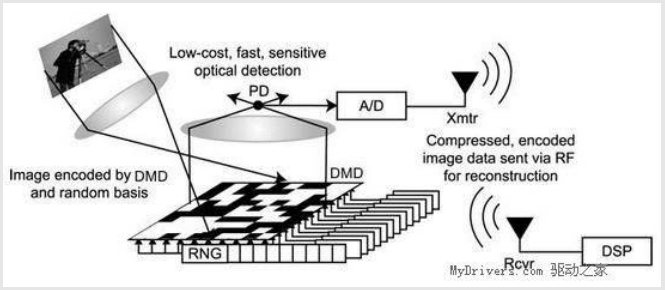
$x \in R^{N\times 1}, \Psi \in R^{N\times N}, \Phi \in R^{M\times N}, y \in R^{M\times 1}$



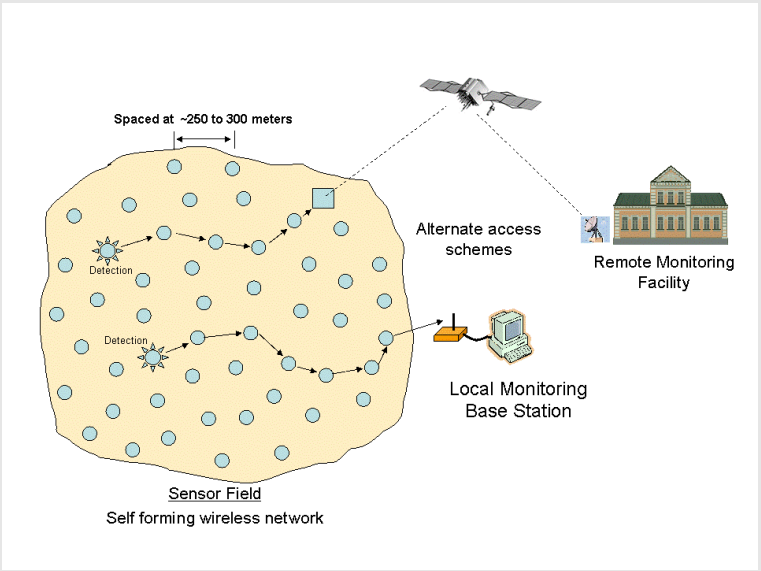
Zen of Signal Processing

# Project Overview
## Background



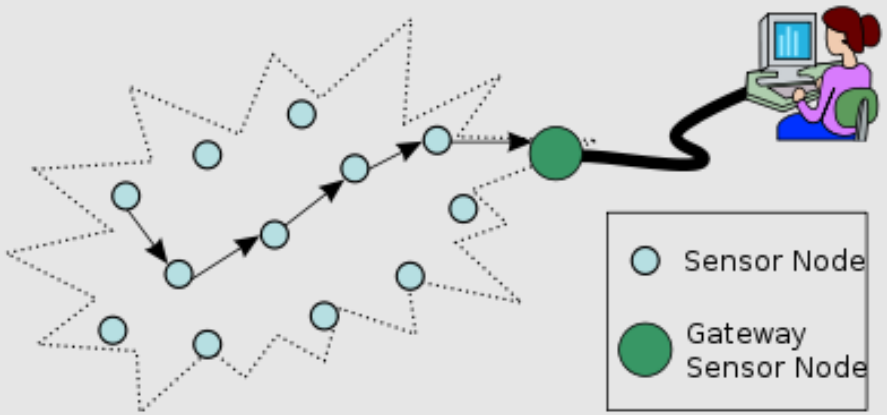




Dror Baron

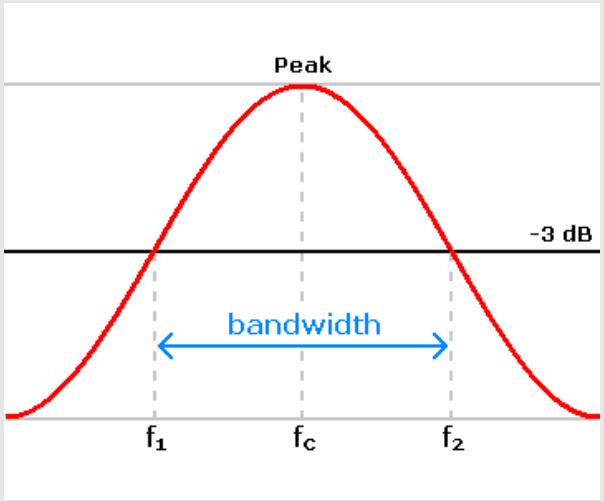



DCS(Distributed Compressed Sensing)

