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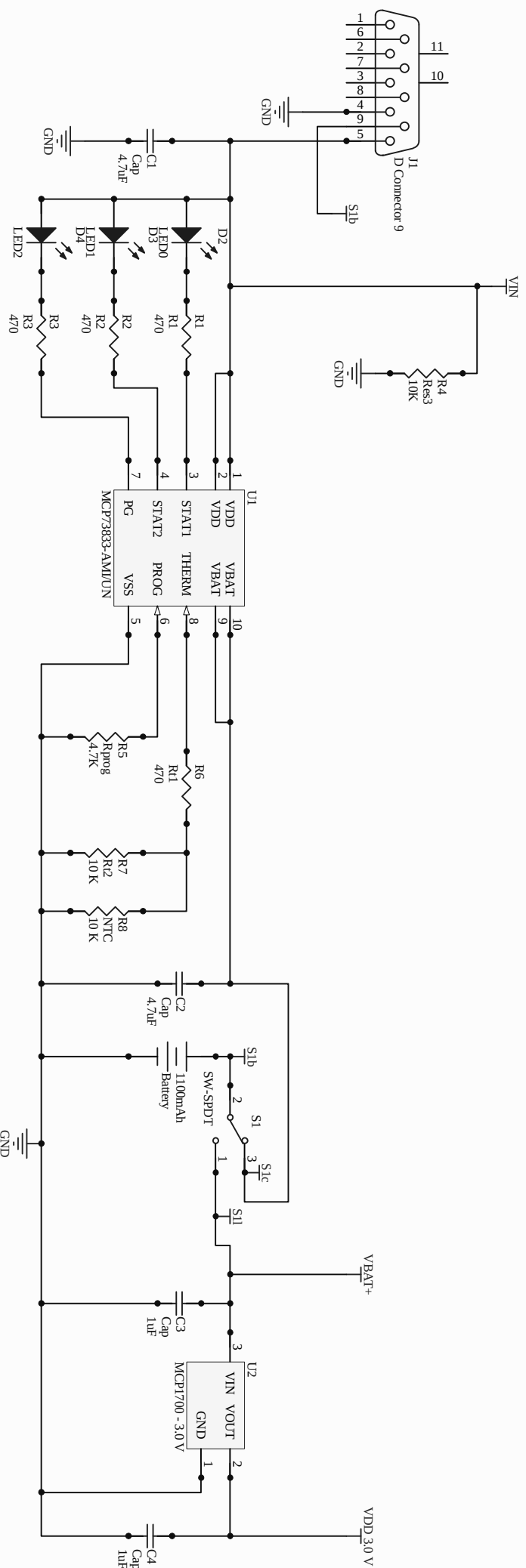
Appendix A

Conference Contributions

- J. G. J. Krige, M. J. Grobler and H. Marais “A Test-bed Implementation of Energy Efficient Wireless Sensor Network Routing Protocols, *Southern African Telecommunications and Networks Access Conference (SATNAC)*, George, South Africa, Sept. 2012.
- J. G. J. Krige, M. J. Grobler and H. Marais “A Novel Energy Consumption Ascertaining Wireless Sensor Network Routing Protocol Test-bed, *Southern African Telecommunications and Networks Access Conference (SATNAC)*, Stellenbosch, South Africa, Sept. 2013.
- J. G. J. Krige, M. J. Grobler and H. Marais “A Novel Wireless Sensor Network Test-bed Sensor Node, *IEEE Africon*, Port Louis, Mauritius, Sept. 2013.

