DTU Compute
Department of Applied Mathematics and Computer Science

Technical University of Denmark

Project Wood in Metal

Introduction

Lendager is an arkitectural company who wants to be more sustainable. One of their methods is by reusing wood. Unfortunately this method is not always the best because inside this wood, there's often metal from previous usage, like nails and screws. These pieces of metal damages the tools that is used to prepare the wood for new usage, some time even destroys it.

Therefore we've come up with a solution that will locate the metal and mark it, so it can either be discarded, removed or an area or piece of wood can be cut away. So the wood can processed and manufactured easilier.

In this project a Xlinix Zybo is used as main controlling unit while a lot of periphials like sensors and actuators are used to handle the pieces of wood. This includes, infrared sensors, metaldetectors, motors and a solenoid. Everything is based hardware, programmed hardware with premade and custom IP cores and software coded in C.

User Manual

The system is pretty straight forward to use. It mainly consists of the automation mode and the manual mode. In automation mode the user doesn't have much influence on the system, except the settings. In contrast the user can control all the inputs and outputs.

Root menu
Start/Stop Automation
Set Mode
Settings
Exit

Manual Menu
Start/Stop Conveyer
Set Conveyer Speed
Start/End Wood
Detect Metal
Control Lasers
Control Marker
Return

Info

Study
IT-Electronics

Course
02321 Hardware/Software Programming
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Infrared Sensors

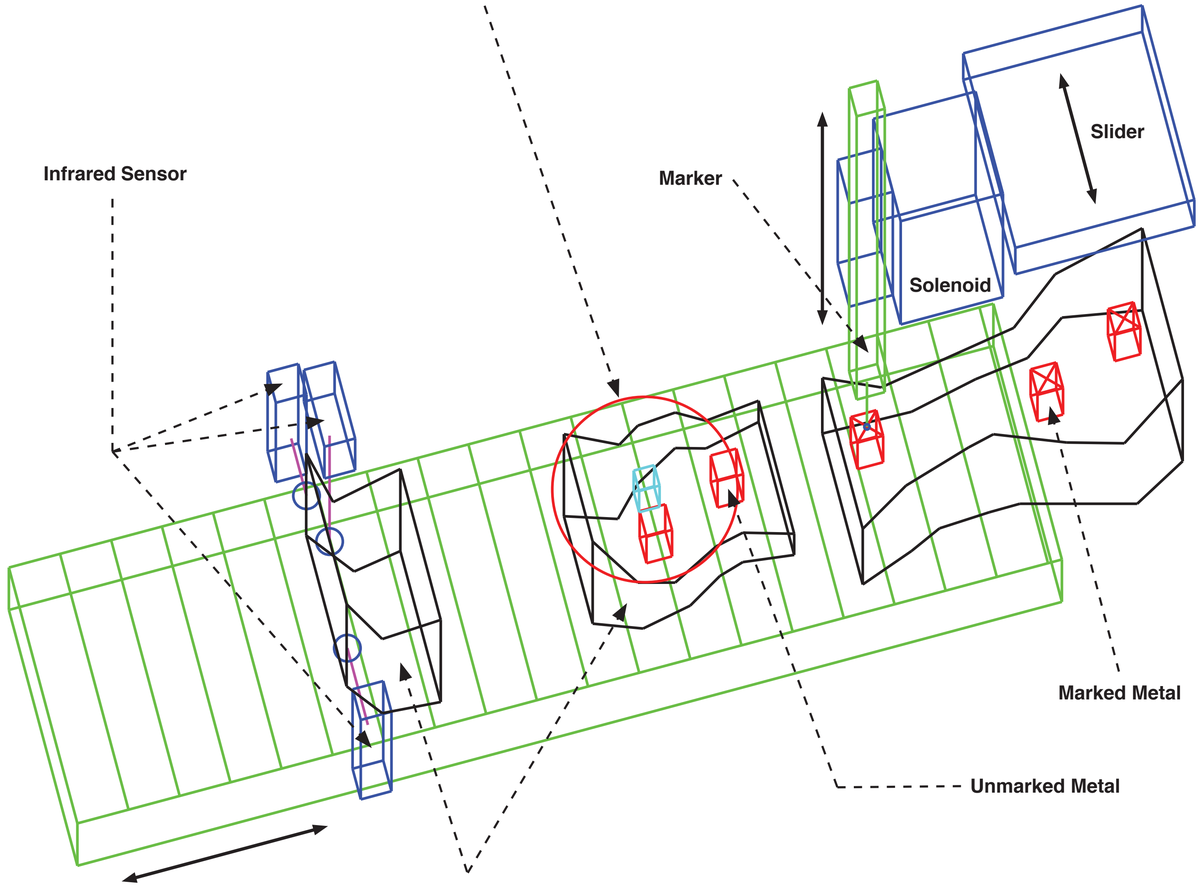
Three sensors are used to determine height and width by detecting z-point from the left and right. The top sensor is keeping track of new pieces of wood or whenever a piece of wood is moved past the sensors.

Metaldetector

If metal is detected, the X-position and Z-position is saved and further processed in the marking system. This is done by determine a radius, when this radius starts to decrease the metal must be the closest to the detector.

Marker

The marker can move left and right (z-axis) and mark with a tusch attached to a solenoid. It keep track of the next metal to be marked. Whenever a metal is in reach the conveyerband is stopped until the marking is succesful.



Conveyerband

A simple conveyerband used to move the pieces of wood through the different stages of the system.

Wood

If wood is detected in the infrared sensors, it's dimensions are being used determine the position of metals, so the marker know the Y-position of where to put the mark.

Metal

The red squares indicate detected metal. With the detected XYZ postion the marker can mark them with a tusch.