CURRICULUM VITAE

Name:	**AGUST H. BJARNASON**
Profession:	**Professional Electrical Engineer, M.Sc.**
Nationality:	Icelandic.
Education:	Master of Science from the Lund Institute of Technology - Lund University (LTH) Sweden 1971. Scholarship from the J.C. Møller fund. Bachelor of Science from the University of Iceland 1969.
Field of specialization:	Process control, automation and instrumentation systems in geothermal power plants and industry. Communication systems.
Languages:	English, Swedish, Danish and readability of German and Norwegian.
Professional societies	Association of Chartered Engineers in Iceland, VFÍ. Association of Electrical Engineers in Iceland, RFVÍ. IEEE Computer Society.
Registration	Registered as a Professional Engineer in 1971 by the Ministry of Industry. Authorized by Ministry for the Environment to make drawings of electrical layouts and systems, communication systems and lighting in buildings, factories and other man made structures.

PROFESSIONAL EXPERIENCE

2008-	VERKÍS Consulting Engineers. RT Ltd-Rafagnatækni merged with four other leading Consulting Engineering firms in 2008 into Verkís.
2003-2008	VTR Consulting Engineers. Electrical engineering company. Manager and chief consulting engineer.
1971-2008	RT Ltd-Rafagnatækni. Electrical engineering company. Chief Consulting Engineer. Manager since 1997.
1971-1987	Lecturer (Adjunct) at the University of Iceland. Faculty of Engineering.
1968-1970	University of Iceland. Magnetic Observatory.
1966-1967	Telephone Administration. Electronics laboratory.

Main recent projects:

- Enex Iceland: Geothermal Power Plant in Geretsried-Wolfratshausen, Germany. Tender documents for electrical and control.
- Sudurnes Regional Heating: Project Engineer for the 30 MW (electrical) Svartsengi Power Plant.
- Sudurnes Regional Heating: Project Engineer for the 2 x 50 MW (electrical) Reykjanes Power Plant.
- Sudurnes Regional Heating: Project Engineer for the 75 MW thermal + 30 MW electrical Svartsengi-5 Power Plant.

Year	Project Name – Client – Position – Responsibility – Project description and size

GEOTHERMAL PROJECTS:

2008-	Reykjanes Geothermal Power Plant (100 MW electrical). *Hitaveita Suðurnesja. Sudurnes Regional Heating.* Chief project engineer. Writing tender documents (electrical & control part) for a 50 MW + 30 MW extension to the 2x100 MW power plant at Reykjanes
2007-	Enex Iceland: Geothermal power Plant in Geretsried-Wolfratshausen, Germany. Preliminary study and writing Tender documents for electrical and control for a planned 15 MW binary power plant.
2006-2007	Svartsengi Power Plant 6 (30 MW electrical). *Sudurnes Regional Heating.* Chief project engineer. Consulting and design. Project engineer for the design and programming (PLC & SCADA) of the main part of the control and supervisory instrumentation for the Geothermal Svartsengi Power Plant 6 in Iceland, including the steam supply system. The PLC system uses networked Siemens Simatic S7-400 in reduntant configuration. Programming according to the IEC-1131-3 standard. About 3000 Inputs/ouputs in the PLC system. Extensive dual ring fiber optic communication system using Profibus and Industrial Ethernet. GPS clock for time synchronization. Specification of all measurement and control loops. Specification of the instrumentation, especially where consideration had to be given to hydrogen sulphide in the atmosphere and geothermal brine. Also wrote the electrical and control part for the specification of the turbine/generator tender documents. Svartsengi Power Plant 6 is designed for unmanned operation remotely controlled from Sudurnes Regional Heating´s main control room. The unique turbine uses three sources of steam; high pressure, medium pressure and low pressure. Sudurnes Regional Heating's (SRH) activity is not simple: The steam supply system harnesses the energy from 200°C geothermal brine coming from several 1000-2000 m deep wells near the power plants at Reykajnes and Svartsengi. Fresh water is obtained 5 km from the plant. Twelve turbine/generators produce electricity. Four heat exchange systems produce hot water. The distribution system for electricity, hot and cold water spans the whole Reykjanes peninsula. A remote (20 km away) power plant at Reykjanes (2x50MW) is controlled from Svartsengi via two separate fiber optic links. Several remote pumping stations are remotely controlled, as well as 13 transformer stations. Operation stretches to the Westman Islands, about 150 km away (line-of-sight), and Hafnarfjordur town, about 40 km away.