Appendix B

Sensor Node Design Schematics


$$R_{\text{prog}} = 1\text{K}$$

Charge current = 1A

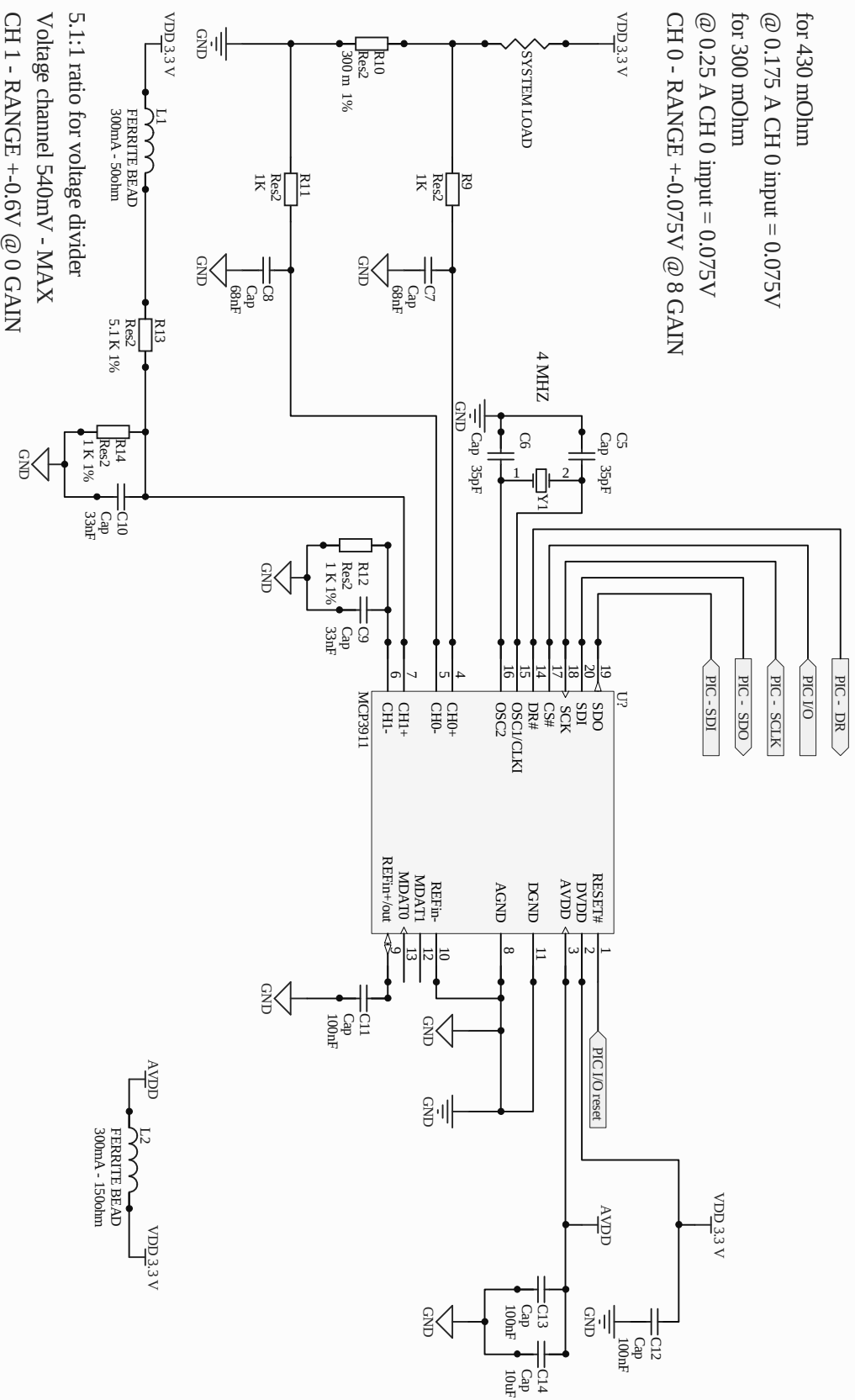
The temperature control circuit is available on the PCB, however it is not implemented. R6 is shorted and the NTC is not connected.

$$R_{\text{prog}} = 4.7\text{K}$$

Charge current = 212.77mA

Title			Charger & Power Supply		
Size	Number	Revision			
A4					
Date	12/11/2013	Sheet of	J.C.J. Krieger		
File:	C:\Users\Charger & Power Supply\Schuldraven By				

for 430 mOhm
@ 0.175 A CH 0 input = 0.075V
for 300 mOhm
@ 0.25 A CH 0 input = 0.075V
CH 0 - RANGE +0.075V @ 8 GAIN



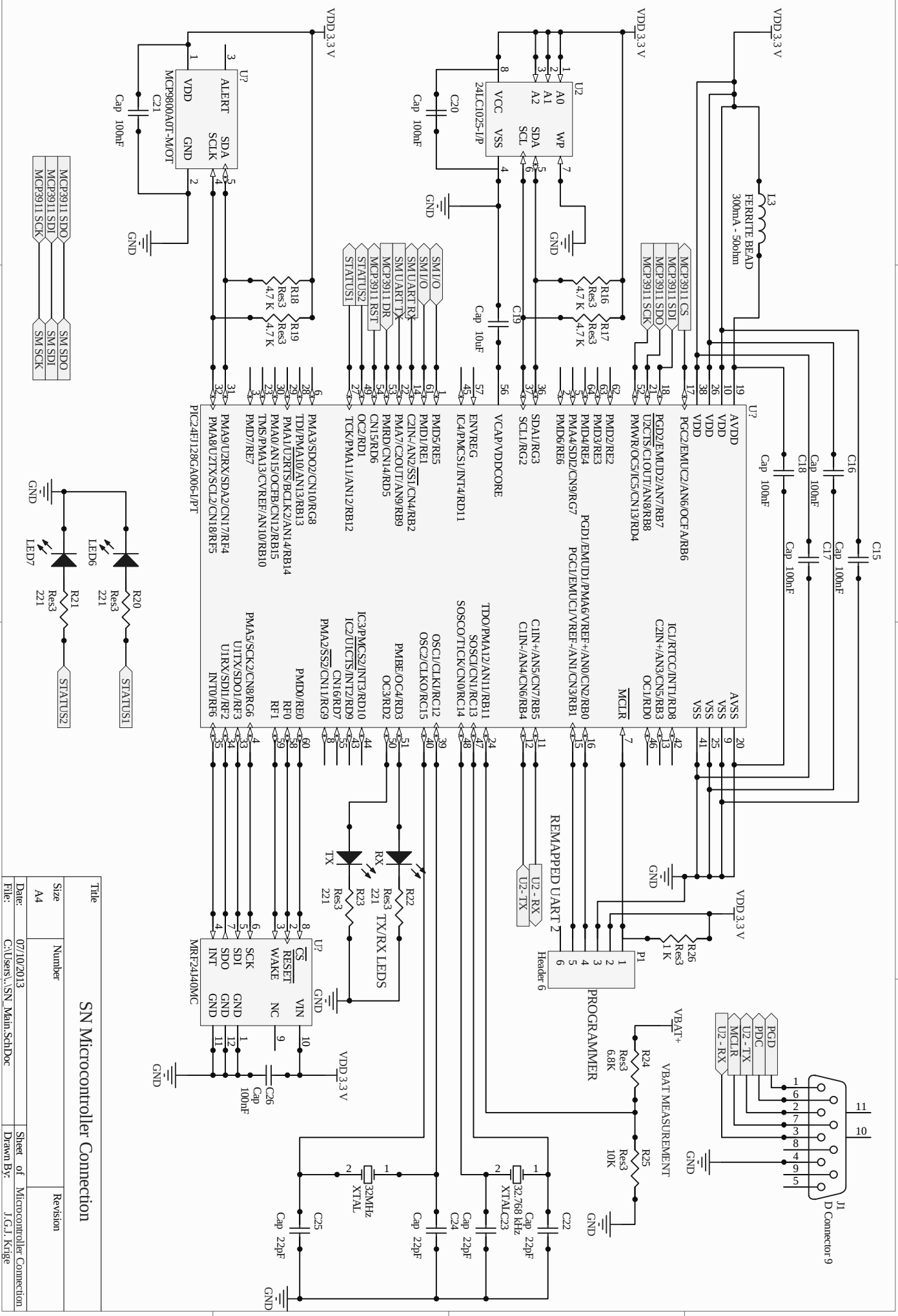
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Analog Front End			
Size	Number	Revision	
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File:	C:\Users\Analog Front End\SchDoc	Drawn By	J.G.J. Krijger

