



HACETTEPE UNIVERSITY

ELECTRICAL AND ELECTRONICS ENGINEERING

ELE - 402 GRADUATION PROJECT

RADAR USING LASER

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INTRODUCTION

The purpose of the project is mapping of the environmental factors. The map is obtained on the internet in real time. For doing these things, the embedded system is used. To mapping the environmental factors, the distance of the system and the factor is important. The Lidar sensor measures this distance. Lidar means that “**L**ight **D**etection and **R**anging” or “**L**aser **I**maging **D**etection and **R**anging”. Lidar is a remote sensing technology which uses the pulse from a laser to collect measurements which can be used to create 2D models and maps of objects and environments. Lidar calculates the distance from device to targets. The measurement is dispatched to microcontroller which is STM32F429I. The distance data is transferred to the microcontroller and the microcontroller sends the data on the internet. If the project is completed, the map processing is done on the internet.

PROJECT DESIGN AND SIMULATION RESULTS

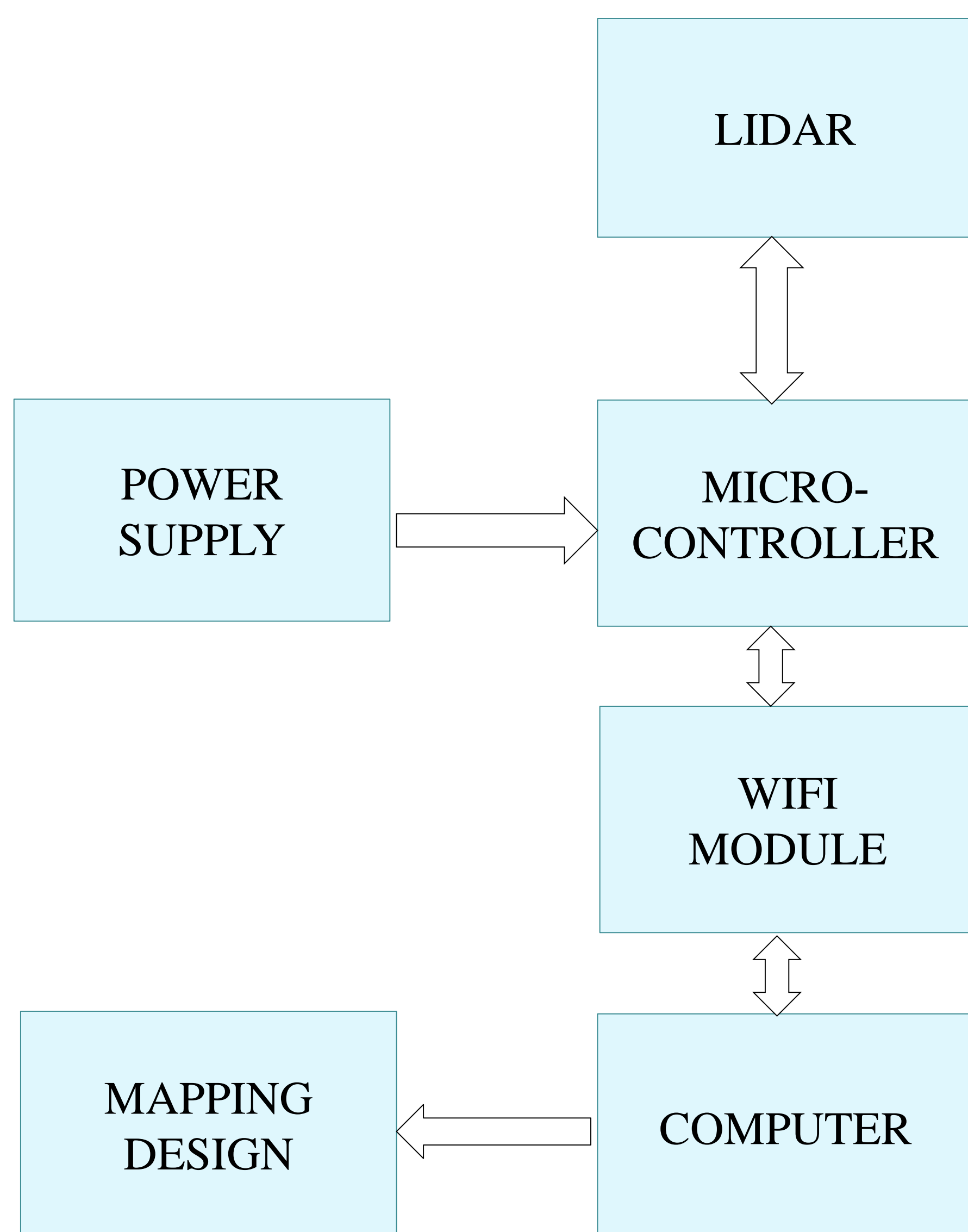


Figure 1 – Simple Block Diagram

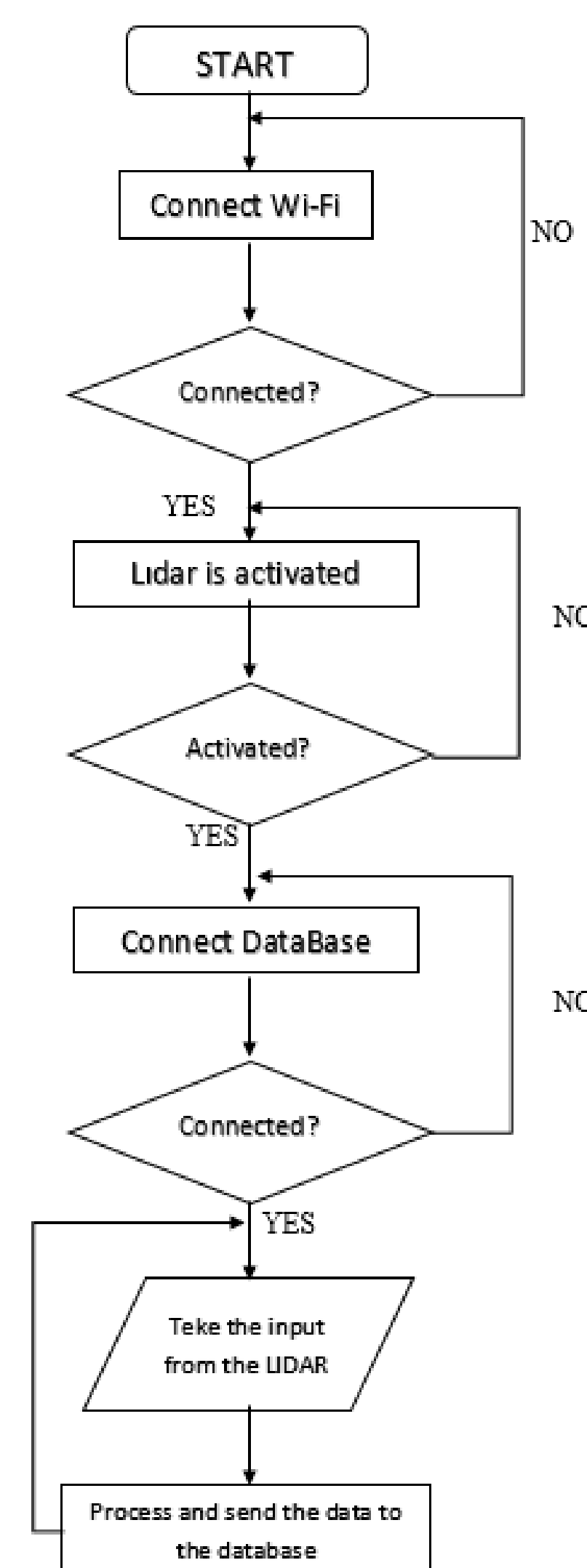


Figure 2 – The Flow Chart of the system

