GNG 1103 - Engineering Design

Group 3.4

University of Ottawa

Deliverable E : Cost Estimate Assignment

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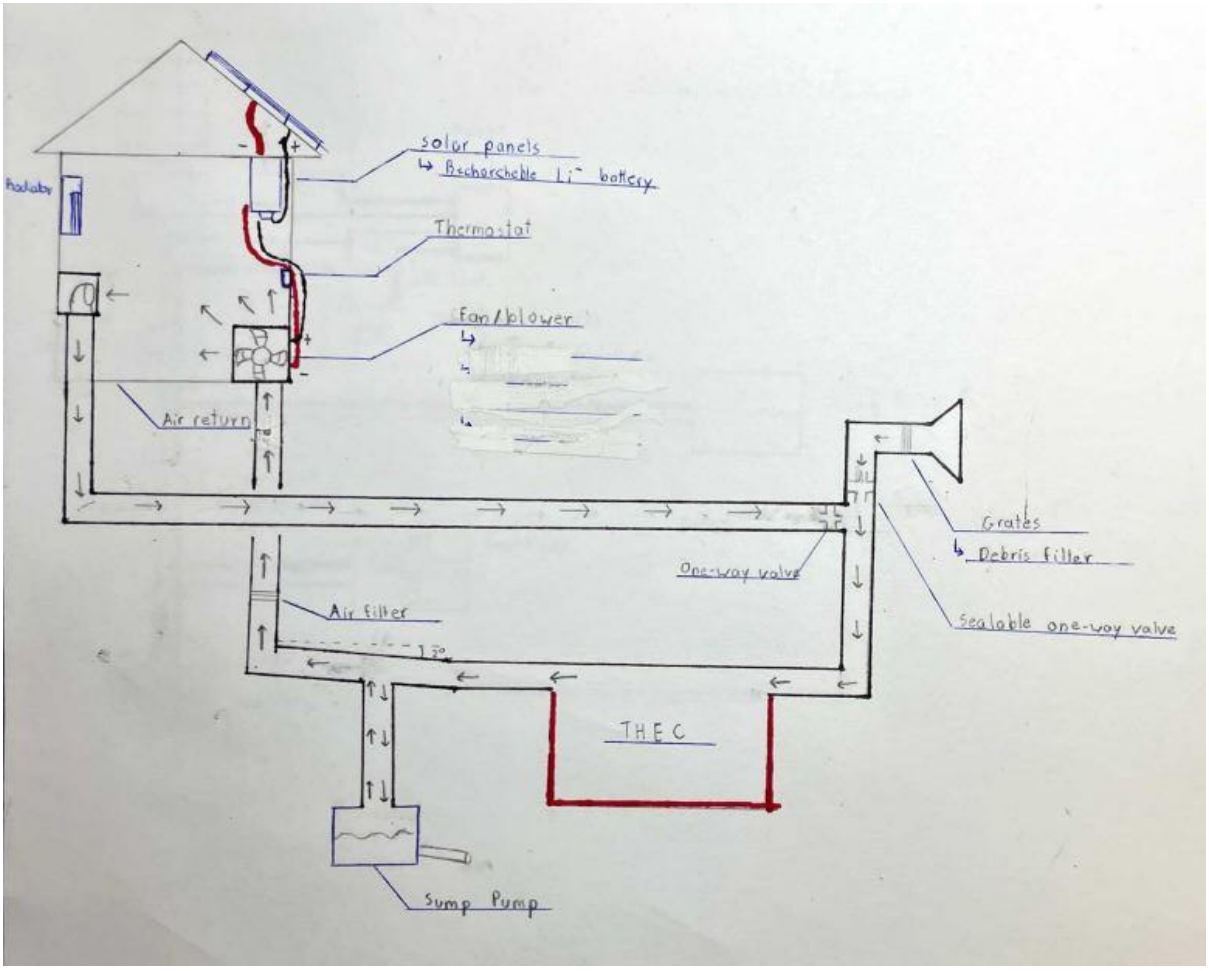
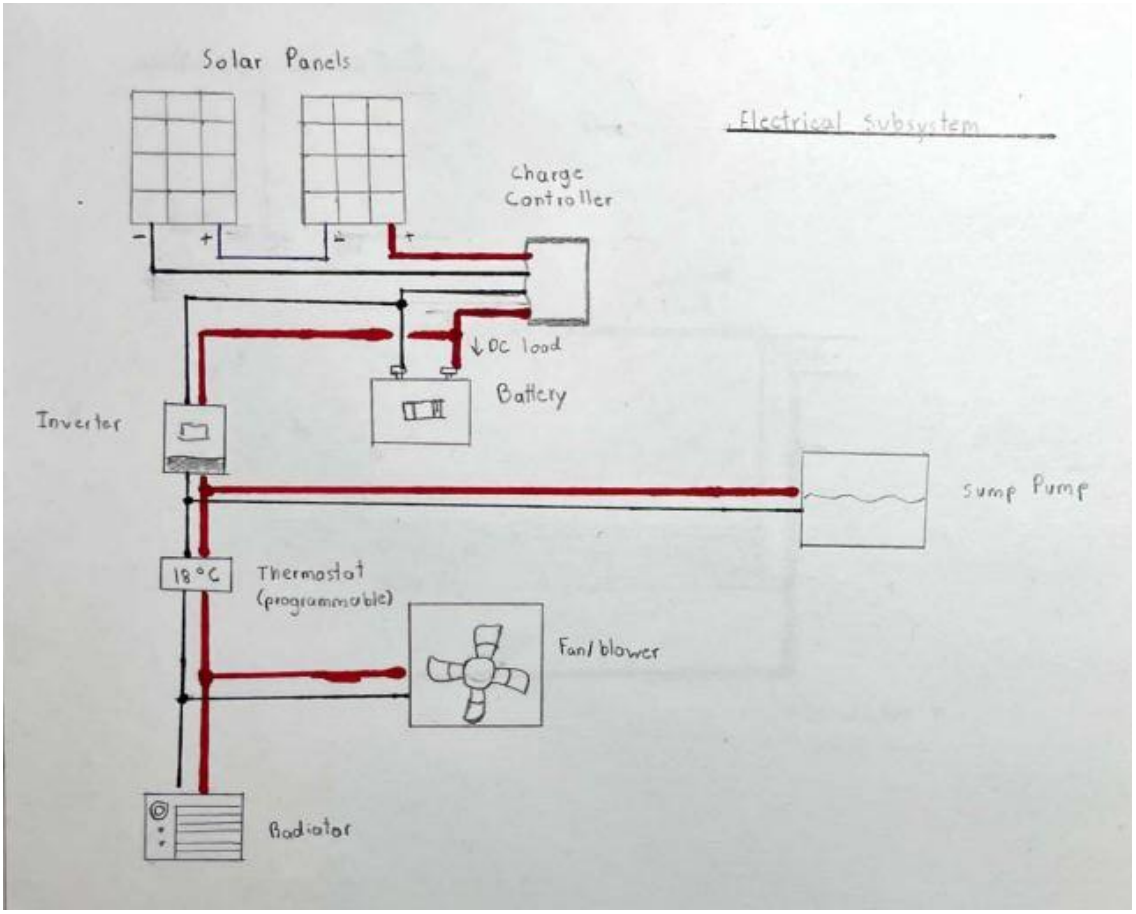
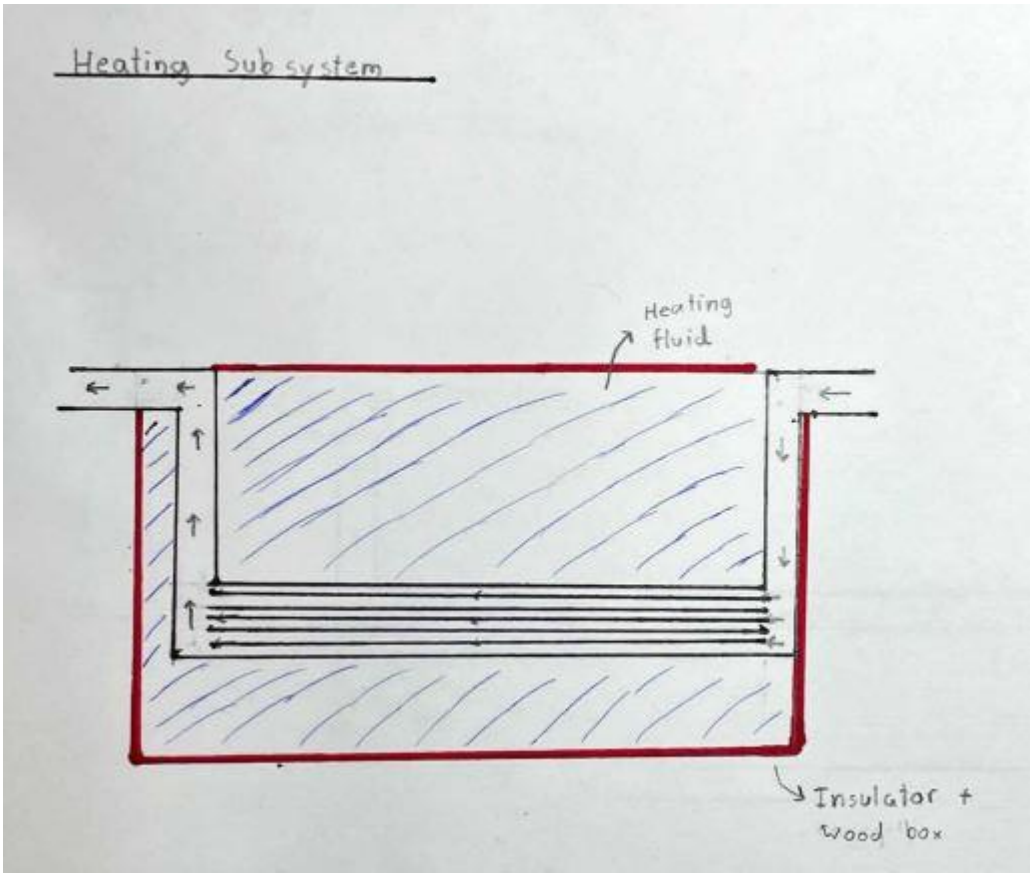
Paul Karakach (300238050)
Stephen Palczak (300170632)
Oliver Meng (300263524)
Luxan Jeyarajah (300238003)
Dominick Bernard (300086025)
Alex Bailey (300191795)