# Project Overview
## Content







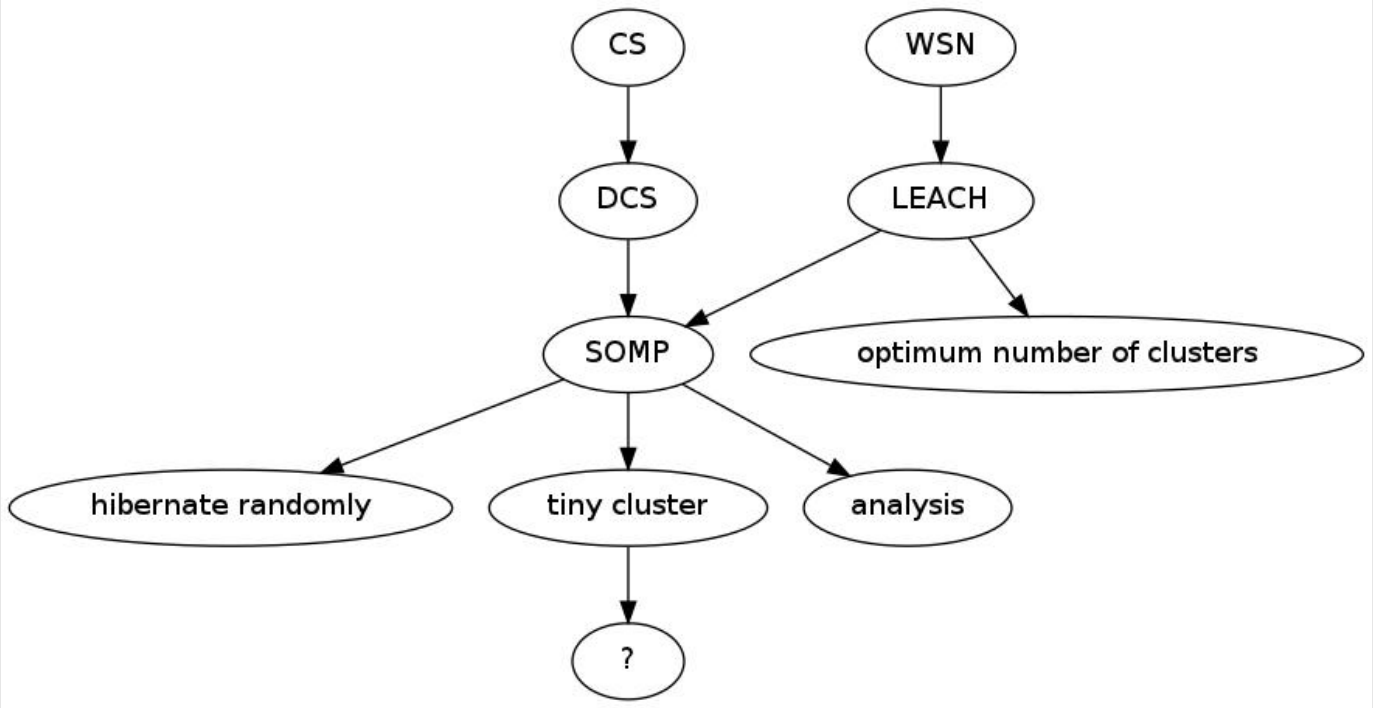

bandwidth

WSN life

encryption