WORKING PRINCIPLE OF LIDAR

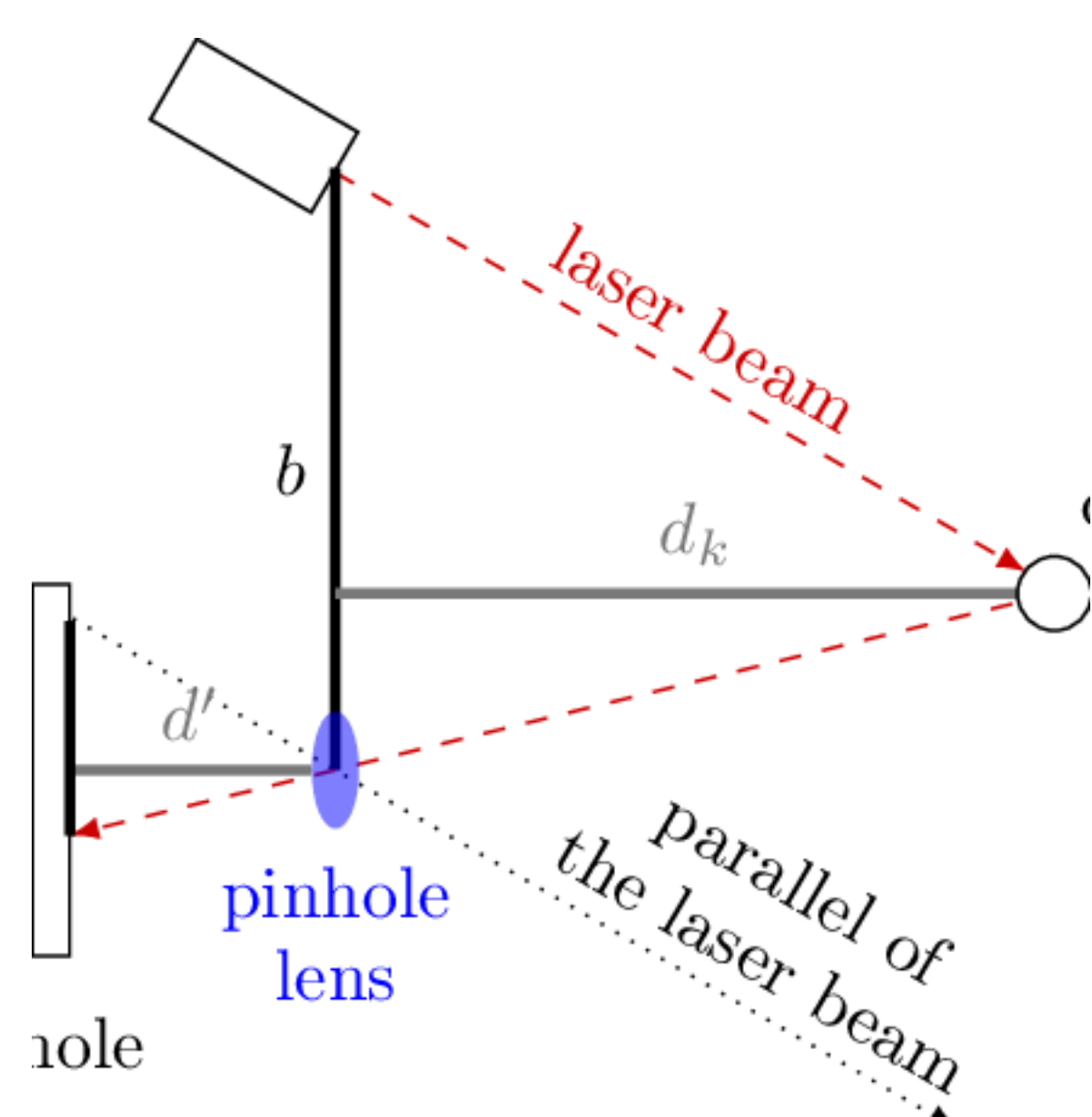


Figure 3 – The diagram of working principle of Lidar System

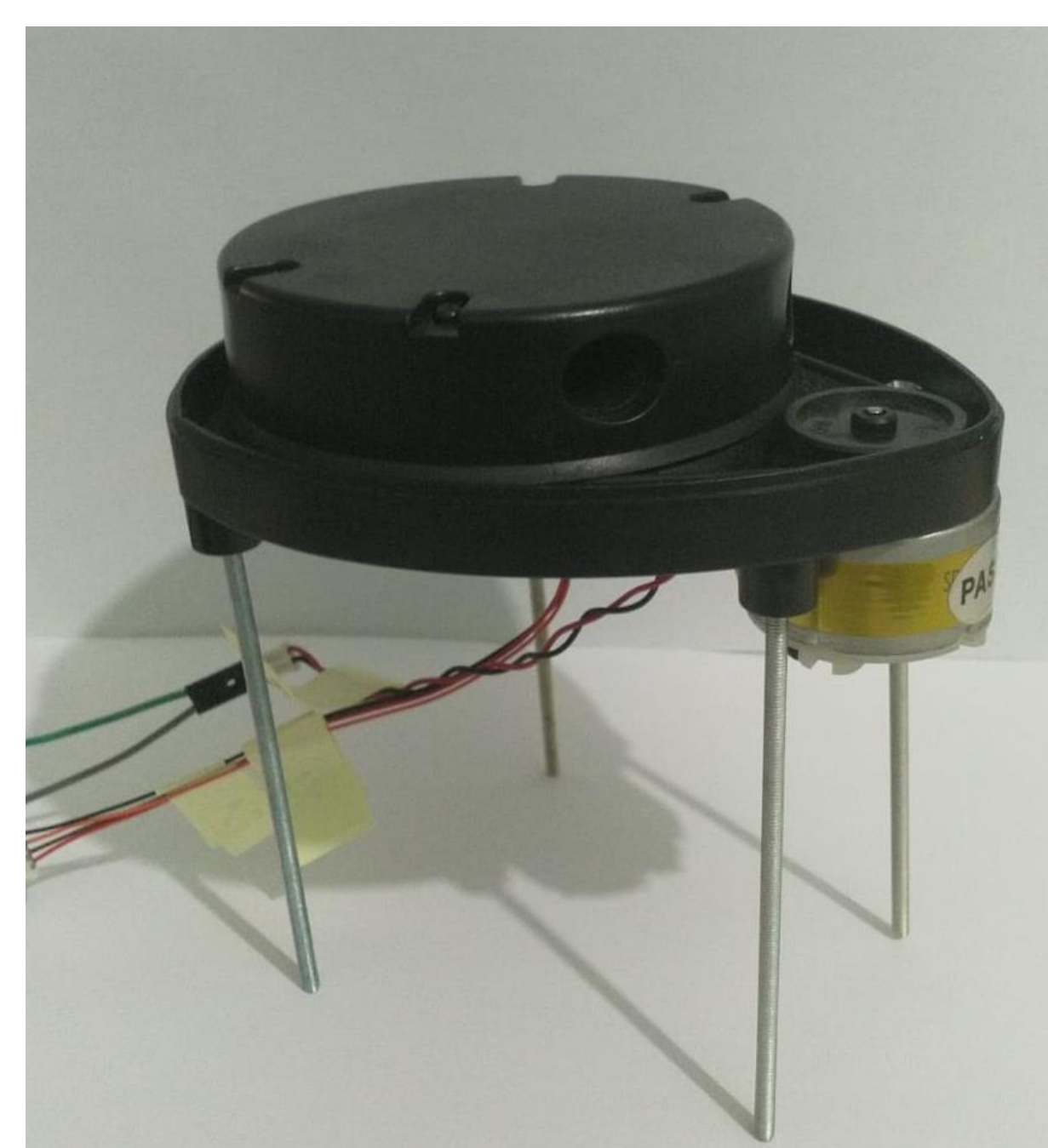


Figure 3 – The figure of Lidar Sensor

A full revolution will yield 90 packets, containing 4 consecutive readings each. The length of a packet is 22 bytes. This amounts to a total of 360 readings (1 per degree) on 1980 bytes.

