T-411-MECH Mechatronics 1
Data logger for geological research
Team Proposal

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This report is a proposal of a mechatronic project to do as a final project in the course T-411-MECH Mechatronics for the fall of 2014.

1 Description

Andrew Wickert is a PHD in earth surface processes in University of Colorado and has an idea of using the Arduino platform as a base for low-cost data logger used mainly for geological research. The Arduino platform offers a wide range of application and connection to sensors. The Arduino community provides large collection of libraries and various vendors have variety of shields for all kind of application. Available WSN platform [1] to day for harsh and remotely areas are heavy and expensive. Arduino platform offers opportunity to make low-cost WSN platform. This project aims first at making a solid means of communication between data-loggers and mother hub and secondly of good power-management for the logger.

2 Application

The main application of the data logger as seen in figure 2 will be telemetry for returning data. Good telemetry communication for a data logger eases the process of maintenance checks and enables more involved researches.
Telemetry via GSM network is available throughout most part of Iceland, see figure 1. With GSM shield on the data logger one might be able to monitor data logging in most places in Iceland.
Radio coverage can be quite good over long distance. The XBee modules with Arduino support come with radio ranges for up to 60km [2]. If the data logger is equipped with the Xbee module the researcher might set up a ground station with in a 60km radius.
Satellite phone (Iridium) might be connected to the data logger to enable good coverage in remote areas. Iridium phone has coverage anywhere in the world were there is a clear view of the sky, by connecting to any of the 66 iridium satellites in orbit around the earth[3]. We will try to make standard platform for GSM, Xbee and Iridium. So it will be easy to switch between modules like in figuree 3

3 Usage

This equipment useful in geological measurements, mainly for weather and water-resources, see figure 4. Especially in remote locations. Geologist Andy Wickert has special interests in this equipment to collect geological data with higher density and wider distribution.

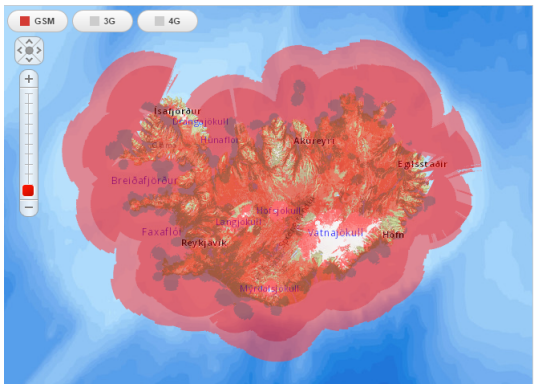

Figure 1: GSM coverage in Iceland [4]

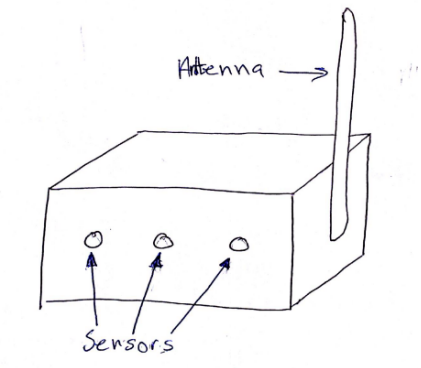

Figure 2: Sketch of Datalogger box [5]

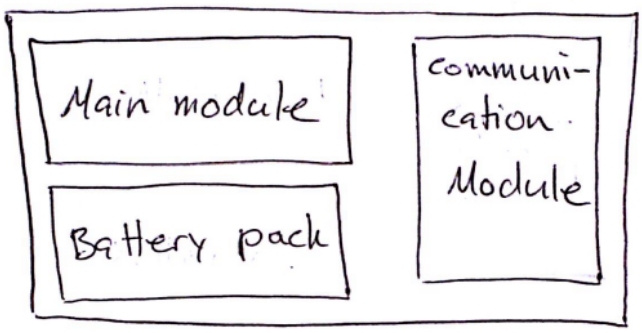

Figure 3: Raw figure of Data Logger inside [6]

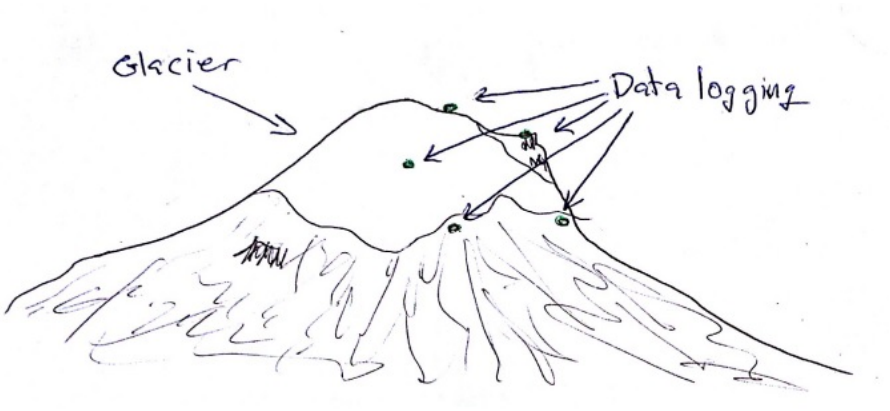

Figure 4: Glacier data logging
[7]

3.1 Bill of material

Item	Already have	Quantity	Cost	URL	Summary
Arduino Mega	-	1x	45.95$	`https://www.sparkfun.com/products/11061`	Open-source electronics platform
GSM Module with shield	-	1x	99.95$	`https://www.sparkfun.com/products/9607`	Connects Arduino to the internet using the GPRS wireless network
Special AM board from Andy	-	4x	~80$	`https://github.com/NorthernWidget/ALog-LogMega/blob/FoleyMechatronics/BoM/LogMega083_DigiKey.csv`	

References

[1] (2014, October) Wsn platforms. Wiki. [Online]. Available: http://wsn.oversigma.com/wiki/index.php?title=WSN_Platforms

[2] (2014, September) Xbee buying guide. Sparkfun. [Online]. Available: https://www.sparkfun.com/pages/xbee_guide

[3] (2014, September) Iridium phone. Rock Block. [Online]. Available: https://www.rock7mobile.com/products-rockblock.php

[4] (2014, September) Gsm coverage. Vodafone. [Online]. Available: http://www.vodafone.is/simi/staersta/

[5] P. Helgason, "Data logger box," September 2014.

[6] ——, “Inside databox,” September 2014.

[7] ——, “Glacier data logging,” September 2014.