1

2

3

4

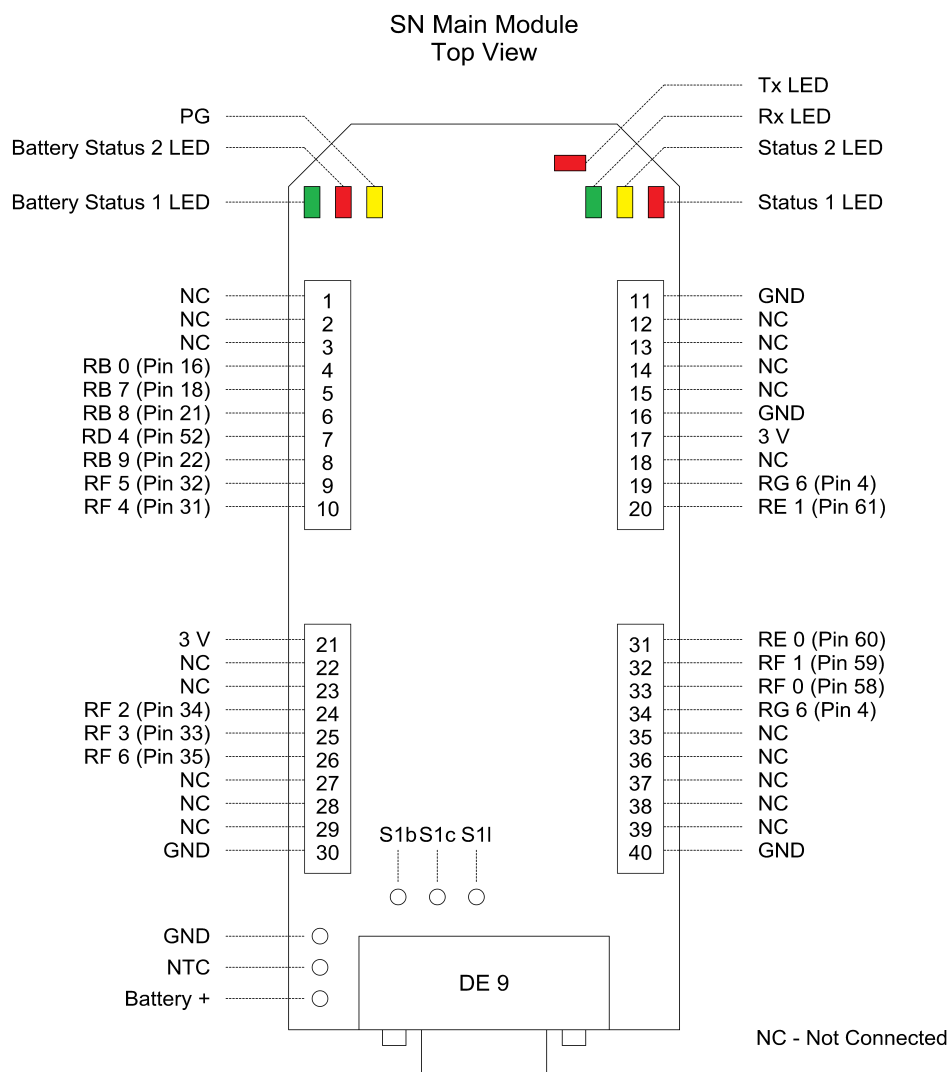


SN Microcontroller Connection

Title			
SN Microcontroller Connection			
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A4			
Date:	07/10/2013	Sheet of	Microcontroller Connection
File:	C:\Users\... \SN_Main_SchDoc	Drawn By:	J.C.J. Krige