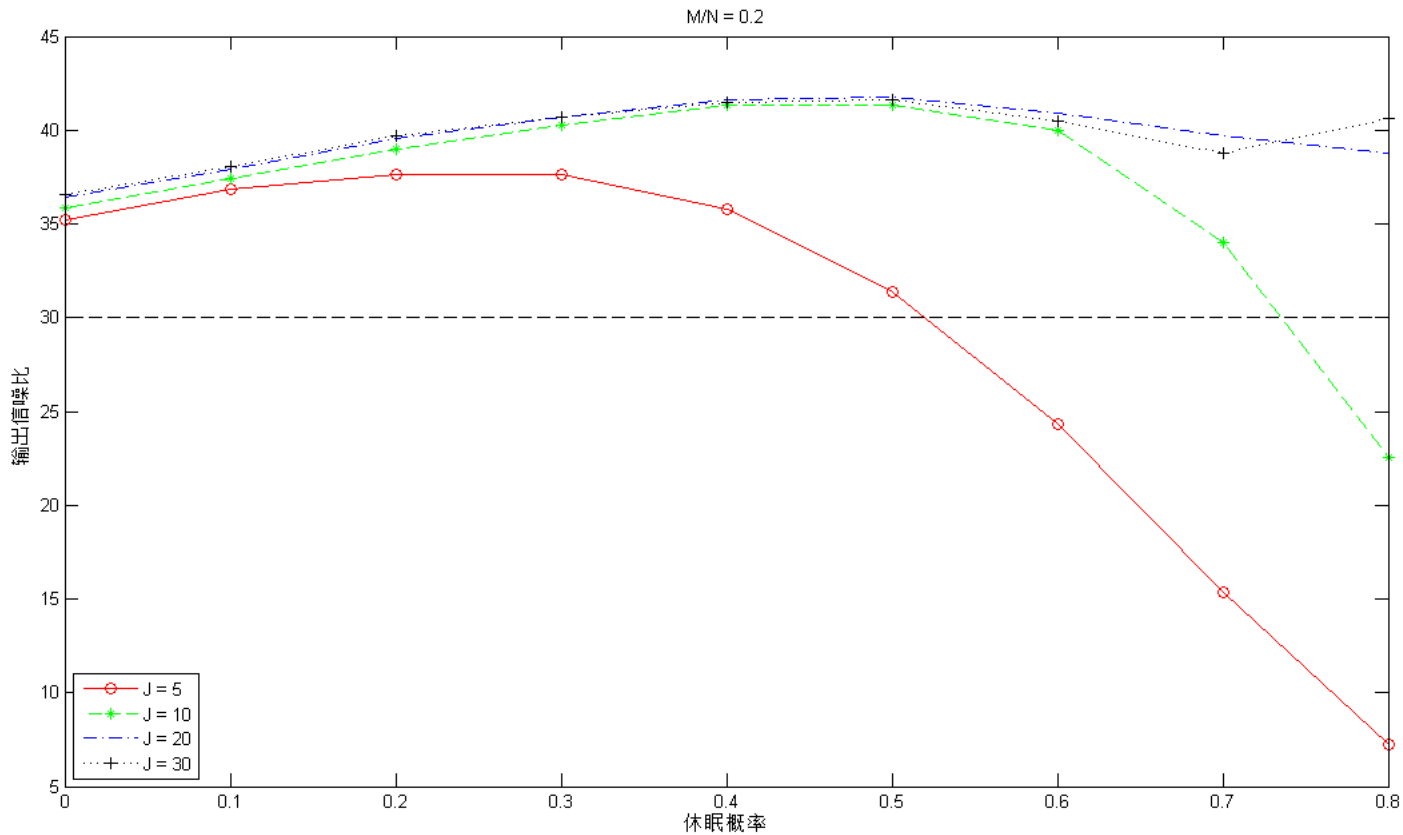
encoding simplicity

# Research Process



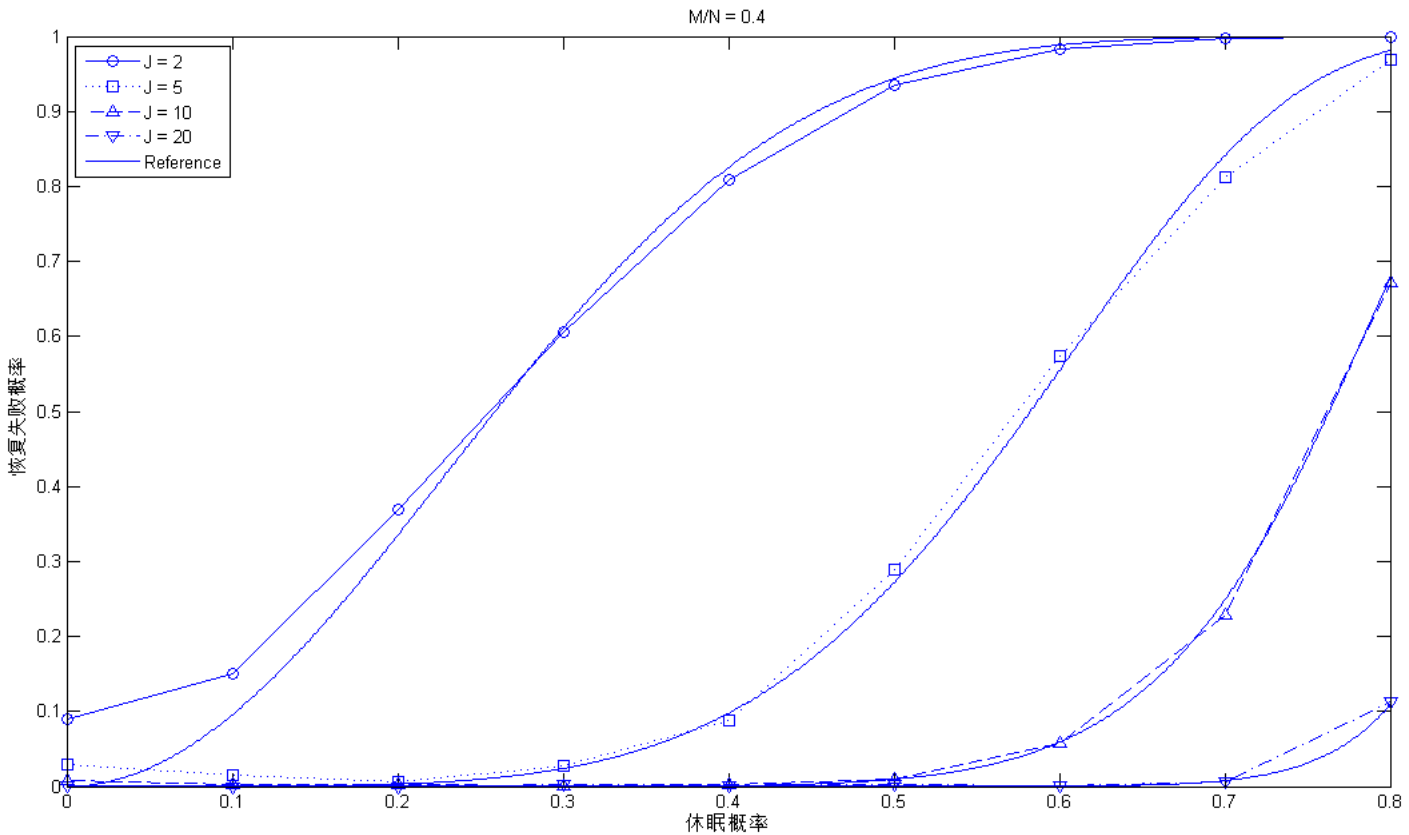

