

# Automatic fan – Introductory report

Our idea was to produce an automatic fan that turns on when the ambient temperature of the room has passed a certain threshold.

When designing our product, we knew from experience that it must have these properties:

1. The base must be supportive enough for the system to not fall over.
2. The chassis must be big enough to contain the components
3. The tower must be tall to give clearance for the propeller
4. The body must be strong enough to withstand the stress from the spinning propeller.

Our concept design ended up having a round base that holds all the components and a tower that holds the motor and propeller. We might have to add some supporting structuring to the inside of the tower based on how the first prototype performs.

We had thought about other shapes for the housing but concluded that the usual fan design worked the best. For example, we thought about having the fan housing being a box, but that design would probably have problems with air flow to the propeller, and in general it looked unwieldy.

Bill of materials:

- Arduino Uno R3
- Breadboard Small
- DC motor
- Temperature Sensor - TMP36
- Power supply

Concept art of the design



# Learning diary

- Jere Tepsa, 2693460
- Kalle Veijalainen, 2638991
- Jeremias Körkkö, 2586810
- Juho Kurula, 2642246

We agreed on a division of tasks as following:

- Jere would be in charge of the chassis
- Juho would be in charge of the propeller
- Kalle and Jeremias would be in charge of the electronics and software respectively
- Even though we had clear areas of focus, we still worked together on every field of the project.

## Week 22.3 – 28.3

- Formed our group and came up with the idea for our project.

## Week 29.3 – 4.4

- We finalized our concept design
- We decided on how to build the chassis and propeller, and what materials to use for them
  - 3d print the propeller
  - Laser cut plywood for the chassis.
- Wrote the introductory report
- Working code for Arduino in simulator (Uploaded to the project GitHub)
- Attended TA session and discussed about the 3d printing the propeller and laser cutting the chassis. The TA approved our concept.

## Week 5.4 – 11.4

- First draft with real Arduino Uno working with LED, problems with the given motor.

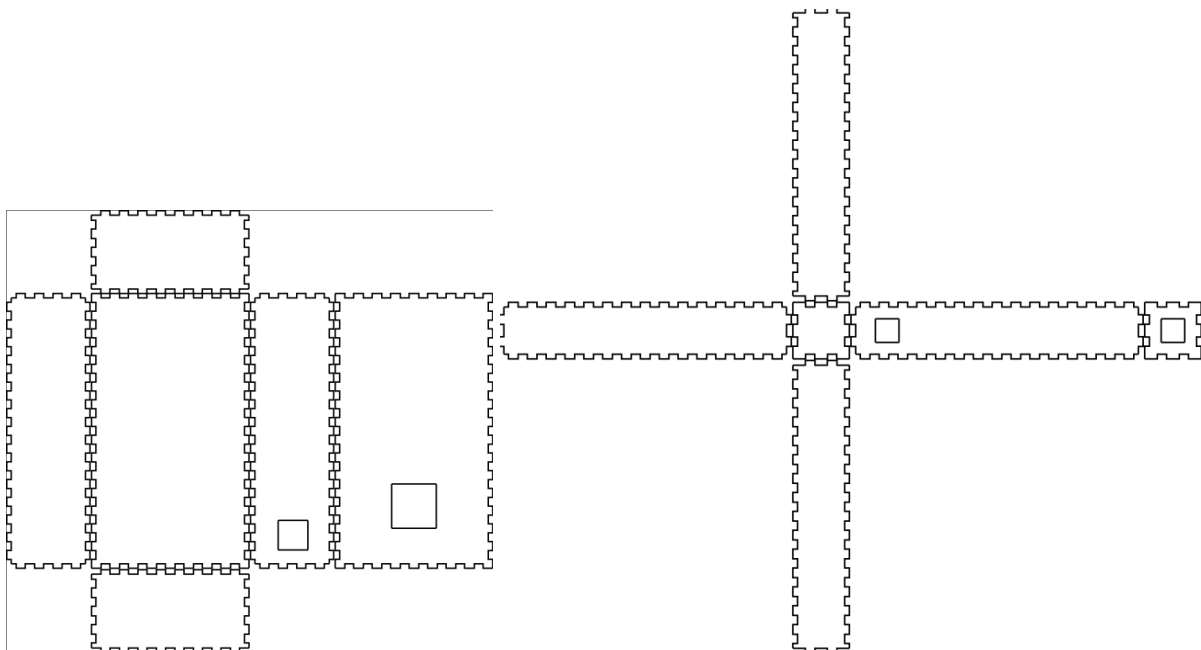
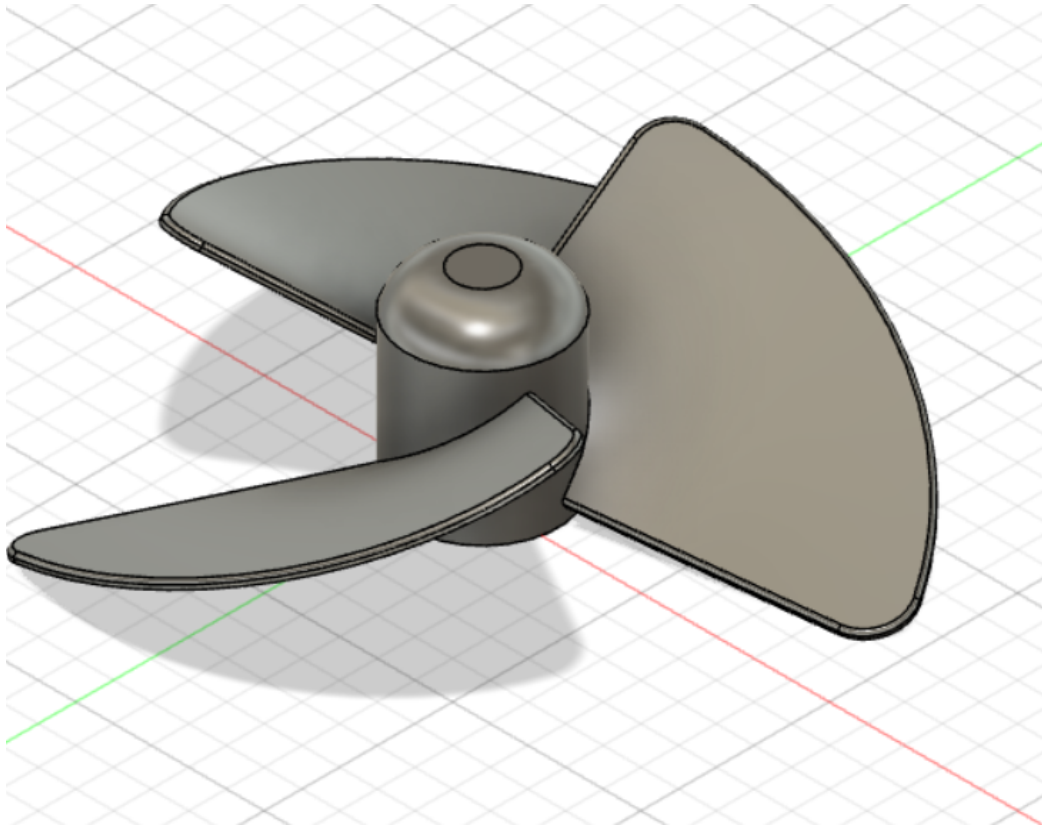
## Week 12.4 - 18.4