Year	Project Name – Client – Position – Responsibility – Project description and size
2003-2006	Reykjanes Geothermal Power Plant (100 MW electrical). *Hitaveita Suðurnesja. Sudurnes Regional Heating.* Chief project engineer. Consulting and design. Project engineer for the design and programming (PLC & SCADA) of the main part of the control and supervisory instrumentation for the Geothermal Power Plant at Reykjanes in Iceland, including the steam supply system. The PLC system uses networked Siemens Simatic S7-400 in reduntant configuration. Programming according to the IEC-1131-3 standard. About 6000 Inputs/ouputs in the PLC system. Extensive dual ring fiber optic communication system using Profibus and Industrial Ethernet. GPS clock for time synchronization. Specification of all measurement and control loops. Specification of the instrumentation, especially where consideration had to be given to hydrogen sulphide in the atmosphere and geothermal brine. Also wrote the electrical and control part for the specification of the turbine/generator tender documents. Reykjanes Geothermal Power Plant is designed for unmanned operation remotely controlled from Sudurnes Regional Heating´s main control room 20 km away.
2002	Reykjanes Geothermal Power Plant (100 MW electrical). *Sudurnes Regional Heating.* Project engineer. Cost estimate and preliminary design. Preliminary design and cost estimate for a planned geothermal power plant at Reykjanes. Instrumentation, control and supervision. 40 MW and 80 MW versions. This power plant will operate unmanned during night hours and weekends. All SCADA , PLC and communication network redundant for fail safe operation. Remote control from Svartsengi Geothermal Power Plant, 20 km away.
1996-2000	Svartsengi Power Plant 5 (75MW thermal + 30 MW electrical). *Sudurnes Regional Heating.* Chief design engineer. Consulting and design. Design and supervision of design of the main part of the control and supervisory instrumentation for the Geothermal (75 MW thermal + 30 MW electrical) Svartsengi Power Plant 5 in Iceland and steam supply system. The PLC system uses networked Siemens Simatic S7-400 and S7-300. Programming according to the IEC-1131-3 standard. About 3000 Inputs/ouputs in the PLC system. Extensive dual ring fiber optic communication system using Profibus and Industrial Ethernet. The station´s SCADA system was connected to to the PLC network. GPS clock for time synchronization. Specification of all measurement and control loops. About 40 control loops. Specification of much of the instrumentation, especially where consideration had to be given to hydrogen sulphide in the atmosphere and geothermal brine.
1996-1997	Svartsengi Power Plant 5 *Sudurnes Regional Heating.* Project engineer. Writing the control system part of the tender documents "Geothermal Power Plant, 30 MW Turbine Generator and Auxiliaries", for the purpose of inviting Tenders for the execution of work involving the design, manufacturing and delivery of one 30 MW geothermal turbine generator unit with auxiliaries, incl. supervision of erection at the plant site, Svartsengi, Iceland. Cost estimate for the project.

Year	Project Name – Client – Position – Responsibility – Project description and size
1989-1993	Svartsengi Power Plant 4 (7 x 1.2 MW generators). *Sudurnes Regional Heating.* Project engineer. Consulting. In the years 1989 to 1994 seven Ormat Rankine cycle geothermal turbine/generators were installed. I was from the start of the project involved in specifying the interface to a scada system, and maintaining the process PLCs that came with the turbine/generators, as well as interfacing them to a new SCADA system. Also design of instrumentation for the steam supply etc.
1985	Seltjarnarness Municipal District Geothermal Heating – Control system. *Seltjarnarnes Municipal District Geothermal Heating Service.* Project engineer. Consulting and design. Design of control equipment for Seltjarnarnes Municipal District Geothermal Heating Service. Seltjarnarnes is a relatively small community near Reykjavik. The job involved design of control loops and instrumentation.
1983-1984	Reykjanes Chemicals – evaporators. *Reykjanes Chemicals.* Chief design engineer. Consulting and design. Design of a control system for the two stage evaporators at the geothermal chemical factory, Reykjanes Chemicals. The plant extracts salt from geothermal brine. The evaporators increase the concentration of salt in the brine before crystallization.
1982	Bjarnarflag Geothermal Power Plant. *Orkustofnun (National Energy Authority.)* Project design engineer. Consulting and design. Design of control and instrumentation for the Bjarnarflag geothermal power plant´s steam supply system for a 3.4 MW_e turbogenerator and processed steam for a diatomite plant. Total flow of geothermal fluid is 40 kg/s. Total steam production is 28 kg/s.
1982	Reykjanes Chemicals - steam supply system. *Reykjanes Chemicals.* Chief design engineer. Consulting and design. Design of a control system for the steam supply system at the geothermal chemical factory, Reykjanes Chemicals. The plant extracts salt from geothermal brine. Process steam produced is 16 kg/s. The steam supply system is also for a power plant that produces 0.5 MW electricity.
1978	Olkaria Kenya Geothermal Plant. (45 MW electrical). *Virkir Consulting Group.* Project engineer. Consulting and design. Specification of a control system and writing tender documents for the steam supply system in the 45 MW (3 x 15 MW) Geothermal Power Plant in Olkaria, Kenya. Steam production is 112 kg/s.