Appendix C

Sensor Node Connection Diagram



DE 9 Pinout

- 1 PGD
- 2 UART 2 TX
- 3 UART 2 RX
- 4 GND
- 5 Charger Input (5V)
- 6 PDC
- 7 MCLR
- 8 NC
- 9 S1b (Battery +)

Figure C.1: Sensor Node Connection Diagram

Appendix D

Shortest Hop Path and MTTP Experiment Data

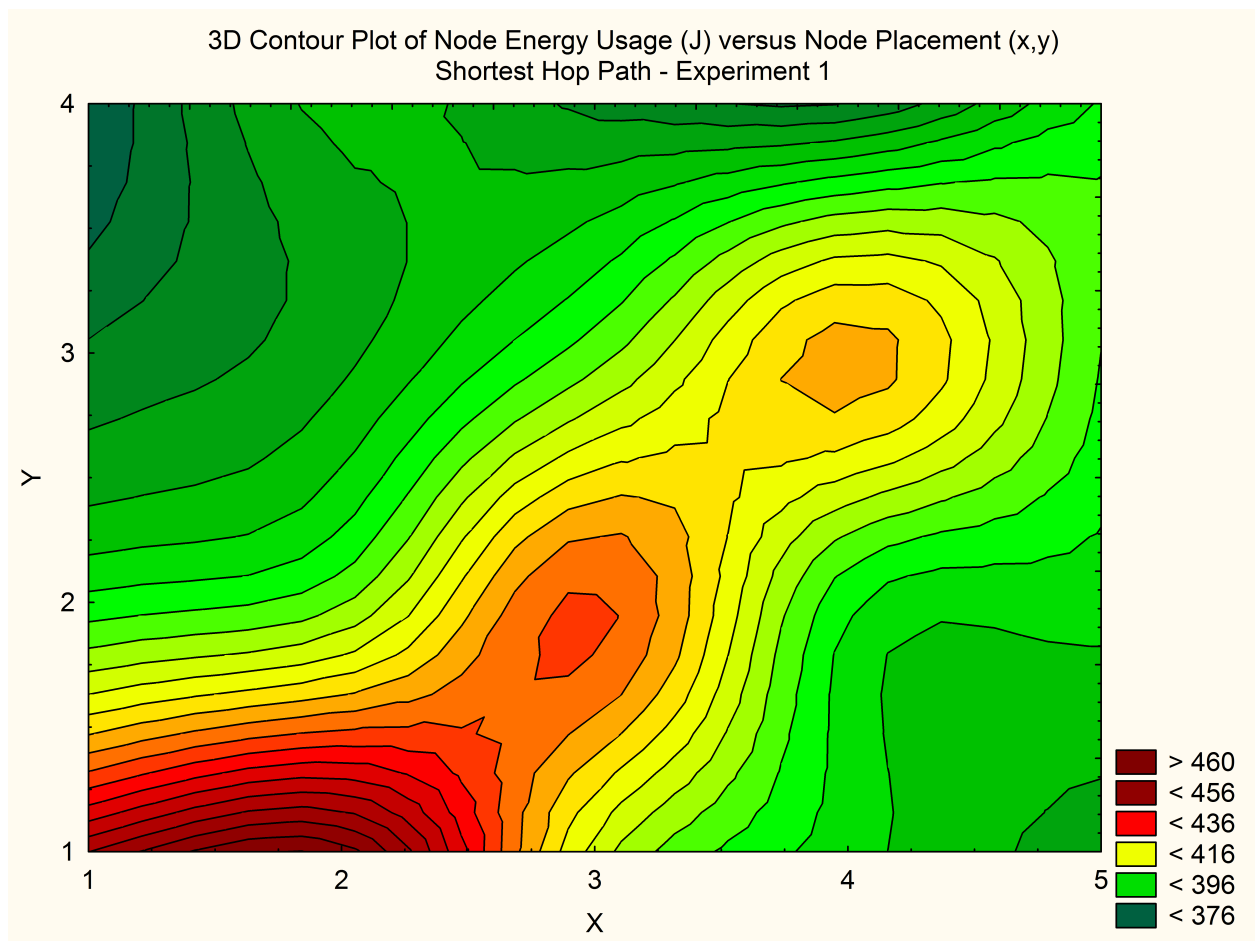


Figure D.1: A 3D Contour Plot of the Node Energy Consumption (J) of the Shortest Hop Path Routing Scheme (Experiment 1) Versus the Node Deployment (x,y)

