Temperature Control Reproduction

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1 Checkpoints

1.1 First observations

1. Only instructions for arduino UNO.

2. No instruction to connect arduino.

3. All links in the readme are dead because they point to a personal repo to which we do not have access.

4. Code for arduino saved as a .txt file instead of .ino.

5. Not specified which mosfet is which

1.2 Documentation

1. *Could you understand the purpose of the experiment? Explain.*

   The purpose of the experiment is to regulate the temperature within a closed environment. This includes measuring the current temperature and controlling a heating/cooling element which are activated when the temperature reaches certain thresholds.

2. *Were the safety instructions clear?*

   There were no safety instructions. Even though we are working with a heating element and with power supply.

3. *How helpful is the documentation for reproducing the measurement?*

   There is a step-by-step guide to reproduce their experiment and to the best of our knowledge we managed to recreate the setup as it is described by their guidelines. However, we did not get the desired results.

   The instructions said to use only an arduino UNO, but in the pictures that were included, an arduino DUE was used. In the report it is even stated that two arduino's are connected, about which we could not find anything in the instructions.

   Some pictures were included of a completed setup, however these did not match the instructions in the README.

4. *Did you get stuck at some point? What extra help did you need to proceed?*

There is limited information on the Mosfet and Peltier. Only a figure of a Mosfet is given. For a more immediate understanding it would be nice to have some more written information on it.

5. *Are you guided to reproduce previous measurements?*

There were no previous results given in the instruction manual. A suggestion could be to create a temperature graph where at some indicated times the heating/cooling element is either powered or turned off. For the presentation you could even make it such that this runs real-time.

6. *How easily could you navigate through the project documentation?*

Not really, there were links to instructional images included in the README, however all of these links pointed to images that were on a personal repository to which we did not have access. The images were however also included in a different folder, so we could see them but it was not the smoothest experience.

7. *What can be improved in the documentation?* As mentioned above, the links can be made with relative paths.

More information on the working of Mosfet and Peltier can be provided.

The results to previous measurements can be included, which give examples to reproduce.

1.3   Measurements

1. *Can you operate the setup with the provided instructions?*

Perhaps it is possible, however we did not manage.

2. *How close were the results you obtain to the previously reported results?*

There were no previously reported results. We did obtain a single measurement of temperature 33.87 (no unit reported). It was supposed to read out a datapoint every minute, but it stopped after the first.

3. *Can you understand and explain the analysis procedure to a third person?*

The general idea behind the setup, yes.

4. *Is the setup robust and safe to operate?*

The connections of the wires to the heating element came loose upon trying to put the Breadboard into the foam box. It would have been nice to see these soldered together.

5. *Did you encounter any issues?*

We didn't get the expected temperature measurements and could not control the heating element.

6. *Could you troubleshoot those without contacting the owners?*

We added some code to the .ino file to try to see what exactly was causing our lack of data. The Arduino turned out to be reporting infinite temperatures, which caused it to initiate an hour of downtime.

We put in the loop to activate the heating element, outside of the if statements. But the heating element did not give out heat.

7. *What part of the measurement procedure did you appreciate most?*

The download and installation procedure of the Arduino EDI is nice and clear.

1.4   Interactions

1. *Could you relate to the stated goal of the project?*

There is no cooling element in the setup, or at least it is not explained how the Peltier is both a heating and a cooling element. The rest of the goals we could relate to, even though they are not working.

2. *Which instructions did you need from the owners on top of the written files?*

The owners did not get results yet either.

3. *Does the experiment accomplish its stated purpose?*

No.

4. *What do you recommend to the project owners to improve their complete package?*

Try to make sure that all a user has to do is open the readme and everything follows from there. So if the installation instructions are in a seperate file, or if there are multiple readme files, please link to them from within the first readme. Also double check that all links are working.

Instead of using Mosfet logic circuits we can just use the Arduino to manage the logic built into the Arduino. It should be possible to control the heating element in this more direct manner.

Instead of the fancy measurement apparatus with resistance, we can also use BME/BMP 280 sensors. These are readily available and easily compatible with Arduino, since it has its own library.

We do not see how signal wires can transport enough power to power a heating element. We suggest connecting the heating element directly to the power source and creating some sort of switch controlled by the Arduino.