Year	Project Name – Client – Position – Responsibility – Project description and size
1978-1982	Svartsengi Power Plant 2 (75 MW thermal, 7 MW electrical). *Sudurnes Regional Heating.* Chief design engineer. Consulting and design. Design of most of the control and supervisory instrumentation for the 75 MW thermal and 7 MW electrical Geothermal Svartsengi Power Plant 2, in Iceland. Total flow of geothermal fluid is 400 kg/s. Steam production is 85 kg/s.
1976-1978	Svartsengi Power Plant 1 (50MW thermal, 2,5 MW electrical). *Sudurnes Regional Heating.* Chief design engineer. Consulting and design. Design of most of the control and supervisory instrumentation for the 50 MW thermal and 2,5 MW electrical geothermal Svartsengi Power Plant 1, in Iceland.
1977	Krafla 70 MW Geothermal Electric Power Plant. *Landsvirkjun, The National Power Company.* Chief project engineer. Commissioning. Commissioning of the whole instrumentation for the geothermal Krafla electric power plant. 70 MW (2 x 35MW).
1976-1978	Krafla 70 MW Geothermal Electric Power Plant. *Landsvirkjun, The National Power Company.* Chief design engineer. Consulting and design. Design of almost all the control and supervisory instrumentation for the geothermal steam supply system for the 70 MW Krafla electric power plant. Total flow of geothermal fluid is 200 kg/s. Steam production is 75 kg/s.
1971-1978	Reykjavik Municipal District (Geothermal) Heating´s SCADA system. *Reykjavik Municipal District Heating.* Electrical Engineer. Supervision / maintenance of the remote control and monitoring system for the Reykjavik Municipal District Heating Service (geothermal water). This includes instrumentation for remote control of all pumping stations. Reykjavik Municipal District Heating Service supplies hot water for space heating and domestic use to all houses in the capital Reykjavik and the villages Gardabaer, Kopavogur and Hafnarfjordur.

Year	Project Name – Client – Position – Responsibility – Project description and size

HYDROELECTRIC PROJECTS:

2003	Geysir Power Plant *Hotel Geysir.* Project engineer. Consulting. Consulting engineer for the Geysir hydroelectric project. Asynchronous generator. This is a small power plant that harnesses the power in a nearby river in order to supply all necessary electricity for the hotel complex Geysir. Energy is also sold to the State Electric Power Works, Rarik.
1987	Blanda 150 MW hydroelectric power plant. *Landsvirkjun, The National Power Company.* Chief design engineer. Consulting and design. Design of a PLC control system for the dam gates at Blanda power plant. This involved design of control loops and programming of a Siemens Simatic process logic computer.
1984	Vatnsfell 100 MW hydroelectric power plant. *Landsvirkjun, The National Power Company.* Project engineer. In coperation with the Virkir consulting group. Consulting. Project planning study of a 100 MW Hydroelectric Power Station at Vatnsfell. Vatnsfell is near the lake Thorisvatn in the highlands, where Landsvirkjun has many hydroelectric plants.
1983	Sultartangi Dam. *Landsvirkjun, The National Power Company.* Design engineer. Consulting. Design of a control system for the Sultartangi Dam Project. This involved design of control loops and programming of a Siemens Simatic process logic computer. Sultartangi is near the river Thjorsa in the highlands where Landsvirkjun has many hydroelectric plants.
1976	Lagarfossvirkjun Power Plant. *Landsvirkjun, The National Power Company.* Main project engineer. Consulting and design. Design and construction of an automatic control system for the dam tainter gates at Lagarfoss Hydroelectric Power Plant. This included design of control loops and design of an inclinometer for synchronizing the large hydraulic jacks at each side of the wide gates.

Year	Project Name – Client – Position – Responsibility – Project description and size
1971-1973	<u>Vatnsfell Dam.</u> *Landsvirkjun, The National Power Company.* Main project engineer. Consulting and design. Design of a remote control equipment for controlling the tainter gates at the Vatnsfell dam from Burfell 130 MW hydroelectric power plant, as well as for remote measurement of water level in Thorisvatn and Tungna at Hofsvad. Commercial equipment was not available at this time, so the system had to be designed from scratch. Radio VHF link between Vatnsfell and Hofsvad. Distance between Burfell and Vatnsfell is about 30km, and between Vatnsfell and Hofsvad about 15km.

<u>MUNICIPAL WATER DISTRIBUTION SYSTEMS:</u>

Year	Project
2001-2002	<u>Hafnarfjordur Municipal Water Distribution.</u> *Vatnsveita Hafnarfjardar.* Project engineer. Consulting and design. Design of the control and supervision system. The company harnesses fresh water from underground wells outside the town Hafnarfjordur (10 km away) and delivers it via underground pipes to all houses in the town. Several remotely controlled pumping stations. Programmable logic controllers (PLC) and a SCADA system.
1993-2002	<u>Reykjanes Municipal Water Distribution´s control system.</u> *Reykjanesbaer.* Project engineer. Consulting and design. Various small SCADA and PLC projects. The job involved design and programming of programmable logic controllers for local control and also for use as outstations in the main SCADA system in the Svartsengi Power Plant, as the system is monitored from the plant. Reykjanes Municipal harnesses fresh underground water near the Svartsengi power plant and delivers it via underground pipes to all houses in the towns and villages nearby. Extensive use of fiber optic and radio links for communication.
1971-1974	<u>Westman Island Water System.</u> *Westman Isles Community.* Electrical Engineer. Supervision / maintenance of the remote control and monitoring system for the Westman Isles Water Supply, Iceland. This was one of the first SCADA systems in Iceland used for remote control of the pumping station on the mainland from the isles, using a VHF radio link.
1971-1978	<u>Reykjavik Municipal District Heating control system.</u> *Reykjavik Municipal District Heating.* Electrical Engineer. Supervision / maintenance of the remote control and monitoring system for the Reykjavik Municipal District Heating Service (geothermal water). This was one of the first SCADA systems in Iceland used for remote control of all pumping stations in Reykjavik. Reykjavik Municipal District Heating Service supplies hot water for space heating and domestic use to all houses in the capital Reykjavik and the towns Gardabaer, Kopavogur and Hafnarfjordur.