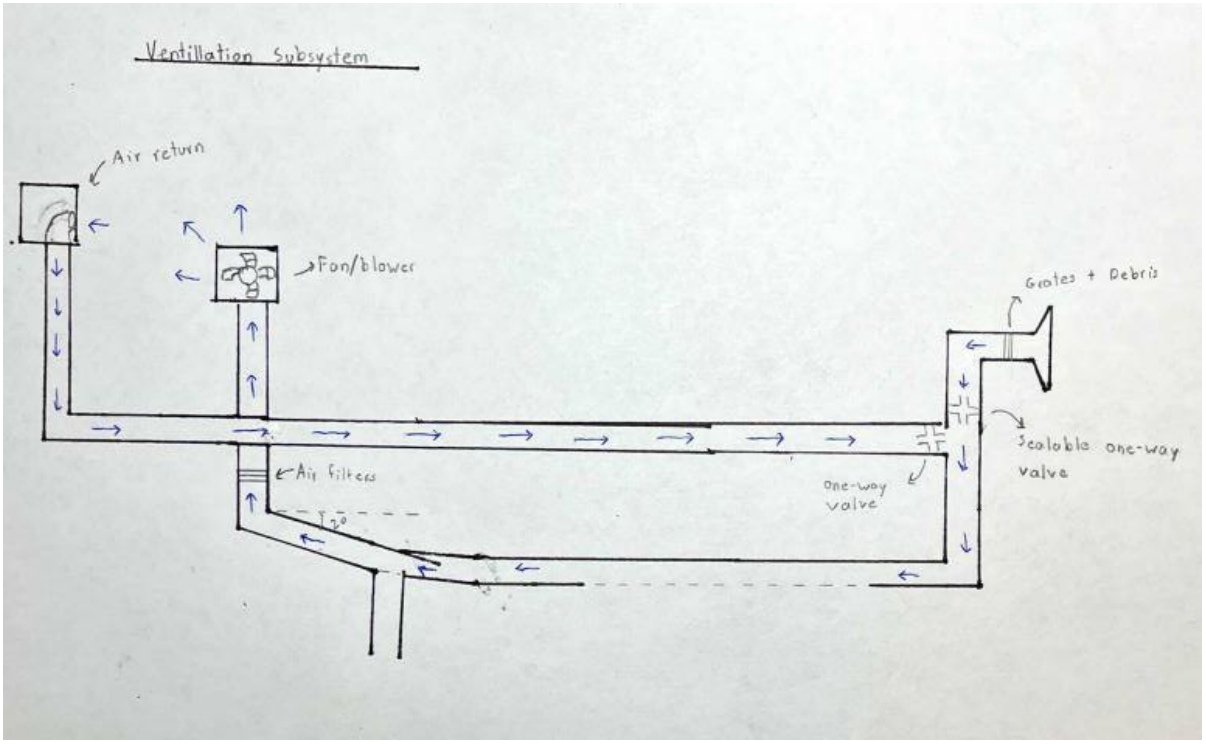
Introduction

In this deliverable, more detailed drawings of our designed concept and its subsystems are shown below with the addition of key elements based on client feedback. These elements include a radiator to warm the air during Ottawa's cold winters, as well as coupling our system to the house's energy grid as a failsafe when there is a lack of sunlight. Furthermore, an estimation for the cost of our designed concept will be calculated by finding the cost of every individual material and part used, making sure to include tax and shipping costs. This information is listed in a bill of materials submitted along with this document. Finally, we will discuss the risks associated with our project and our plan to mitigate these risks. By the end of this deliverable, we will not only have an improved, and more clear, overall system and risk management plan, but also a realistic idea of what it will cost to construct.




Solar Panels
Electrical Subsystem
Charge Controller
DC load
Battery
Inverter
Sump Pump
18°C
Thermostat (programmable)
Fan/blower
Radiator


Heating Subsystem
Heating Fluid
Insulator + wood box


Ventillation Subsystem
Air return
Fan/blower
Grates + Debris
Scalable one-way valve
Air filters
one-way valve

Risks

Collapse:
There is a risk of THEC collapsing primarily due to forces from overhead weight. To mitigate this risk, we will use a durable material for piping and the actual chamber.

Air flow blockage:
Having the intake outside, it could get blocked by snow/debris, and cause reduced air flow into the system . To prevent this we will have a debris filter in addition to the intake pipe being inside of a shed. In addition to this the height of the lowest part of the vent will be at a height that is higher than any height seen for the average snowfall plus there is a roof to prevent snow accumulation directly against the air intake

Electrical failure:
Contact with exposed live parts causing electric shock and burns (for example, exposed leads or other electrical equipment coming into contact with metal surfaces such as metal flooring or roofs). Also equipment may become wet and may be at greater risk of damage. We will use good quality materials and equipment also, make most of the equipment easily accessible incase of failure. In addition to this we will ensure only appropriately licensed or registered electricians carry out electrical work.

Seepage:
Working with machinery dealing with water, Inorder to prevent leakage to maximise flow and reduce risk of electrical and any other damages caused by the water. We have put liner pads to stop liquid from spilling out, along with compact tubing

Constructing Risks:
Dealing with electronic components always comes with its risks. Possibly shorting out and causing a shock or even the start of a fire. To prevent this certified technicians will be hired for different jobs to make sure everything is well put together. Also, Mounting solar panels on the roof creates the risk of falling off. To prevent this, installers should plan on wearing a harness when up on the roof.

Machine safety:
People can get struck and injured by the moving parts of the machinery or ejected material. Parts of the body can also be drawn in or trapped between any moving parts. Sharp edges can cause cuts and severing injuries, sharp-pointed parts can cause stabbing or puncture the skin, and rough surface parts can cause friction or abrasion.

Conclusion:

The task of this deliverable was to determine the final project plans as well as further detailed renders of our system and three main subsystems: heating, electrical and ventilation. We first created a detailed drawing of one of our prototypes. After that we made a bill of materials to calculate the total cost. Then we made additions to our project plan and created task breakdowns. We decided to make the due dates feasible for all of us to get our work done properly and without cramming. Lastly we established the risks and safety procedures to follow in case of them to ensure our safety and that of our client. With this deliverable done we are able to start creating our first prototype.