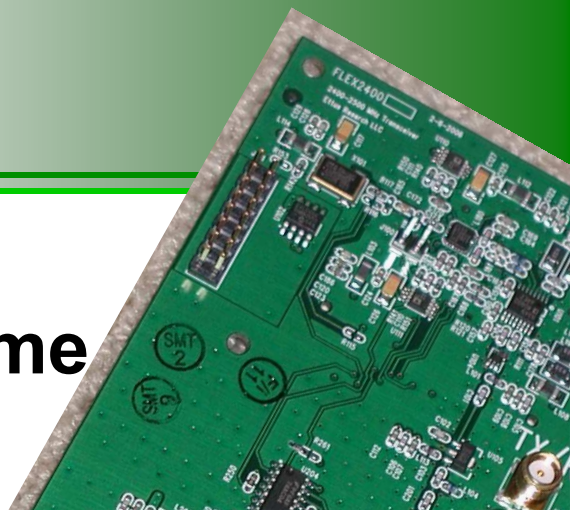
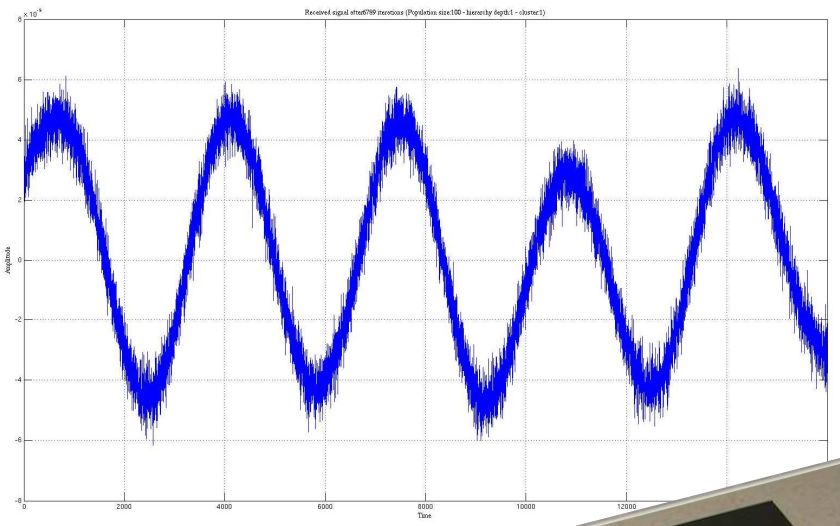