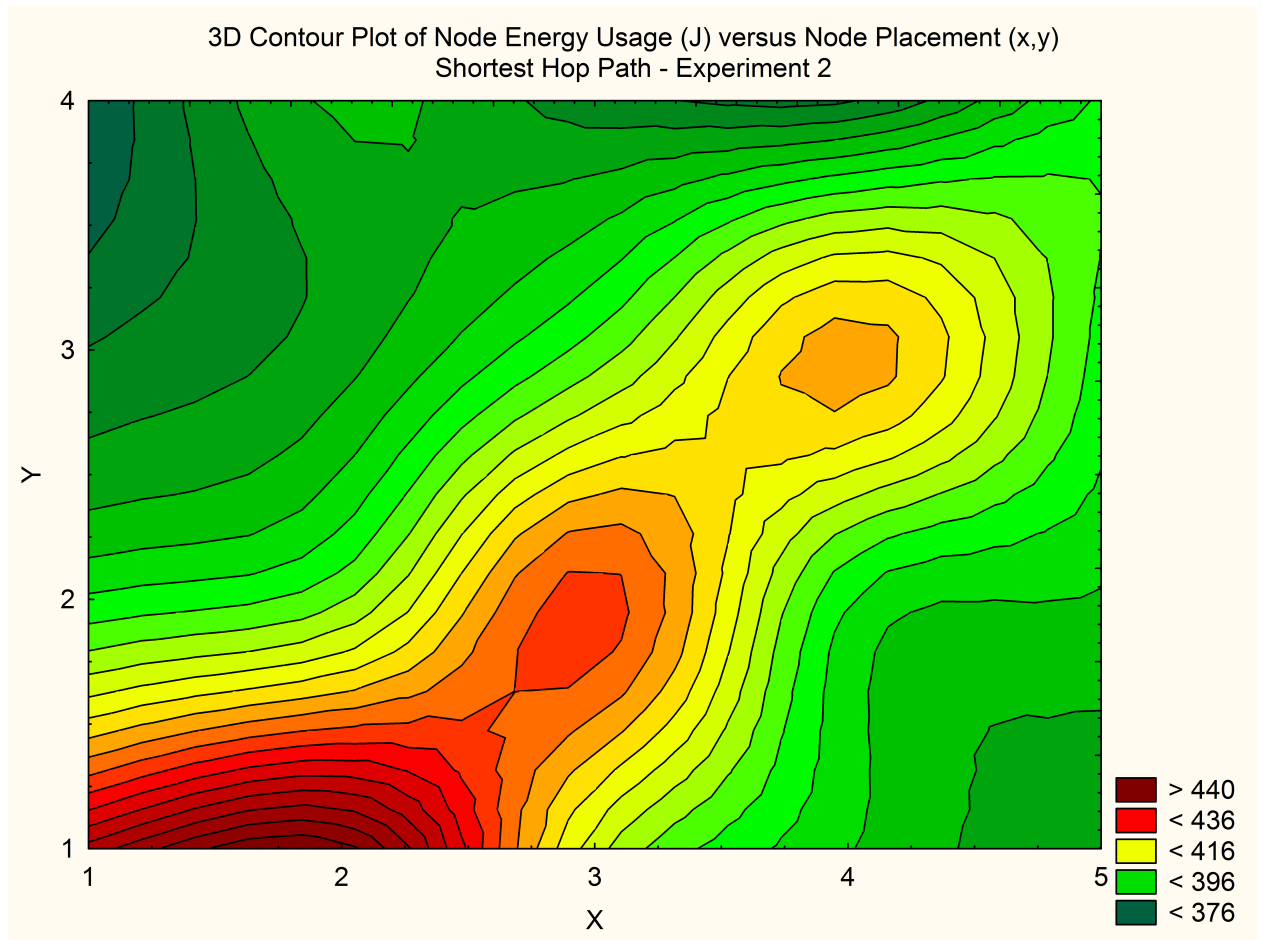


Figure D.2: A 3D Contour Plot of the Node Energy Consumption (J) of the Shortest Hop Path Routing Scheme (Experiment 2) Versus the Node Deployment (x,y)

