# KOKKUVÕTE

Lõputöö eesmärgiks on projekteerida Apple kellaklaasi lõikur, mis on vajalik ekraanimooduli taastamiseks. Eesmärk sai täidetud ning tulemusega saab olla rahul. Tulemuseks on kellaklaasi lõikur, millele on tehtud turuanalüüs. Selle käigus saadi teada, et turul ei ole selliseid masinaid võimalik osta.

Lõputöö käigus selgitati ekraanimooduli taastamise protsessi, see on kasulik ka keskkonnale, säästmaks elektrooniliste jäätmete tekkimist. Ekraanimooduli taastamiseks eraldatakse OLED ekraan ja selle peal olev klaas peenikese traadiga, peale mida puhastatakse OLED ekraan liimist tsitruse ainega. Ekraanile saab peale lamineerida uue klaasi, kui kogu protsessi käigus ekraan katki ei läinud.

Samuti oli lõputöö eesmärgiks välja selgitada, kuidas kellaklaasi lõigata. Ka see eesmärk saavutati, jõudes lahenduseni lõigata kellaklaasi pealmise poole pealt, kuna see on majanduslikult kasulikum. Antud lahendi eeliseks on survetundlikkuse andurite mitte katki tegemine. Teiseks eeliseks on antud viisil kinnitamine, sest ekraanimoodul on veel kella küljes kinni, mis muudab kella fikseerimise lihtsamaks.

Autoril oli lõikuri mootori reguleerimiseks kaks visiooni, mis on ka näidatud eskiisidena. Esimeseks lahenduseks oli reguleerida lõikuri kõrgust kasutades keermelatti, mis tagab lõikuri suurema reguleerimise. Teise lahendusena mõtles autor välja lõikuri mootori reguleerimise kinnituse küljes. Viimane lahendus rakendub kunagi tulevikus, kui parameetrid on täpsemalt paigas. Esimese prototüübi juures soovis autor rohkem reguleerimise võimalust, mistõttu valiti lahendiks esimene variant.

Lõputöö käigus kasutati valmistooteid Alas Kuulilt saadud tootekataloogist. Valmistooteid kasutatakse prototüüpimisel, kuna nii saab prototüübi kiiremini valmis. Kuid on kasutatud ka 3D prinditud detaile, selle eeliseks on kiire toomine. Autor soovib printida välja kella- ja mootori kinnituse, kuna just need detailid peavad olema täpsete mõõtmetega, mis ei pruugi esimese korraga õiged olla. Kasutatakse ka metallist detaile, mis on esialgu käsitsi tehtud, kuid tulevikus lastakse need detailid välja freesida. Metallist on tehtud alusplaat, kella kinnituse plaadid ja mootori all olevad plaadid.

Järgmise etapina ehitab autor valmis esimese prototüübi projekteeritud mudeli põhjal, peale mida saab iHelp OÜ testida prototüüpi. Peale seda saab teha mudelis vajalikud muudatused. Lõpptulemusena peaks kella klaasilõikur olema kõvasti kompaktsem ja esteetilisem, et seda masinat saaks ka müüa teistele ettevõttetele.

# SUMMARY

The aim of the dissertation is to design an Apple watch glass cutter, which is necessary to restore the display module. The goal was achieved and the result can be satisfied. The result is a watch glass cutter that has undergone a market analysis. In the course of this, it was learned that it is not possible to buy such machines on the market.

During the dissertation, the process of restoring the display module was explained, it is also beneficial for the environment to save electronic waste. To restore the display module, the OLED display and the glass on top of it are separated with a fine wire, after which the OLED display is cleaned of glue with citrus. New glass can be laminated to the screen if the screen did not break during the whole process.

The aim of the dissertation was also to find out how to cut a watch glass. This goal was also achieved by reaching a solution to cut the watch glass on the upper side, as it is more economically advantageous. The advantage of this solution is that the pressure sensitivity sensors are not broken. Another advantage is that it is attached in this way, because the display module is still attached to the watch, which makes it easier to fix the watch.

The author had two visions for adjusting the cutter motor, which are also shown as sketches. The first solution was to adjust the height of the cutter using a threaded rod, which ensures greater adjustment of the cutter. As an alternative, the author devised a cutter for the motor adjustment mount. The latter solution will be implemented in the future if the parameters are more precisely in place. For the first prototype, the author wanted more regulation, so the first option was chosen as the solution.

In the course of the dissertation, finished products from the product catalog received from Alas Kuuli were used. Finished products are used in prototyping, as this allows the prototype to be completed faster. However, 3D printed details have also been used, which has the advantage of fast retrieval. The author wants to print out the clock and motor mounting, because these details must have exact dimensions, which may not be correct the first time. Metal parts that were initially made by hand are also used, but in the future these parts will be milled out. The base plate, the clock mounting plates and the plates under the motor are made of metal.

As the next stage, the author builds the first prototype on the basis of the designed model, after which iHelp OÜ can test the prototype. After that, the necessary changes can be made to the model. As a result, the glass cutter of the watch should be much more compact and aesthetic, so that this machine can also be sold to other companies.