Verteilte und Ubiquitäre Systeme

Kollaborative Übertragung in drahtlosen Sensornetzen



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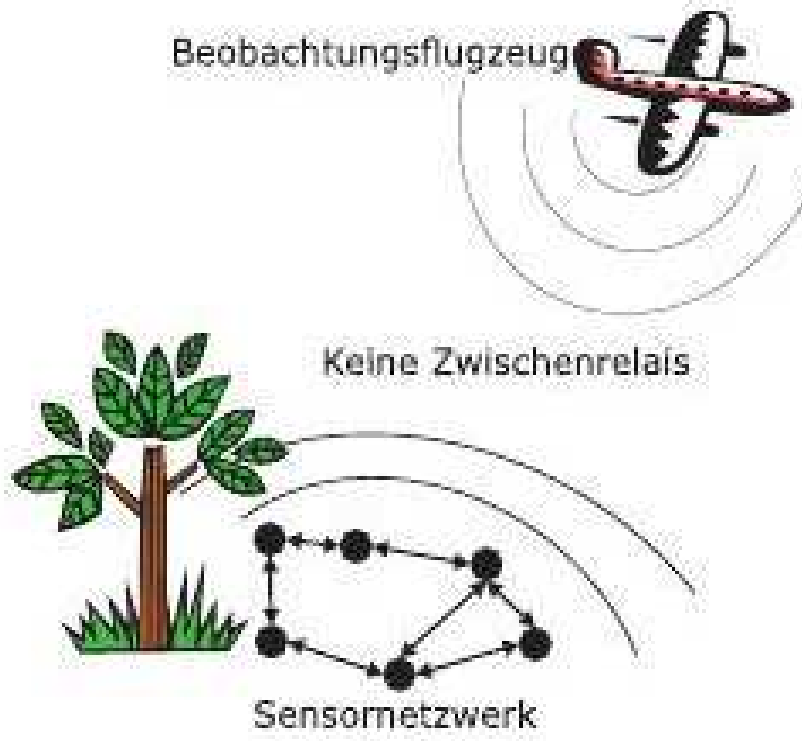
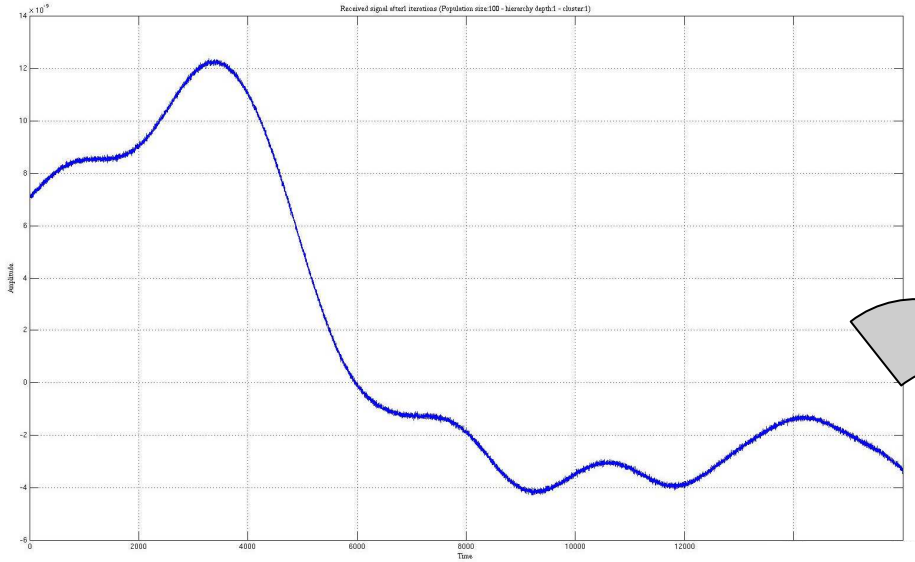
http://www.ibr.cs.tu-bs.de/dus/index.html

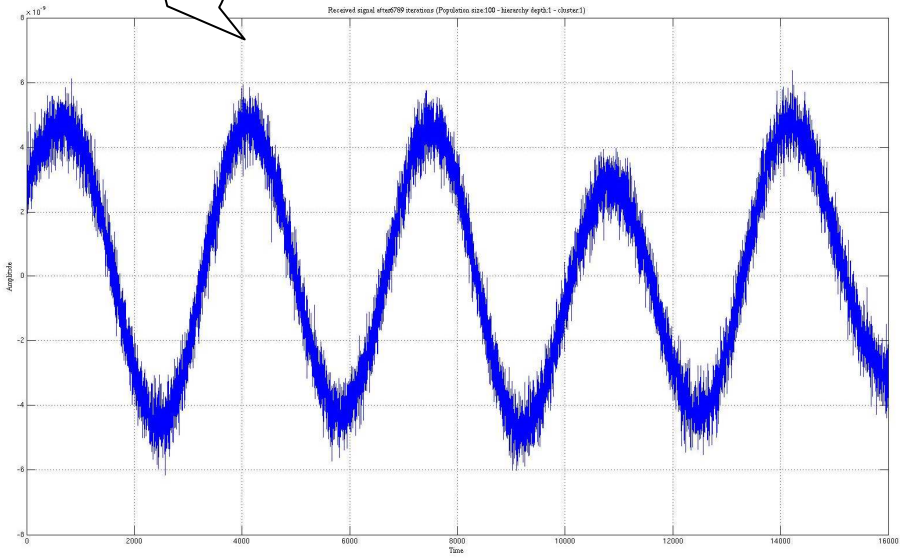
Collaborative transmission

- Szenario:
  - Knoten in einem Sensor-netzwerk kombinieren ihre Sendesignale, um mit entfernten Zielen zu kommunizieren
  - Nutzen von konstruktiver Interferenz
  - Phasengenaue Synchronisierung identischer Sendesignale