# Research Results

- $SNR - P_{hib}$



## failed ratio

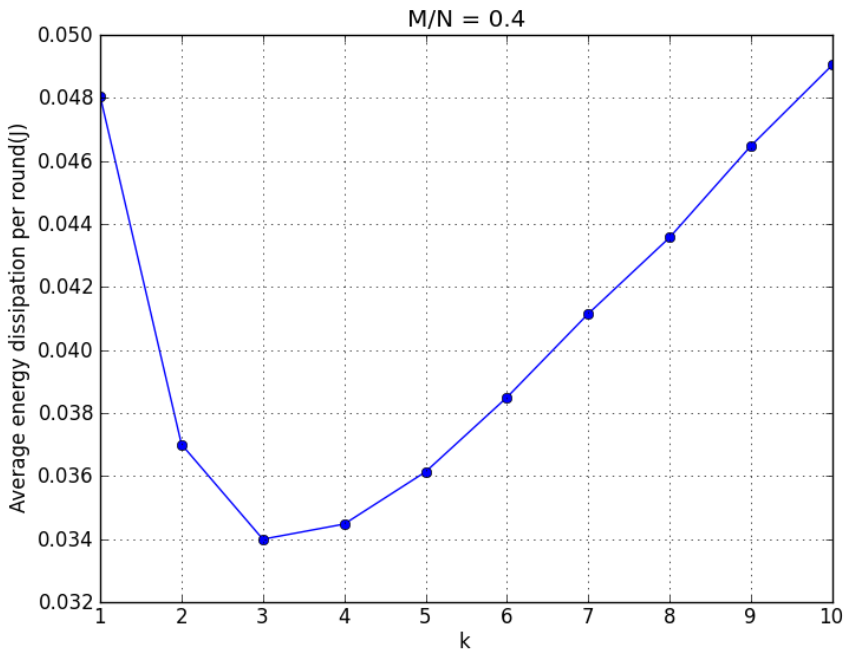
$$P_{failed} = 1 - (1 - r^J)^K \quad (2)$$