ROAD TRAFFIC SYSTEMS:

1988

Speed warning system.
Public Roads Administration.
Project engineer.
Electronic design.
Design of a microwave doppler measuring and speed warning traffic sign for the Public Roads Administration. A doppler radar is used to measure the speed and custom designed electronics used to evalute the speed and control the warning sign. I designed the whole system except the microwave module. Used at various roads in Reykjavik and around Iceland (Keflavik, Selfoss, near the air terminal, Blonduos). Manufactured by Rafidn.
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1985

Traffic lights.
Reykjavik City.
Project engineer.
Electronic design and programming.
Design and programming of PLC controlled traffic lights for Reykjavik City. Designed the whole system, some electronics design, and programmed the computer. Used at various roads in Reykjavik and around Iceland. Manufactured by Rafidn.

1974

Reykjanesbraut icing warning system.
Public Roads Administration.
Main Project engineer.
Consulting.
Feasibility study of an ice and snow detection warning system for highways. Reykjanesbraut is a 40km long highway between the capital Reykjavik and the Leifur Eiriksson air terminal. A long report was written after considerable study and research.

CONTROL AND SUPERVISORY SYSTEMS:

2002

Reykjanes Municipal Water Distribution.
Reykjanesbaer. Now owned by Sudurnes Regional Heating Corp.
Chief control engineer.
Consulting, design and PLC programming.
Control system for the Eyjavellir pumping station in Keflavik town. This involved among other things programming of control logic for local control, and for remote control via radio and fiber optic from the Svartsengi power plant.

1996-2000

Svartsengi hot water distribution system
Sudurnes Regional Heating.
Chief design engineer.
Consulting, design and PLC programming.
Design and programming of a PLC radio network for the hot water distribution system. This involved several outstations for measurement of flow and temperature in the distribution system, and remote control of pumping stations. Mainly UHF radio and single mode fiber optic.

1995-

Svartsengi fresh water supply system.
Sudurnes Regional Heating.
Chief design engineer.
Consulting, design and PLC programming.
Design and programming of a an extensive PLC network for the power plant

Year	Project Name – Client – Position – Responsibility – Project description and size
	Svartsengi. The power station uses a network of PLCs, mainly Siemens Simatic S5-95/150 and S7-300/400. Redundant ring connected multimode network is extensively used. More than 100 I/Os. All are connected to the station SCADA system.
1994	Svartsengi peak power demand. *Sudurnes Regional Heating.* Chief design engineer. Consulting and design. Design and programming of a PLC network for measuring peak power demand. This is network of S5-95U PLCs in various places on the Reykjanes peninsula that make power load measurements at the same moment. A central PLC calculates the peak and average power load and alarms if it is over a predetermined limit.
1989-2008	Sudurnes Regioanl Heating SCADA system. *Sudurnes Regional Heating.* Chief design engineer. Consulting and design. Design of the new SCADA system for the geothermal Power Plants at Svartsengi and Reykjanes, as well as continuing updates and additions. This SCADA system is one of Iceland's largest with 20000 connected points, 500 different displays and 60 remote outstations connected with fiber optic, copper lines, radio links and TCP/IP frame relay links. I have been involved with this system from beginning, and designed and implemented a large part of it. A short description of the SCADA system: - 20000 connected points. - 500 different displays. - Ethernet TCP/IP connected Operator Workstations and Data Concentrators: - 20 workstations with a 21" color LCD display. - 15 data concentrators connected to PLCs (Siemens S5/S7, Opto22/Dutec, GE-Series Six and ABB SACO power line protection equipment). - GSM cellphone connected transportable workstation. The SCADA system at Svartsengi monitors using 50 substations: - Four hot water heat exchangers, producing hot water with 150 MW thermal energy.. - Hot water distribution system. - Electricity generation in 12 turbines/generators, producing 170 MW electricity. - Electricity distribution system. - Cold water distribution system.
1987	Reykjanes Chemicals – evaporator pans. *Reykjanes Chemicals.* Chief design engineer. Design and programming. Design and programming of a PLC controlled system for the evaporator pans at Reykjanes Chemicals. The plant extracts salt from geothermal brine. The evaporator pans are used for chrystallization. Texas Instruments PLC.

