Gunn Diode Oscillator Minutes

David Headland

2004-02-26 10:00

Attendance

- Fourth year students:
  - AJ Nelms.
  - JM Higginbotham.
  - R Wan.
  - DP Headland.
  - RE Irwin.
- UMIST Staff
  - WS Truscott (10:15–10:30, 11:50–12:05).

Apologies

- MP Gaskill.

Approvals

- The minutes from the previous meeting were approved.

Power Supply

- The data acquisition board used by R Wan in his third year project is currently in use elsewhere.
- T York has been mailed to request borrowing another one.
- Alternative reference voltage sources were discussed:
  - A PWM controller implemented by a PIC with a low pass filter.
  - Using a standard analogue potentiometer as coarse control with a digital potentiometer for finer control, although automated ramping will not be possible here.
  - An FPGA in combination with a DAC.
- An old PSU without a cover has been found which could be used as the source for our circuit. It is rated at 6 A, 10 V.
- I Hawkins provided the group with an ISA8 DAQ card.

Feedback from directors

- WS Truscott has not been able to contact R Sloan to agree on feedback.
- Directors will arrange individual interviews with group members.

Progress with e2v

- WS Truscott will contact e2v to check on build progress.
- R Sloan and WS Truscott will concentrate on getting us some hardware to test.
- An oscillator will be available by 2004-03-07.
- If HFSS suggests that a particular radial line transformer design is good, we can get the designs to e2v in time for them to make them with the rest of the oscillator.

Simulation

- We will need to compare experimental results with simulated theoretical results.
- To do this, we will need lots of simulation data.
- Radial line transformer simulation is currently on hold as the results don't make sense. Help will be sought from supervisors.
- Work has continued with WS Truscott on the radial resonant disc.
- The disc operates at the fundamental frequency.
- Different sizes are being tried to find the optimum design.
- The column above the disc affects the second harmonic.
- e2v's waveguide and radial line transformer will be modelled.
- The model will be compared to the experimental results to check the accuracy of the simulations in general.

Gunn diode history

- Talking to Prof. Missous has been suggested for details.
- He has a lot of knowledge of the history.
- He could probably point us in the direction of good sources.

Final report

- Positive and negative comments about the interim report have been marked.
- Considering this, a preliminary breakdown of sections for the final report has been created.
- Chapters that end up having a lot of information in them can be split into multiple chapters if required.

- Sections should be submitted as soon as they are complete.
- Deadline for all sections is Friday 2004-04-02.

Preliminary task split

Executive Summary	Aims of the project, motivation, progress compared to plan (1 Page, do this last).
Introduction	Summary of the Interim Report including block diagrams (RUTH). Minor changes to project since R1.
Chapters	Main body:

1. Management — including safety, auditing, website etc.
2. Overview of research/history of the Gunn diode (DAVE).
3. Individual device system — design, simulation, testing, optimisation.
4. Multiple device system — design, simulation, power supply, heat sinking testing, optimisation.
5. Conclusion — Summary of testing, project to date and future objectives (for *this* design), progress against plan.
6. Other designs/future work — hot electron injection etc.

   Key Points for each Chapter:

   - Summary of work/findings from R1
   - Module Definition
   - Progress

Appendixes	Attached as a CD:

- Project plan - chart
- Minutes of meeting
- Financial Accounts - costs
- Design Documents

Long-term tasks

- Tasks should be retained with the following additions:

  R Wan: Heat sinking.

  MP Gaskill: Work with the testing team for optimisation.

Proposed actions

DP Headland	Ask G Blackman if there is a DAQ board available.
R Wan	Ask T York if there is a DAQ board available.
DP Headland	Discuss Gunn history with Professor Missous.
All	Mail possible times for interviews to the UMIST mailing list at `gunn-umist@winterwolf.co.uk`.
AJN, REI, DPH	Design a PCB once the bias circuit is finalised.
AJN, RW	Continue work of the PSU and bias circuit.
All	Start work on the report where possible.
RE Irwin	Mail the report task list to DP Headland for publication.
DP Headland	Check `gunn.winterwolf.co.uk` for AAAA records.

Next meeting

Time Thursday 4 March 2004, 10:00.

Place D2c coffee room.

Meeting adjourned, 12:12.