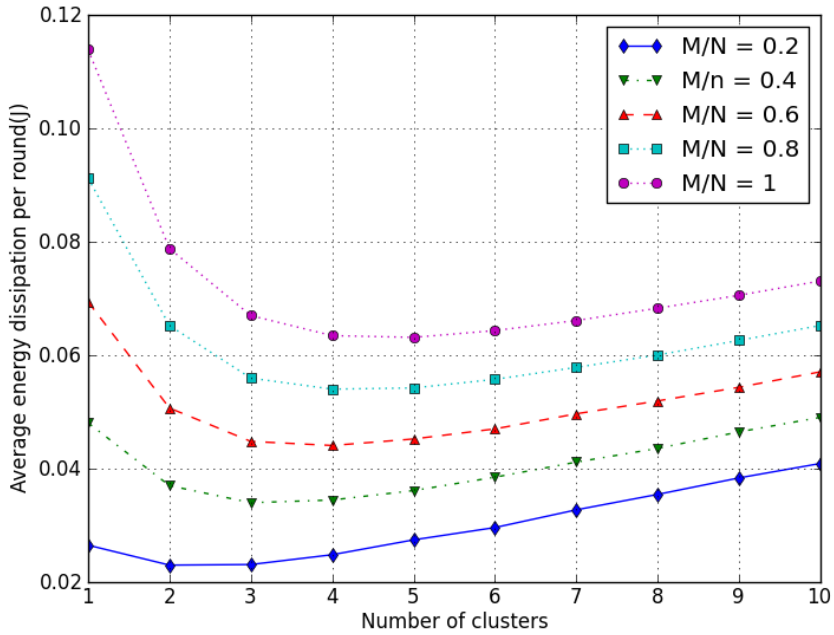


# Research Results

## $k_{opt}$

$$k_{opt} = \sqrt{\frac{M}{N}}\left(\frac{\sqrt{J}}{\sqrt{2\pi}}\sqrt{\frac{\varepsilon_{fs}}{\varepsilon_{mp}}}\frac{\sqrt{S}}{d_{toBS}^2}\right) \tag{3}$$



## tiny cluster

$$\Phi'_{new} = \phi_{n_1,1} + \phi_{n_n,2} + \cdots + \phi_{n_N,N} \tag{4}$$

$$\begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_M \end{bmatrix} = \begin{bmatrix} \phi_{11} & \phi_{12} & \cdots & \phi_{1N} \\ \phi_{21} & \phi_{22} & \cdots & \phi_{2N} \\ \vdots & \vdots & \ddots & \vdots \\ \phi_{M1} & \phi_{M2} & \cdots & \phi_{MN} \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_N \end{bmatrix}$$

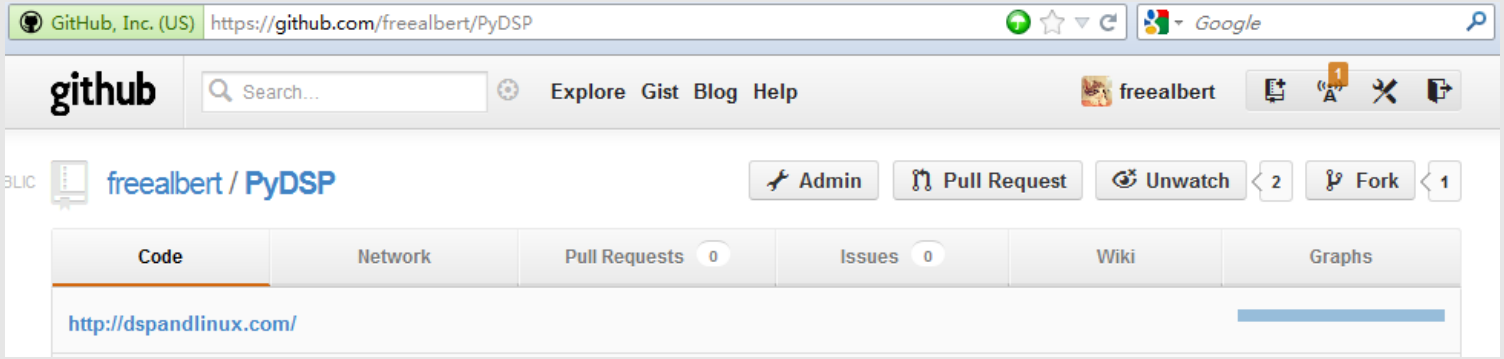
$$y_m = \phi_{m1}x_1 + \cdots + \phi_{mn}x_n + \cdots + \phi_{mN}x_N$$