- Acquired a new motor and temperature sensor.

- The code works on the Arduino, but we haven't yet finished the full configuration

## Week 19.4 – 25.4

- Finished the 2d model for the chassis and 3d model of the propeller
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## Week 25.4 – 2.5

- We reserved times for the FabLab and went to produce the chassis and propeller
- Encountered a few problems with the design of the chassis. The holes were either in the wrong location or too small, but with small adjustments I produced the working chassis with relative ease.
- We assembled the chassis. It fit together well and was large enough to contain the electronics.
- 3D printed the propeller with Stratasys and attached it to the motor.
- Assembled the circuit and got the fan to working
- After getting the motor to spin, we encountered a new problem where we couldn't control the motor in the way we wanted. The problem was that the transistor was connected incorrectly.
- The problem was caused by IRLZ34N transistor which has a different pin layout to the PN2222, which was in the instruction set of the Moodle material. After consulting with the Teaching assistants and other students, we figured out the correct pin layout and managed to get it working.

## Personal Reflections

I was working most with the autodesk fusion360 for the last 2 weeks before we finished our project. I had to learn how to use the software because it was kind of complicated at first but after a few hours of learning I managed to manage the software. I learned that with fusion360 you can actually make whatever you want, your imagination is just the limit. After I studied the software I managed to do the propeller of the fan with the right measurements for our DC motor. I also did the animation of the propeller so I can see that it works correctly when the motor spins the propeller. With the last few days I was also helping with the electronics and circuits because we had a problem with them. -Juho K

We decided to produce a simple chassis as a group, but I think we could have done something a fancier. I don't like the current position of the power cord in the prototype, but we decided not to make another chassis to fix said problem. The problem could have been circumvented with more prototyping and better placement of the components inside.

I think the project turned out well and the teamwork was efficient and of good quality. -Jere T

I took charge of the software side of things on the project. It was fairly straight forward as can be seen from the final version of the code. As I had some previous experience of an arduino project I had a good understanding of how to implement a code for our features. We looked at some examples of similar projects from the internet and actually ended up utilizing some code related to the temperature sensor. Then moved on to writing our own code. The code is very simple, define needed constants for pins and threshold then setup the program and then do a loop where the temperature measuring and motor would be controlled. The only thing that needed some adjusting was finding the correct inputs for the motor to get it working as planned. - Kalle V.

In the beginning of the course we got the whole product working in Tinkercad-simulator. I thought the work was done and started putting the hardware together 10 days before the deadline. It wasn't a walk in the park as I had thought. We had some problems, the motor wasn't responding as supposed to even though the code looked solid and hardware was assembled according to the instructions. We had to ask for guidance and through that we found out that the problem was our transistor. It wasn't the one we thought it was. We found documentation for it and hooked it up with the updated information we had. Product started working immediately. Other than that we really didn't have hardware issues, everything else went smoothly. - Jeremias K.