Year	Project Name – Client – Position – Responsibility – Project description and size
1983-1984	Reykjanes Chemicals – two stage eveporators. *Reykjanes Chemicals.* Chief design engineer. Consulting and design. Design of a control system for the two stage evaporators at the geothermal chemical factory, Reykjanes Chemicals. The plant extracts salt from geothermal brine. The evaporators increase the concentration of salt in the brine before crystallization
1980-1982	Sudurnes Regioaal Heating first SCADA system. *Sudurnes Regional Heating.* Chief project engineer. Consulting and design. Supervision of design and installation of a pdp-11 based process computer and remote control equipment at Svartsengi geothermal power plant.
1980	Sudurnes Regioanl Heating SCADA tender documents. *Sudurnes Regional Heating.* Chief design engineer. Consulting and design. Specifications for a new SCADA system and writing the "Invitation of Tender for Process Computer System". This was the first SCADA system installed at the Svartsengi geothermal power plant. The project was implemented during the next two years. Total cost of the project about 1 M$.
1975-1977	Byggdarlina project. *State Electric Power Works.* Chief design engineer. Consulting and design. Design and specification of a *power line carrier communication system and cyclic telemetering and control system* for the State Electric Power Works, Iceland. Writing of delailed tender documents with many tables and drawings. This power line was the first to interconnect Reykjavik and Akureyri. The project was fully implemented.
1971-1974	Westman Island Water System – Remote Control. *Westman Isles Community.* Electrical Engineer. Supervision / maintenance of the remote control and monitoring system for the Westman Isles Water Supply, Iceland. Remote control of the pumping station on the mainland from the island. This was one of the first SCADA systems in Iceland.
1971-1973	Vatnsfell Dam supervisory control and data acqusition. *Landsvirkjun, The National Power Company.* Design engineer. Consulting and design. Design of a remote control equipment for controlling the tainter gates at the Vatnsfell dam from Burfell 130 MW hydroelectric power plant, as well as for remote measurement of water level in Thorisvatn and Tungna at Hofsvad. Commercial equipment was not available at this time, so the system had to be designed from scratch. Radio VHF link between Vatnsfell and Hofsvad. Distance between Burfell and Vatnsfell is about 30km, and between Vatnsfell and Hofsvad about 15km.

Year	Project Name – Client – Position – Responsibility – Project description and size

ELECTRONIC DESIGN AND DEVLOPEMENT:

1997	Fiber optic cable failure detector. *The Post and Telephone Administration.* Main project engineer. Electronic design. Design of an ultra low frequency phase lock loop system for detecting failures in long (50km) fiber optic cables. The measurement is very difficult as the metal shead is isolated from ground and will become charged with static electricity. Even aurora will induce low frequency signals. 50 Hz from mains power is also a problem as are signals from adjacent radio transmitters. The capacitance to ground is very high in long cables. The solution was to use a very low frequency phase lock loop system and a phase locked rectifier, so an ultra narrow bandpass filter could be used to filter out the unwanted signals, and measure the real component of the complex impedance to ground.
1988	Doppler Speed warning system. *Public Roads Administration.* Main project engineer. Electronic design and programming. Design and programming of PLC controlled traffic lights for the Reykjavik City. Designed the whole system, some electronics design, and programmed the computer. Used at various roads in Reykjavik and around Iceland. Manufactured by Rafidn.
1973	The Icelandic Maritime Administration. *Digital automatic wave analyzer.* Main project engineer. Electronic design. Design and supervision of construction of a digital automatic wave analyzer for the Hydraulic Laboratory of the Icelandic Maritime Administration. This involved electronic design and building a working system that was used for many years in the laboratory.
1971-1973	Thorisvatn Supervisory Control and Data Acqusition. *Landsvirkjun, The National Power Company.* Main project engineer. Electronic design. Design of a remote control equipment for controlling the tainter gates at the Vatnsfell dam from Burfell 130 MW hydroelectric power plant, as well as for remote measurement of water level in Thorisvatn and Tungna at Hofsvad. Commercial equipment was not available at this time, so the system had to be designed from scratch. Radio VHF link between Vatnsfell and Hofsvad. Distance between Burfell and Vatnsfell is about 30km, and between Vatnsfell and Hofsvad about 15km.

Year	Project Name – Client – Position – Responsibility – Project description and size

COMMUNICATION PROJECTS:

2006 Fiber Optic Communication in High Voltage Tarnsmission Line
Sudurnes Regional Heating.
Consulting.
A 14 km high voltage transmission line from Reykjanes Power Plant has 12 single mode optical fibers in the ground wire (OPGW, Optical Ground Wire). Writing tender documents for the OPGW as well as supervision of the design of the 1 Gb/s VLAN communication link.

2000 Traffic management communication using TCP/IP.
Reykjavik City Engineer.
Chief project engineer.
Consulting.
Feasibility study of the possibility of using metropolitan TCP/IP wide area network for interconnection of traffic management systems.
The metropolitan network fiber optic system consisting of approximately 300 km of fiber optic cables in the capital Reykjavik and neighboring communities, owned by Reykjavik Energy, is a possible medium for interconnecting traffic management equipment at road intersections and variable message signs with traffic related information.