Collaborative transmission

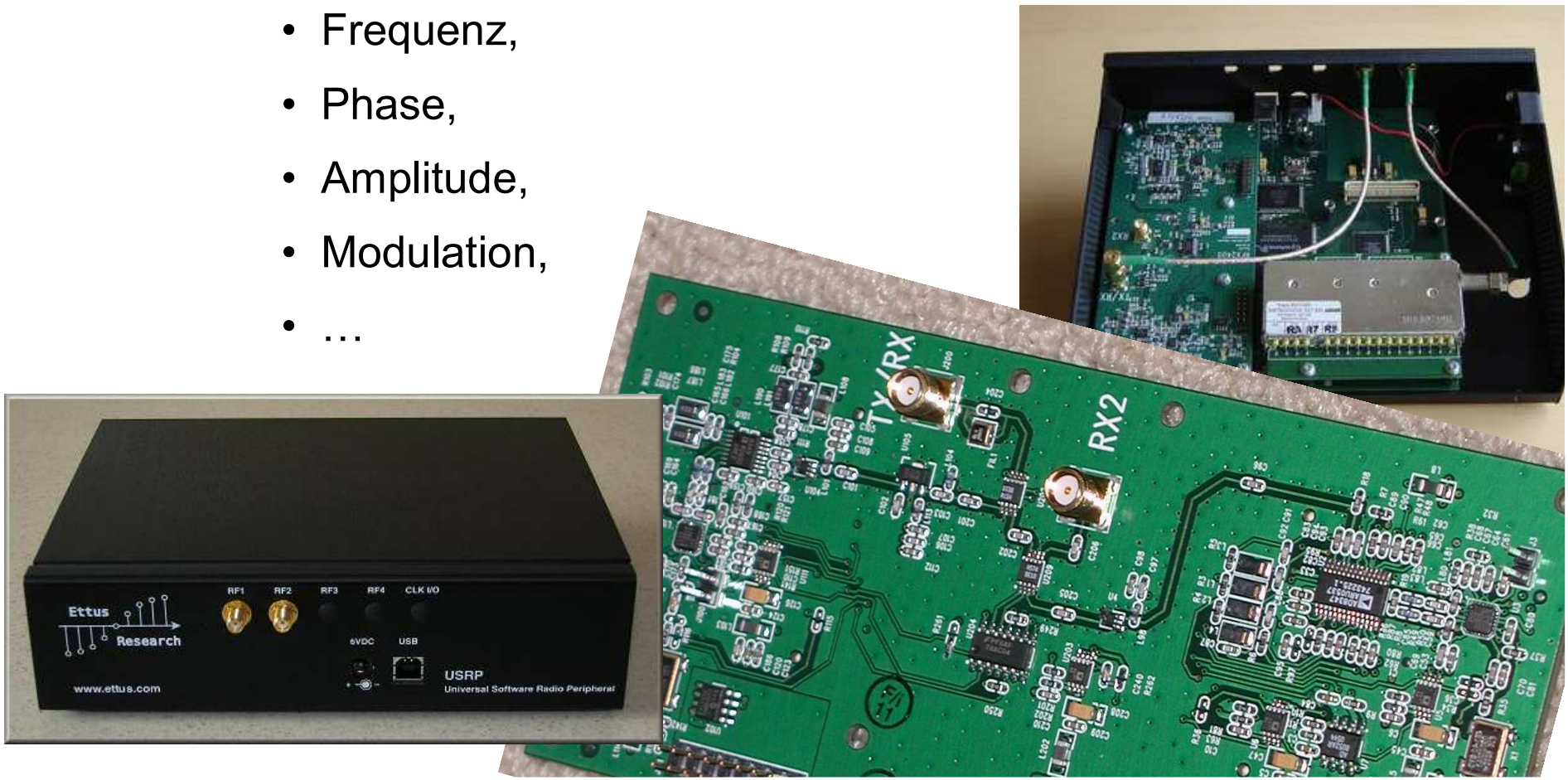




- Optimierung des Sendesignals über randomisierte Suche
- black-box-Optimierung

Collaborative transmission

- USRP (Software radio)
  - Sendesignal kann über software gesteuert werden
    - Frequenz,
    - Phase,
    - Amplitude,
    - Modulation,
    - …

