A NEAR-REAL-TIME ELECTROMAGNETIC DATA-LINK FOR GEOTHERMAL DOWNHOLE INSTRUMENTS

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16/a Topic/Subtopic

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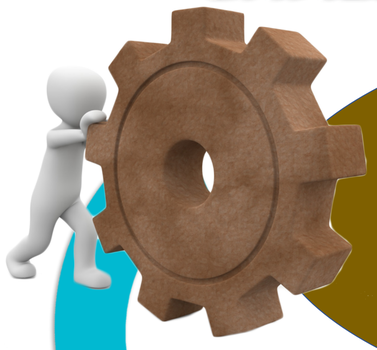
PROBLEM

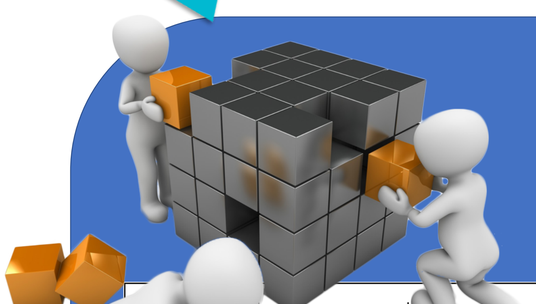
Drilling for subsurface geothermal resources is generally a very costly endeavor compared with oil and gas wells drilled to comparable depths

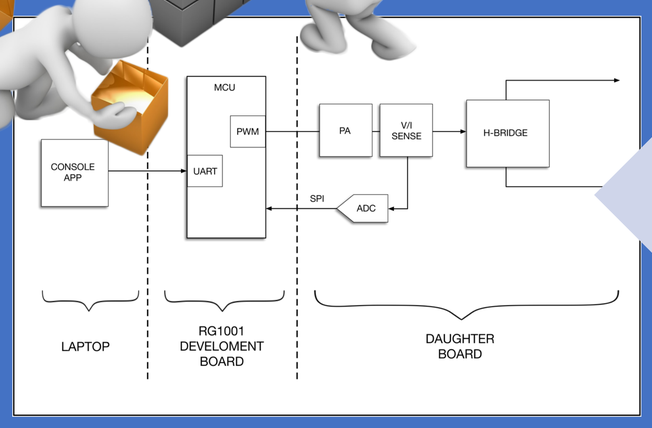
CHALLENGE



Overcome temperature limitations to incorporate important advanced cost-cutting technologies for geothermal drilling

METHODS





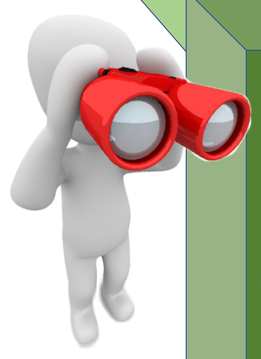
System Design Block Diagram

- Develop an HT Embedded Controller Detailed System Specification Document
- Design an EM Power Amplifier Module Prototype
- Port the Drill Dog™ PA/ICC Code to the HT COTS Development Board
- Fabricate EM PA Daughter Board and Perform Integration Testing of the EM PA Module

Surface Receiver

Perform Surface Field Testing of the EM PA Module using Drill Dog™ Surface System

PROPOSED FUTURE WORK



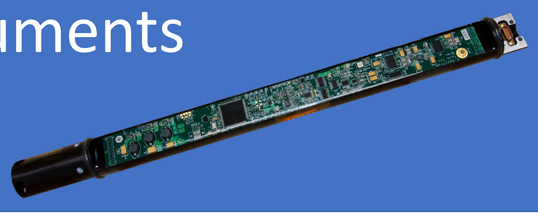
Design and Build a Prototype HT EM Tool and Perform Down Hole Operational Testing

KEY RESULTS & FINDINGS

- Geothermal Transmitter performs as well as the commercial EMT
- After 250 transmissions at continuous operation the Geothermal Transmitter performed reliably
- Phase I tests demonstrate the high temperature design is sound and that a downhole high temperature EM tool can be fielded in Phase II

TOOLS DEVELOPED

Geothermal Transmitter for EM communication using the SM470R1B1MHFQS high temperature micro controller from Texas Instruments



	3Hz			6Hz			9Hz		
	Geo	EMT	delta	Geo	EMT	delta	Geo	EMT	delta
Vout(V_{rms})	3.756	3.747	-0.2%	3.689	3.769	2.1%	3.550	3.775	6.0%
Iout(A_{rms})	0.771	0.802	3.9%	0.786	0.797	1.3%	0.822	0.794	-3.5%
Pout(W_{rms})	2.896	3.007	3.7%	2.902	3.005	3.4%	2.920	2.999	2.7%
Rmeas(Ohm)	4.87	4.668	-4.4%	4.689	4.728	0.8%	4.316	4.752	9.2%
RSSI (dBv)	-49.4	-50.6	-1.23	-48.7	-50.0	-1.24	-50.5	-51.3	-0.71

Geothermal Transmitter vs. Standard Temp EM Transmitter

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