1999 Invitation to Tender for Installation and Splicing of Fiber Optic Cables
Lína.Net
Chief project engineer.
Consulting
Writing Contract Documents, Technical Specifications and Schedules for splicing fiber optic cables. Bid Form and Schedule of Prices. Drawings.
“Invitation to Tender for Installation and Splicing of Fiber Optic Cables - Tender No: LN 002”
The metropolitan network fiber optical system, consisting of 300 km of fiber optical cables in the capital Reykjavik and neighboring towns, is now owned by Reykjavik Energy.

1998 Power Line Communication System.
Orkuveita Reykjavikur (Reykjavik Energy).
Chief project engineer.
Consulting.
Preliminary design and cost estimate for a system that uses the power line network in Reykjavik and neighboring communities for internet communication. Now 800 subscribers have high-speed access to the internet using the power lines.

1996- Digital radio network for the PLC system.
Sudurnes Regional Heating.
Chief design engineer.
Consulting and design.
Design of various UHF radio links for Sudurnes Regional Heating.
The distribution system for electricity, hot and cold water spans the whole Reykjanes peninsula. A remote power plant at Reykjanes is controlled from Svartsengi. Two remote pumping stations are remotely controlled, as well as 13 transformer stations. Operation stretches to the Westman Islands, about 150 km away (line-of-sight), and Hafnarfjordur town, about 40 km away. Radio links, fiber optic and telephone cables are used for communication.

Year	Project Name – Client – Position – Responsibility – Project description and size
1994	<u>Multimode fiber optic system.</u> *Sudurnes Regional Heating.* Chief design engineer. Consulting and design. Design of a multimode fiber optic system for the Geothermal Power Plant Svartsengi. Fiber optic cables have now replaced thousands of meters of multicore copper signal cables in the power plant. The fiber optic network is usually ring connected to make a redundant fail-safe network.
1989	<u>Single mode fiber optic system.</u> *Sudurnes Regional Heating.* Chief design engineer. Consulting and design. Design of a wide area single mode fiber optic communication system for Sudurnes Regioanl Heating. The single mode fiber optic system is the backbone of Sudurnes Regional Heating´s communication system for control and supervision. It interconnects the Svartsengi power plant, Reykjanes geothermal area, offices in Keflavik, and various pumping and transformer stations in the distribution system. Base bit rate is 32 Megabits/second, (equivalent to 512 telephone channels).
1983	<u>Radio link for power demand.</u> *Sudurnes Regional Heating.* Chief design engineer. Consulting and design. Design of a VHF radio link between Reykjavik and Svartsengi power plant near the village Grindavik. No telephone link was available. VHF radio with high-gain antennas was used to bridge 40 kilometers using a knife-edge diffraction over a mountain in order to bridge this non-line-of-sight link.
1973	<u>Tungna river water level.</u> *Landsvirkjun - The National Power Company.* Chief design engineer. Consulting and design. Design of a VHF radio link between Sigalda and Hofsvad in Tungna river in the highlands. This was a part of a custom made battery operated remote station. Low power transceiver in the remote station and high-gain antennas.
1975-1977	<u>Byggdalina power line communication.</u> *State Electric Power Works.* Chief design engineer. Consulting and design. Design and specification of a power line carrier communication system and cyclic telemetering and control system for the State Electric Power Works, Iceland. Writing of delailed tender documents with many tables and drawings. This power line was the first to interconnect Reykjavik and Akureyri. The project was fully implemented.

PROJECT PLANNING AND COST ESTIMATE:

2006

Svartsengi-6 Power Plant (30 MW).
Sudurnes Regional Heating.
Project engineer.
Writing the control system part of the tender documents for Svartsengi-6 Geothermal Power Plant, 1 x 30 MW Turbine Generator and Auxiliaries, for the purpose of inviting Tenders for the execution of work involving the design, manufacturing and delivery of a 30 MW geothermal turbine generator units with auxiliaries, incl. supervision of erection.
Also a cost estimate for the whole project.

2003

Reykjanes Geothermal Power Plant (100 MW).
Sudurnes Regional Heating.
Project engineer.
Writing the control system part of the tender documents “Reykjanes Geothermal Power Plant, 2 x 50 MW Turbine Generators and Auxiliaries”, for the purpose of inviting Tenders for the execution of work involving the design, manufacturing and delivery of two 40 or two 50 MW geothermal turbine generator units with auxiliaries, incl. supervision of erection at the plant site, Reykjanes, Iceland.
Also a cost estimate for the project.

2002

Reykjanes Geothermal Power Plant (100 MW).
Sudurnes Regional Heating.
Project engineer.
Cost estimate and preliminary design.
Preliminary design and cost estimate for a planned geothermal power plant at Reykjanes. Instrumentation, control and supervision. 50 MW and 100 MW versions. This power plant will operate unmanned during night hours and weekends. All SCADA , PLC and communication network are planned to be redundant for fail safe operation. Remote control from Svartsengi Geothermal Power Plant, 20 km away.

