



TALLINN UNIVERSITY OF TECHNOLOGY
SCHOOL OF ENGINEERING

Department of Electrical Power Engineering and Mechatronics

AUTOMATION DEVELOPMENT FOR A BICYCLE TIRE STUDDING MACHINE WITH A CAMERA

**AUTOMAATIKA ARENDUS KAAMERAGA
JALGRATTAREHVI NAASTUTUSMASINALE
MASTERS THESIS**

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SUMMARY

The work presented in this thesis is a part of a practical project at Peretec OÜ. The thesis concludes the automation development of a bicycle tire studding machine.

In the first chapters the previous automation and machine difficulties are explained which require improvements. With the camera implementation machine vision principles are explained. Throughout the work the machine was implemented with new features in order to fulfill the desired output for the task.

Chapter 3 includes the programming process of the camera and the Siemens PLC with the overview of the selected components. As this was a development project there were multiple meetings and the resulting data was discussed in order to decide how to proceed.

Chapter 4 explains how the HMI and operator panel work and how an operator can use the machine.

The next chapters include mechanical, electrical and pneumatical additions to the machine. As the machine's automation was developed some mechanical issues submerged and they had to be improved upon.

The eighth chapter presents a remote connection solution in order to monitor and adjust the program when necessary.

In the tenth chapter the results of programming are analyzed and references for future improvements are proposed. The goals of this automation project were fulfilled and the machine itself has been shipped to the client. For the next version of the machine it is being thoroughly tested.

KOKKUVÕTE

Selle lõputöö sisu on osa ühest praktilisest projektist firmas Peretec OÜ. Töö sisaldab automaatika arendust kaameraga jalgrattarehvi naastutusmasinale.

Esimestes peatükkides juureldakse eelmise automaatika lahenduse ja masina probleemide üle mis vajab parandamist. Kaamera implementeerimiseks on välja toodud masinnägemise printsiibid. Projekti kulgedes implementeeriti masinale uusi lahendusi et saavutada soovitud lõpplahendus.

Kolmas peatükk hõlmab kaamera ja Siemensi PLC programmeerimise progressi koos kasutatud komponentidega. Kuna tegemist oli arendusprojektiga siis arutati koosolekutel vahetulemusi ja edasise protsessi kulgu.

Neljas peatükk selgitab kuidas on HMI ja juhtpaneel üles ehitatud ja kuidas seda masinat kasutada.

Järgmised peatükid hõlmavad mehhaanilisi, elektrilisi ja pneumaatilisi lisasid ja lahendusi masinale. Automaatika arenduse käigus ilmnisid mehaanilised probleemid, mis parandati töö käigus.

Kaheksas peatükk esitleb kaugühenduse lahendust, mille abil on võimalik jälgida masina tööd ja vajadusel muuta programmis seadistusi.

Kümnendas peatükis analüüsitakse programmi variatsioone ja antakse tulevikus parandamiseks ideid. Antud automaatike projekti eesmärgid said täidetud ja masin kliendile ära saadetud. Järgmise versiooni jaoks käib masinal põhjalik testimine.