$$\phi_n x_n = 0$$

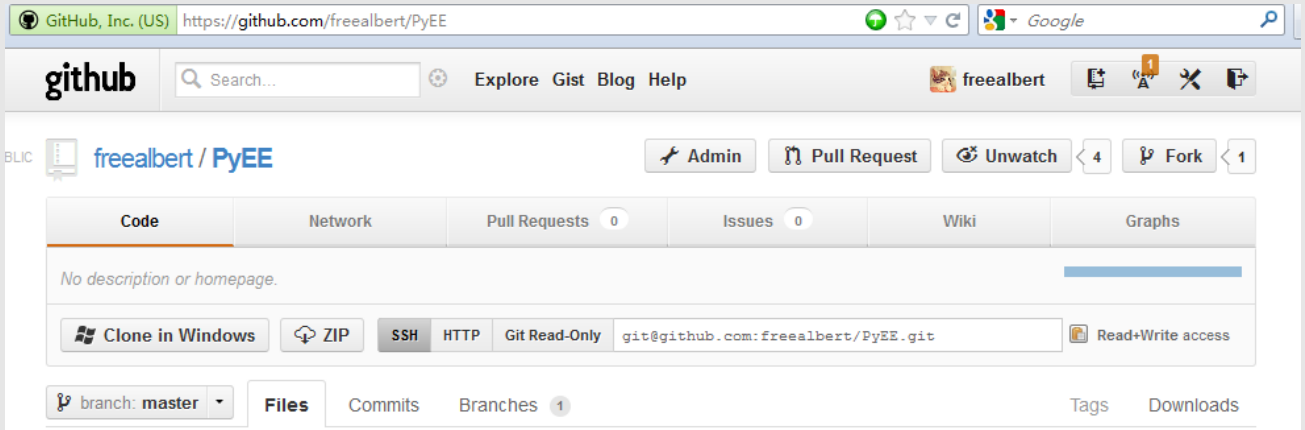
- D&L

# Research Results

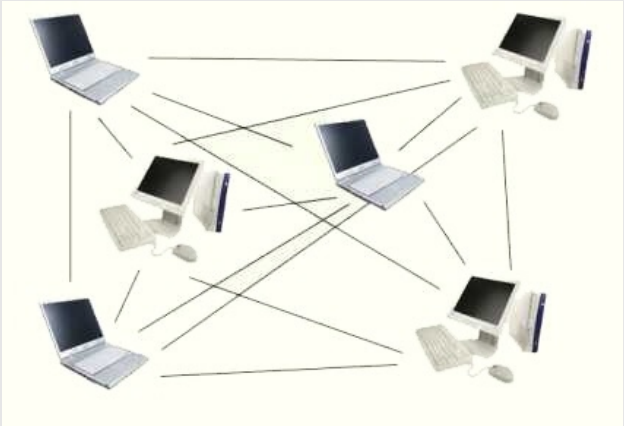
- PyDSP




- PyEE

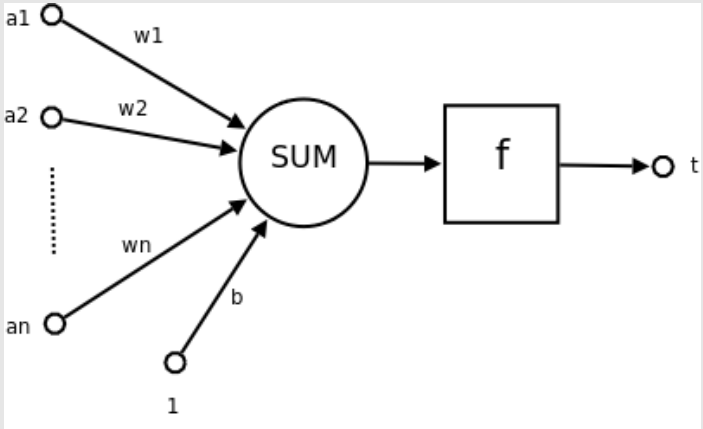


# Project Summary
## Prospect

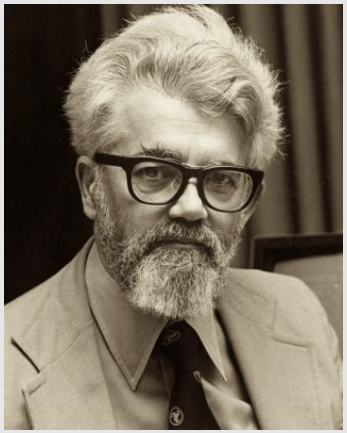


adhoc


TinyOS




ANN



AI

# Project Summary
## Harvest

Teamwork

Communicate with Tutor

pair programming

Taoist