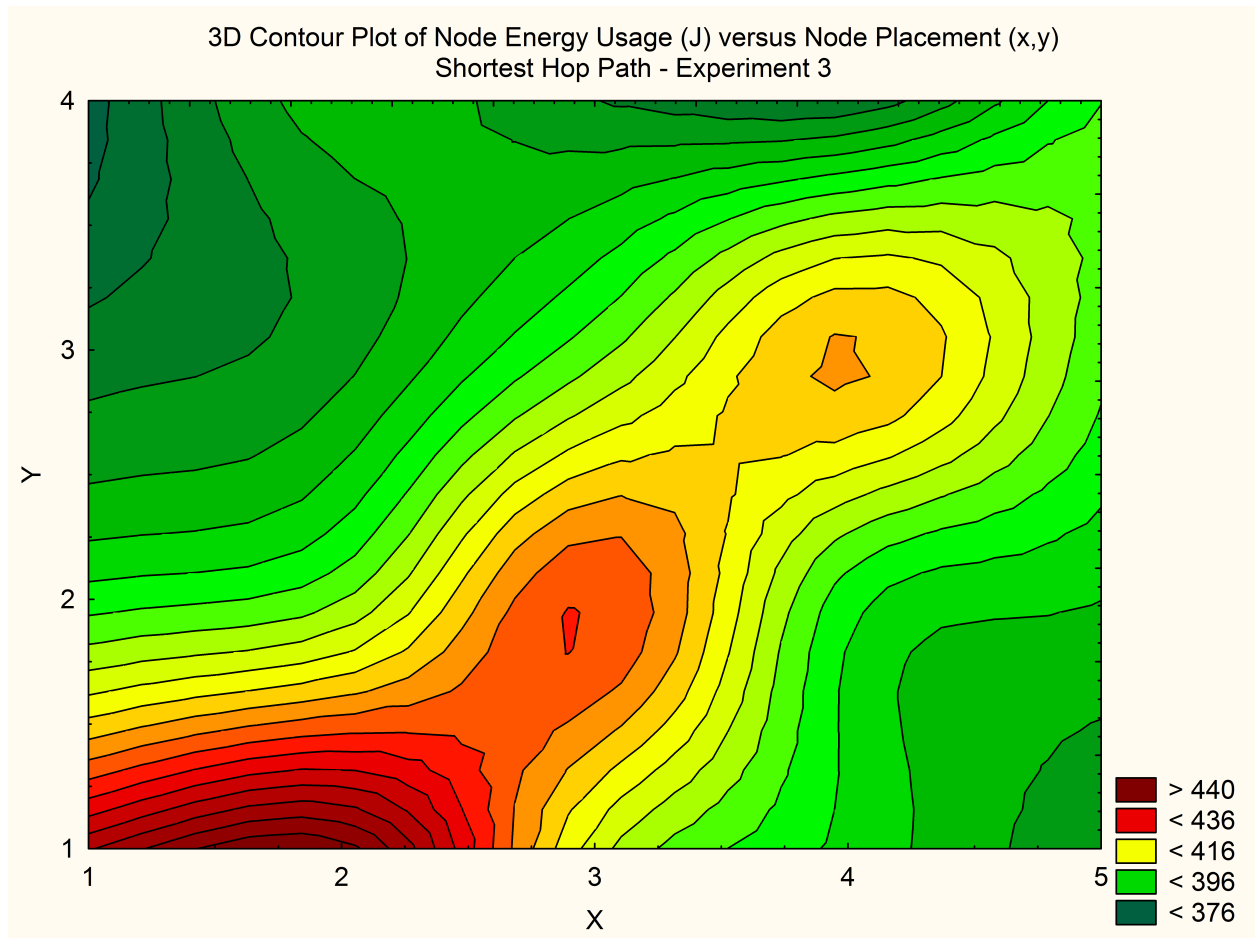


Figure D.3: A 3D Contour Plot of the Node Energy Consumption (J) of the Shortest Hop Path Routing Scheme (Experiment 3) Versus the Node Deployment (x,y)

