Chip Scale Atomic Clock

Needs Analysis

* Specifications
  + Power consumption <120mW
  + Less than 17cc volume, 1.6” x 1.39”x0.45”
  + Aging <3.0e-10/month
  + 10 MHz CMOS-compatible output
  + 1 PPS output and 1 PPS input for synchronization
  + Hermetically sealed
  + RS-232 interface for monitoring and control
  + Short term stability (Allan Deviation) of [2.5e-10@ tau=1sec](mailto:2.5e-10@tau=1sec)

<http://www.symmetricom.com/resources/download-library/documents/datasheets/quantum-sa45s-csac/>

* Applications
  + Underwater sensor system
  + GPS receivers
  + Backpack radios
  + Anti-LED jamming system
  + Autonomous sensors networks
* Versions
  + Options 001 and 101 for commercial applications
  + Options 002 and 102 for military applications
  + Options 003 and 103 for 16.384MHz
  + Options 004 and 104 for 10.24MHz
  + Options 006 and 106 for 5MHz
  + <http://www.chronos.co.uk/files/pdfs/sym/sa.45s.pdf>

GPS receiver with CSAC (chip scale atomic clock)

<http://www.chronos.co.uk/index.php/en/product-groups/time-and-timing/gps-solutions/gps-disciplined-atomic-oscillator-modules-and-high-frequency-source-modules/ctl45x-series/ctl452-gps-timing-module-with-csac>

Time port

<http://www.chronos.co.uk/index.php/en/timeport-2>

CTL45x

<http://www.chronos.co.uk/files/pdfs/ctl/CTL45x.pdf>

* Frequency radiating
* Related with Planck constant
* Quartz/ Crystal
* Chip scale atomic clocks
* Cesium (hot)
* Ragged down the voltage
* Dapper funding project, made small cube Sa45s
* GPS latitude, longitude
* X-y-z 3 axis position
* Rapid acquisition
* Better positioning performance
* IMU (internal measurement unit) for inertial navigation systems
* Time of day- integrate with accelerometers, CSAC
* Inertial navigation system, UAVs, needs control
* Difficult to get tracking
* Sphere around a satellite
* Effectively 2 satellites to see a position (ground)
* Perfectly sync. Satellite clock
* Mathematical trick- extra satellite
* Normally 4 satellites

Application 1

* Railways – GPS navigation for trains, for accuracy navigations, along the tracks
* Enable rail navigation with only 1 sat

Chronos timing

* GPS – vulnerable – jamming to get rid of GPS signals
* Expensive atomic clocks
* Disruptive technology
* Embedded systems
* GPS simulation – MATLAB
* What pattern the consumers’ use??
* Find the pattern that the consumers use

6th Feb minutes of short meeting

Time: 2 – 2:15pm

Location: 4East EEE Computer lab

Members: AA, QG, BD, JT, Nikola, James, YSLO

Meeting notes:

* PMG meeting – 1415 Chit-Chat
* PM Risk impact – 2 persons attending the PMG
* Circulating the documents in Google chrome, Facebook, Asana
* More discussion on what we are doing instead of designing
* What we are selling
* Finding final idea/result + needs analysis
* High financial people with predictable forecast
* Work out what we are going to design
* Few guidance on marketing research and strategy
* Few guidance on sales strategy
* Looking at needs analysis – research on standards, and legal issues on electronics.
* Whether electronic devices are legal or not
* What prototype we are gonna make
* Picking satellite with information
* What the product needs to do to suit the market needs
* Need ranking
* Needs analysis – target specification
* Functional limitations
* Need information or product delivery date from Chronos technology
* Need to define application domains
* Risk assessment and analysis