2000

Reykjanes Geothermal Power Plant´s Steam Supply System.
Sudurnes Regional Heating.
Project engineer.
Cost estimate.
Preliminary cost estimate for a proposed geothermal power plant at Reykjanes. See description above. Instrumentation, control and supervision for the steam supply system.

1998

Svartsengi Power Plant 5
Sudurnes Regional Heating.
Project engineer.
Cost estimate and tender documents.
Cost estimate and tender documents for installation of process instrumentation in the Geothermal (75 MW thermal + 30 MW electrical) Svartsengi Power Plant 5 in Iceland and steam supply system.

Year	Project Name – Client – Position – Responsibility – Project description and size
1998	Power Line Communication System. *Orkuveita Reykjavikur (Reykjavik Energy).* Chief project engineer. Consulting. Preliminary design and cost estimate for a system that uses the power line network in Reykjavik for internet communication. Current (2003) situation of the project: Reykjavik Energy has installed a communication network infrastructure in its service area in Reykjavik and neigboring communities. The network consist of three main parts, the Metropolitan Fiber Optic System, the Metropolitan IP Network and the Powerline Communication Network. The Metropolitan Fiber Optic System consist of 220 km of fiber optic cables each made of 96 fibers forming the basic network and 50 km of last mile fiber cables connecting customers to the basic network. Fiber optic connection devices are located in 320 transformer stations spread over the service area of Reykjavik Energy. Fibers are rented to enterprises and institutions running dedicated bandwidth or “dark fiber” point-to-point connections over the network. The Metropolitan IP Network is an active network built around two main routers connected with two Gbps (Gigabits per second) trunks. From the main routers there are networks of smaller routers and switches connecting customers into the IP network. Internet connections or V-Lan connections between customer’s offices are rented from the system. The Powerline Communication Network (PLC) connects the internet over the 230V power grid of Reykjavik Energy. It is mainly intended for private homes and smaller enterprises. The backbone of the PLC is run on the Metropolitan IP network.
1996-1997	Svartsengi Power Plant 5 *Sudurnes Regional Heating.* Project engineer. Writing the control system part of the tender documents “Geothermal Power Plant, 30 MW Turbine Generator and Auxiliaries”, for the purpose of inviting Tenders for the execution of work involving the design, manufacturing and delivery of one 30 MW geothermal turbine generator unit with auxiliaries, incl. supervision of erection at the plant site, Svartsengi , Iceland. Also a cost estimate for the project.

SUPERVISION AND COMMISSIONING:

Year	Project
1975-2007	Svartsengi Geothermal Power Plant. *Sudurnes Regional Heating.* Project engineer. Commissioning. Commissioning of most of the instrumentation for the geothermal Svartsengi and Reykjanes electric and hot water power plants. (Svartsengi Power plant 1, Svartsengi Power plant 2, Svartsengi Power plant 3 and Svartsengi Power plant 5, Reykjanes power plant and Svartsengi Power plant 6.).
1977	Krafla 70 MW Geothermal Power Plant. *Landsvirkjun, The National Power Company.* Chief project engineer. Commissioning. Commissioning of the whole instrumentation for the geothermal 70 MW Krafla electric power plant. Total flow of geothermal fluid is 200 kg/s. Steam production is 75 kg/s.

Year	Project Name – Client – Position – Responsibility – Project description and size

TEST AND MEASUREMENT:

1966-2003

Leirvogur Geomagnetic Observatory. University of Iceland.
Science Institute, University of Iceland. Upper Atmospheric Section.
Several small projects and maintenance of advanced electronic instruments at the Leirvogur Magnetic Observatory of the University of Iceland: Radio Ionspheric Opacity Meters. Fluxgate magnetometers. Proton Precession Magnetometers (intermittent and continuous), dataloggers, etc. The Leirvogur Magnetic Observatory is a part of a world-wide network of magnetic observatories and sends daily results to the World Data Center for Geomagnetism in Kyoto, Japan

SOFTWARE DEVLOPEMENT:

1993-2000

Sudurnes Regional Heating.
Wide area PLC network.
Project engineer.
Programming.
Programming and plannig of the wide area PLC network for the power plant Svartsengi, using various types of communication links. The network uses tens of Siemens S5-95, S5-115, S7-300 and S7-400 programmable logic controllers (PLCs), that are interconnected with fiber optic links, radio links, telephone cables, Profibus networks, etc. The PLCs are in the water source supply system, power plants, pumping stations, man-holes, etc. I programmed the S5-series PLCs, and planned the S7-network.

1987

Reykjanes Chemicals.
Evaporator pans, control system.
Project engineer.
Programming.
Design and programming of a PLC controlled system for the evaporator pans at Reykjanes Chemicals. The plant extracts household salt (NaCl) from geothermal brine. The evaporator pans are used for chrystallization. Texas Instruments PLC.