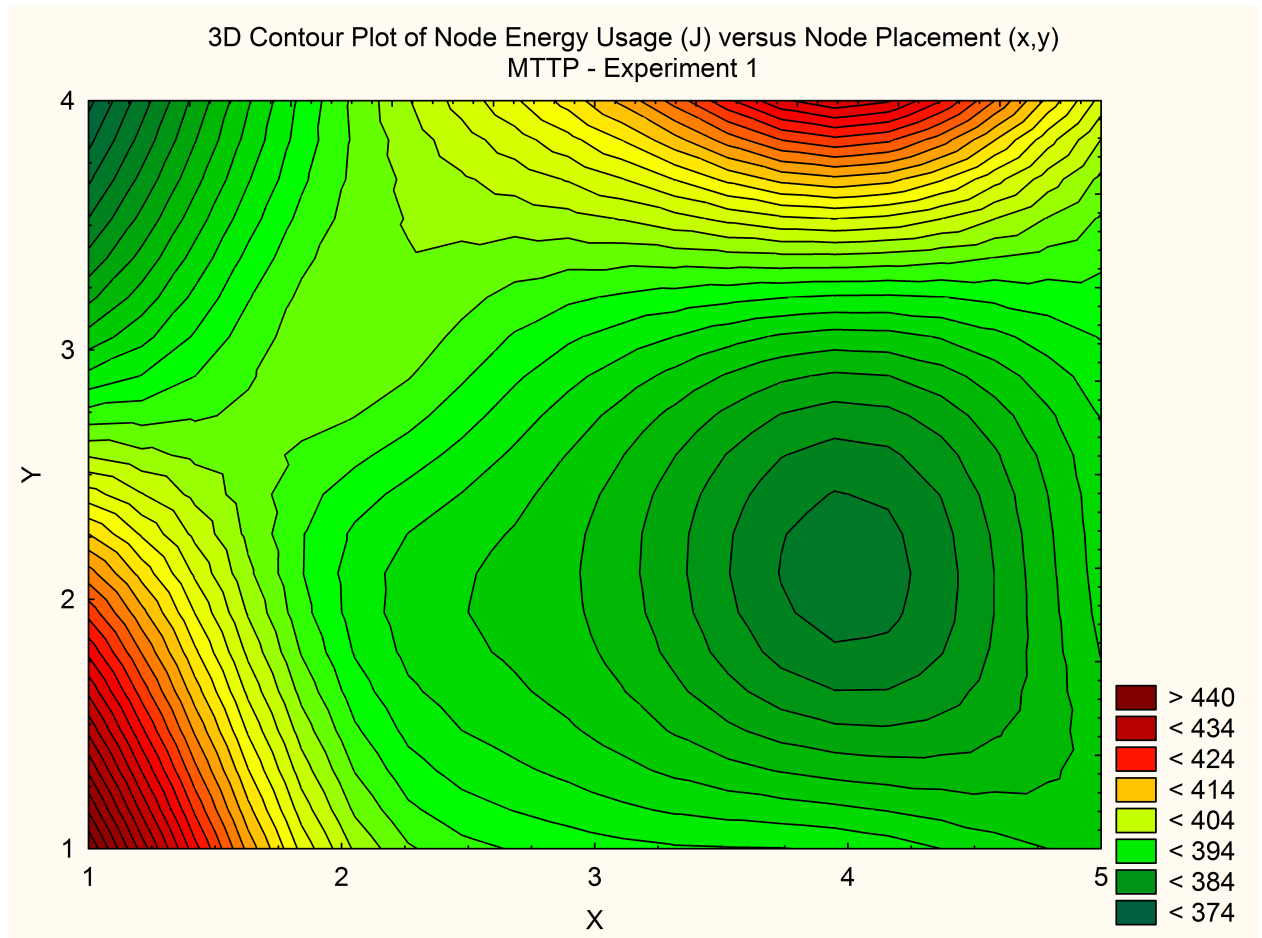


Figure D.4: A 3D Contour Plot of the Node Energy Consumption (J) of the MTTPR Scheme (Experiment 1) Versus the Node Deployment (x,y)

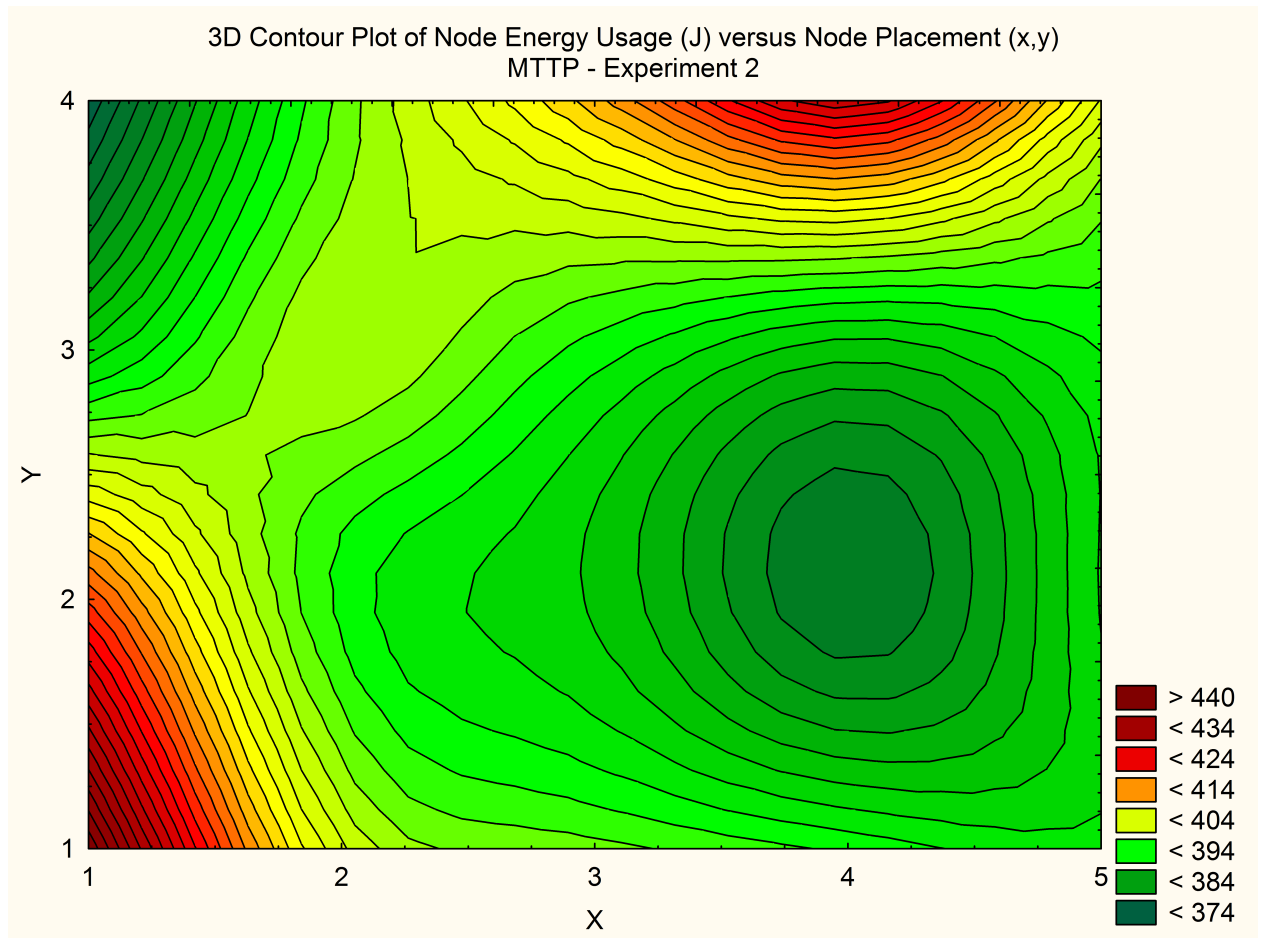


Figure D.5: A 3D Contour Plot of the Node Energy Consumption (J) of the MTTPR Scheme (Experiment 2) Versus the Node Deployment (x,y)