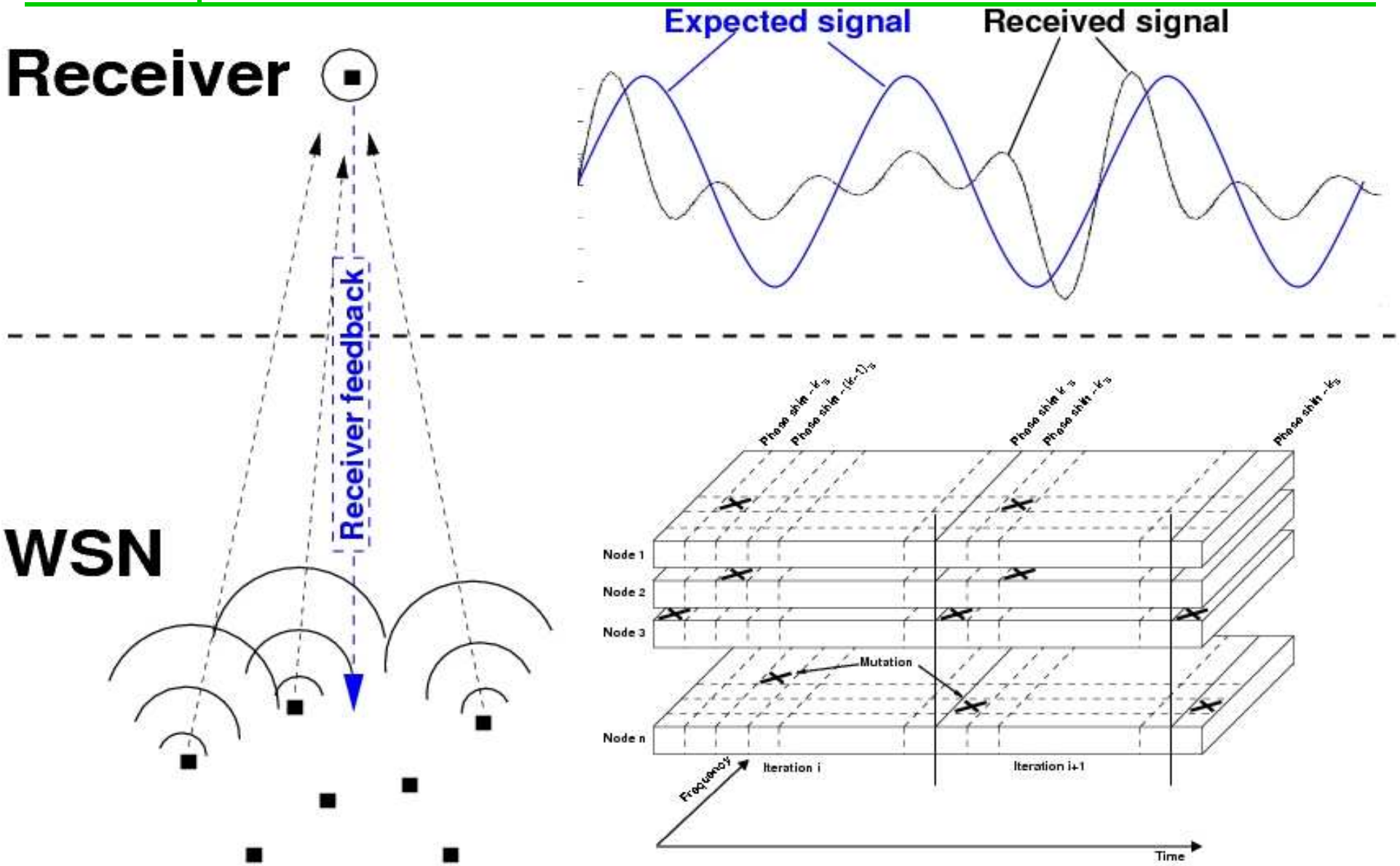


Collaborative transmission

- Programmierung der USRPs
  - GNU-Radio
    - C++
    - Python
  - Matlab
- Programmierung auf Desktop-Rechnern
- USRP über USB an Rechner angeschlossen

```
52  class gr_block {
53
54   public:
55
56    virtual ~gr_block ();
57
58    std::string name () const { return d_name; }
59    gr_io_signature_sptr input_signature () cons
60    gr_io_signature_sptr output_signature () con
61    long unique_id () const { return d_unique_id
62
63    /*!
64     * Assume block computes y_i = f(x_i, x_i-1,
65     * History is the number of x_i's that are e
66     * This comes in handy for FIR filters, wher
67     * ensure that our input contains the appropr
68     * filter.   History should be equal to the
69     */
70    unsigned history () const { return d_history