1985

Reykjavik City Engineer.
Traffic light controllers.
Project engineer.
Programming.
Design and programming of PLC controlled traffic lights for Reykjavik City. Designed the whole system, some electronics design, and programmed the computer. Used at various roads in Reykjavik and around Iceland. Manufactured by Rafidn.

MANAGEMENT:

2003-2008 Manager VTR verkfræðingar ehf. (VTR Consulting Engineers Ltd.)

1997-2008 Manager RT Ltd, consulting engineers.

1987-1997 Chairman RT Ltd´s board of directors.

Year	Project Name – Client – Position – Responsibility – Project description and size

TEACHING ASSIGNMENTS:

1972-1988 Lecturer (adjunct) at the University of Iceland, Engineering Faculty in the following fields:

Applied electronics I and II (1972-1973).
Digital theory (1973-1981).
Computer technology (1973-1981).
Microprocessors (1981-1982).
Linear control systems (1982-1987).

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2002 and 2008 Sudurnes Regional Heating.
PID process control fundamentals.
Course in PID process control for the engineers at the power plant Svartsengi.

2003 and 2008 Sudurnes Regioanl Heating.
SCADA and PLC fundamentals.
Course in SCADA and PLC systems for the engineers at the power plant Svartsengi.

GRANTS:

1970 Scholarship from the J.C. Møller fund.

PUBLICATIONS:

2008 The Icelandic magazine Thjodlif (Þjóðlíf, Summer 2008). *Will global cooling follow global warming?*

1998 Morgunbladid 21.6.1998: *Global warming or natural fluctuations in Sun´s activity?* A four page article in the main Icelandic newspaper.

1998 Summary of the above global warming article in Sudurnes Reagional Heating's newsletter.

1986-1996 Various articles in the Icelandic Aeromodeller's newsletter.

1986 Viðskipta og Tölvublaðið: (1986) *RAM-diskur og Turbo Charger*.
An article about recent computer technologies.

1986 Viðskipta og Tölvublaðið: (1986) *Machintosh eins árs.*
An article about the now famous Mac computer, that had a kind of windows graphical interface, long before PC-Windows. Machintosh was one year old when the article was written.

1981 Tímarit VFÍ 1981: *Orkuver Hitaveitu Suðurnesja Svartsengi - Stjórnstöð.*
An article about the control room in the then new geothermal power plant Svartsengi, in the magazine of the Association of Chartered Engineers in Iceland.

1964-1966 Various articles in the Icelandic Radio Amateur's newsletter.

1966 De Rerum Natura: *Laser.*

Year	Project Name – Client – Position – Responsibility – Project description and size
1965	De Rerum Natura: *Smágervingar* (Integrated circuits).

COMMITTEE ASSIGNMENTS:

2000	The Supreme Court of Iceland. Case 58/2000. In this case I had to evaluate the possible effects of high power broadcast and communication radio transmitters on the human body, and the need for a protection zone around the site.
1983	Study group on opportunities and challenges in production of electrical, electronic and computer related equipment.

OTHER EXPERIENCE:

1968-1970	Worked during the summer months at the Leirvogur Magnetic Observatory of the Science Institute, University of Iceland, Upper Atmosphere Section, maintaining the instruments there. The Leirvogur Magnetic Observatory is a part of a world-wide network of magnetic observatories and sends daily results to the World Data Center for Geomagnetism in Kyoto, Japan
1966-1967	Worked during the summer months in the electronics laboratory of the Post and Telephone Administration. Designed wide band impedance matching units for transmission lines and short wave transmitting antennas. Maintenance of short wave radio equipment.
1964-	Radio amateur license with the callsign TF3 OM after examination at the Post and Telephone Administration in radio theory, regulations and morse code (60 cpm)
1966-1969	Spare time work during nights and weekends while studying at the university: The Science Institute, University of Iceland, Upper Atmosphere Section: Maintenance of electronic instruments at the Leirvogur Magnetic Observatory. Mainly the Radio Ionspheric Opacity Meter.
1967-1969	Spare time work during nights and weekends while studying at the university: Maintenance of electronic medical instruments at Landspitalinn (The National Hospital).
1965-1968	For the British Royal Astronomical Society: Monitoring of satelitte's orbits and time measurement with 0.1 sec resoulution of orbital positions. Purpose was measurement of satellite drag at the atmosphere's highest levels.

SOCIAL ACTIVITIES:

1998-2008	Treasurer for the Amateur Astronomical Society of Iceland
1988-1989	Chairman of the Association of Electrical Engineers in Iceland, RVFÍ
1987-1988	Vice chairman of the Association of Electrical Engineers in Iceland, RVFÍ

Year	Project Name – Client – Position – Responsibility – Project description and size
1987-1989	Member of the board of directors for the Association of Chartered Engineers in Iceland.
1978/9 and 91/96	Secretary of the aeromodellers club in Iceland.
1977-1978	Chairman of the aeromodellers club in Iceland.
1973-1974	Secretary of the Professional Engineers Club, Verkfraedingaklubburinn.
1965-1966	Secretary for the Icelandic Radio Amateurs League.