

KOKKUVÕTE

Käesoleva lõputöö eesmärgiks oli arendada välise puukütte ahjuga kümblustünnile kaugjuhitav juhtseadme füüsiline prototüüp, millega on võimalik lisaseadmeid juhtida ning kümblustünni vee temperatuuri jälgida.

Lõputöö käigus uuriti ja analüüsiti olemasolevaid lahendusi, mille käigus ei leitud autorile sobivat lahendust. Seejärel määrati juhtseadmele lähteülesanded töö, hinna ja ohutuse osas.

Elektronika lahenduse osas valiti juhtseadmele sobilikud komponendid ning loodi seadme elektriskeem.

Konstruksiooni lahenduse osas valiti seadmele sobilik korpus ning loodi arendusplaadi ja releemooduli kinnitusplaat ning kate. Töö käigus loodi juhtseadme 3D mudel ja joonised SolidWorks tarkvaras.

Programmeerimise osas kirjutati juhtseadme põhiprogramm kasutades Arduino arendusplatvormi ning ühendati juhtseade telefonirakendusega. Seejärel loodi kasutajaliides ning temperatuuri saavutamise teavitus kasutades Blynk tarkvara lahendust. Samuti kirjeldati algoritmi ja arvutusi kümblustünni valmimise aja ennustamiseks.

Prototüübi loomise ja katsetamise osas valmistati seadme füüsiline prototüüp ning katsetati seadme funktsioone. Juhtseadme katsetamise käigus veenduti, et lähteülesanded seadme töö osas said täidetud.

Juhtseadme riskianalüüsi ning hinna arvutuse osas, analüüsiti võimalikke riske juhtseadme kasutamisel ning kirjeldati lahendusi nende maandamiseks. Samuti arvutati prototüübi valmistamise lõplik maksumus, milleks oli 129,75 €.

Kõik juhtseadmele määratud lähteülesanded said täidetud ning loodi edukas esimene füüsiline prototüüp.

SUMMARY

The goal of this thesis was to develop a physical prototype of a remote control device for a hot tub with an external wood-burning stove, which can be used to control additional devices and monitor the temperature of the hot tub water.

In the course of the thesis, existing solutions were studied and analyzed, during which no suitable solution was found for the author. The control device was then assigned initial tasks in terms of work, price and safety.

In terms of the electronic solution, suitable components for the control device were selected and the electrical diagram of the device was created.

In terms of the design solution, a case suitable for the device was chosen, and a mounting plate and cover for the development board and relay module were created. During the work, a 3D model and drawings of the control device were created in SolidWorks software.

In terms of programming, the main program of the control device was written using the Arduino development platform, and the control device was connected to the phone application. Then the user interface and the notification of reaching the temperature were created using the Blynk software solution. An algorithm and calculations for predicting hot tub completion time was also described.

In terms of prototyping and testing, a physical prototype of the device was made and the functions of the device were tested. During the testing of the control device, it was ensured that the initial tasks regarding the operation of the device were fulfilled.

Regarding the risk analysis of the control device and the price calculation, possible risks in the use of the control device were analyzed and solutions to mitigate them were described. The final cost of manufacturing the prototype was also calculated which was 129,75 €.

All initial tasks assigned to the control device were completed and a successful first physical prototype was created.