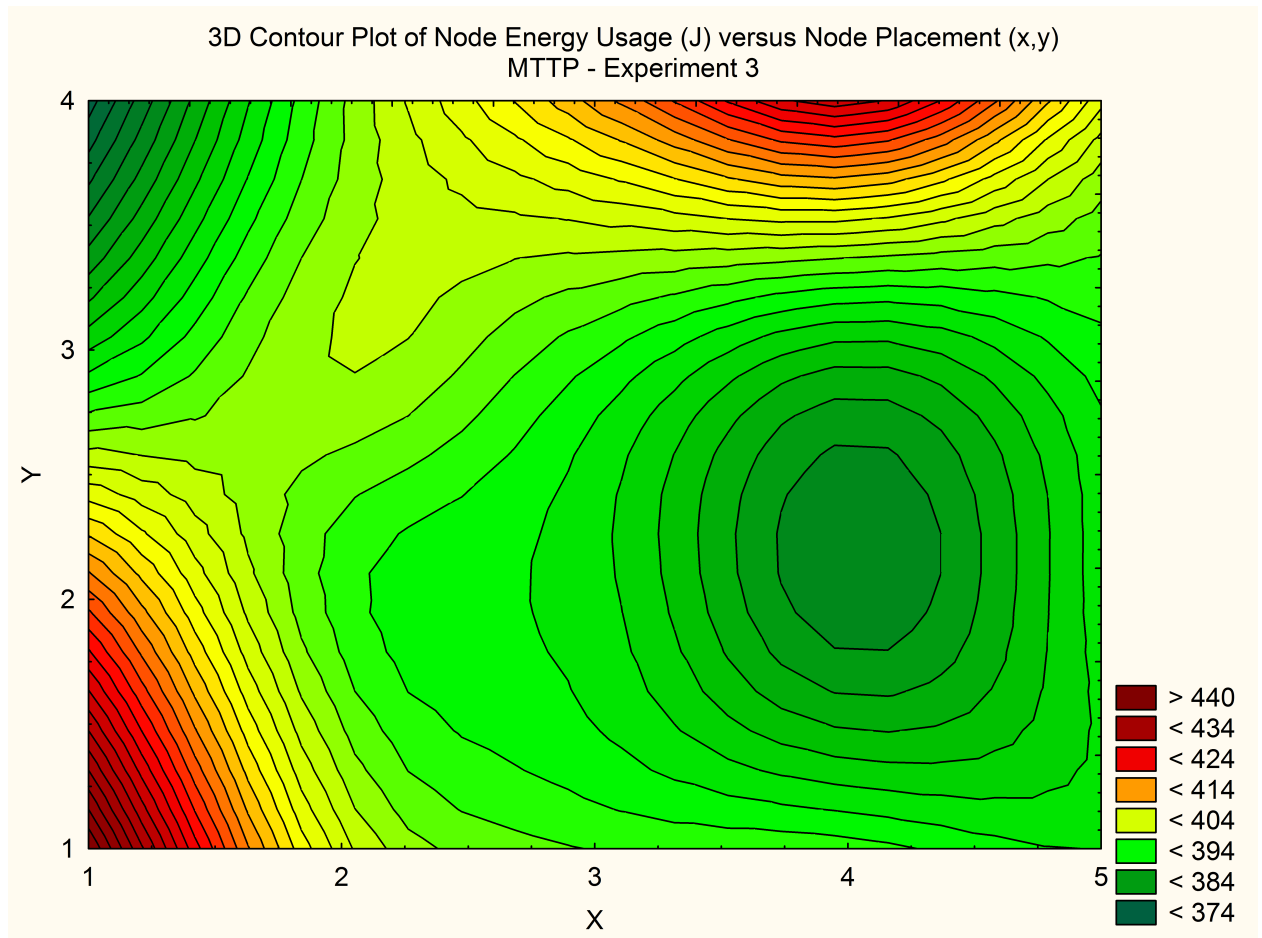


Figure D.6: A 3D Contour Plot of the Node Energy Consumption (J) of the MTTPR Scheme (Experiment 3) Versus the Node Deployment (x,y)

Appendix E

Statistical Consultation Service Letter



NORTH-WEST UNIVERSITY
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Faks: (018) 299 2557

28 Oktober 2013

Re: Verhandeling Mnr J.G.J Krige, studentenommer 21158882

Hiermee word bevestig dat Statistiese Konsultasiediens die data verwerk het en ook betrokke was by die interpretasie van die resultate.

Vriendelike groete

**Prof. H.S. Steyn (Pr. Sci. Nat.)
Statistiese Konsultant**