71    void  set_history (unsigned history) { d_his
72
73    /*!
74     * \brief return true if this block has a fi
75     *
76     * If true, then fixed_rate_in_to_out and fi
77     */
78    bool fixed_rate() const { return d_fixed_rat
79
80    // ----------------------------------------
81    //           override these to define your
82    // ----------------------------------------
```

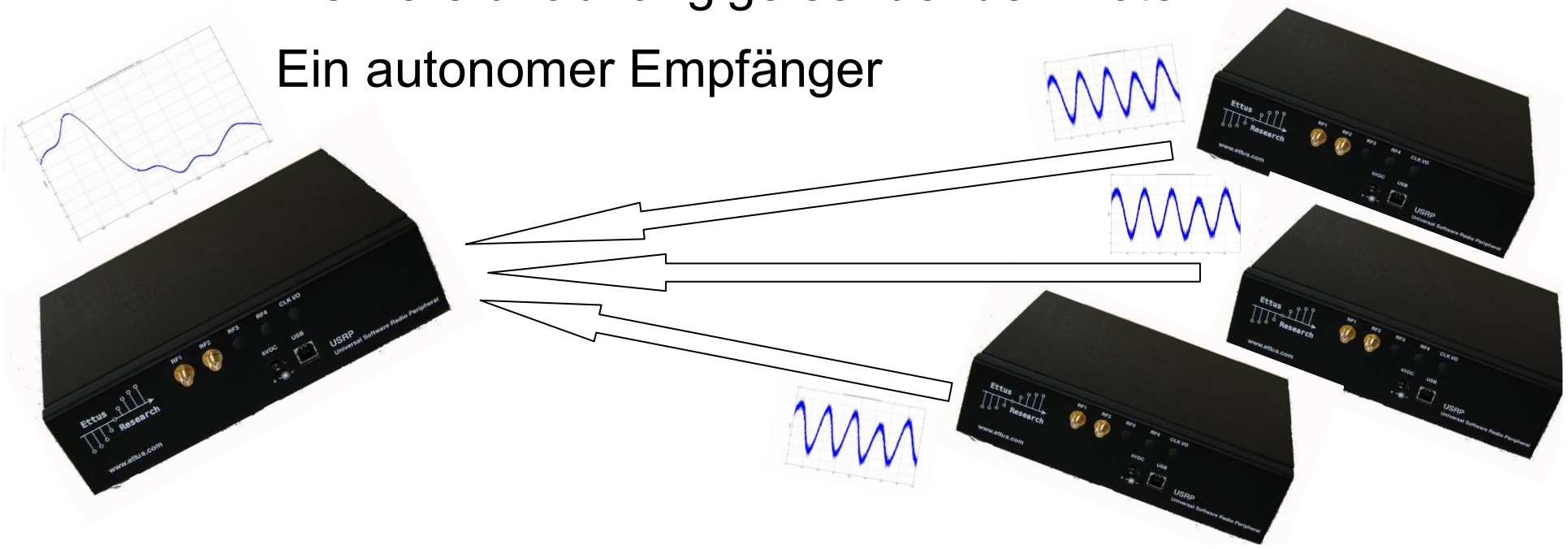
Collaborative transmission



Collaborative transmission

- Aufgabenstellung:
  - Umsetzung eines Sensornetzes aus kollaborativ sendenden Knoten
  - Programmierung eines verteilten Software-Systems
  - Mehrere unabhängige sendende Knoten

  Ein autonomer Empfänger



Collaborative transmission

Danke für die Aufmerksamkeit

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http://www.ibr.cs.tu-bs.de/courses/ss09/sep-dus/index.html