Each packet is organized as follows:

<start byte> <index> <speed> <Data 0> <Data 1> <Data 2> <Data 3>
<checksum>

MAPPING DESIGN

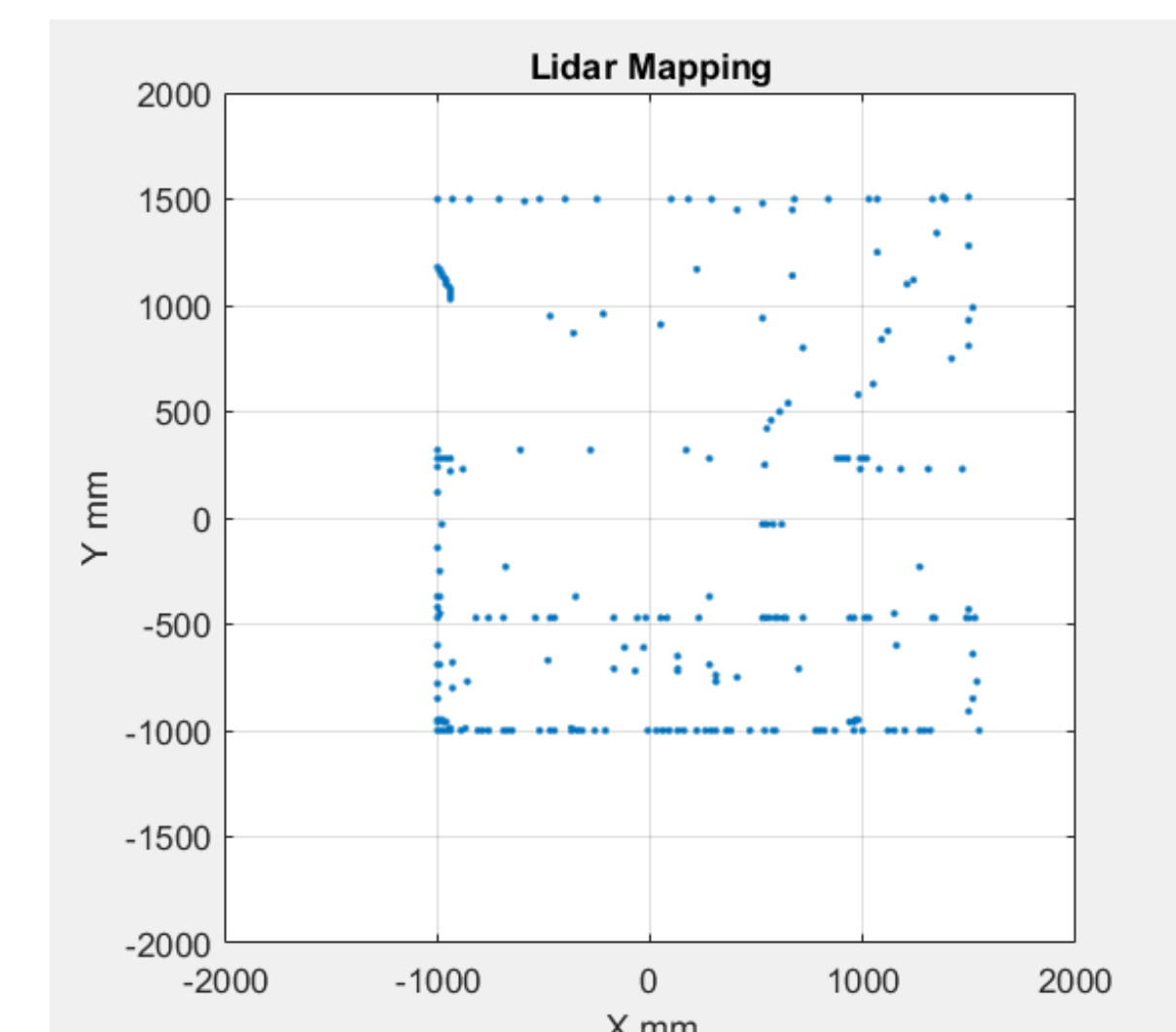


Figure 5 – Plot in MATLAB

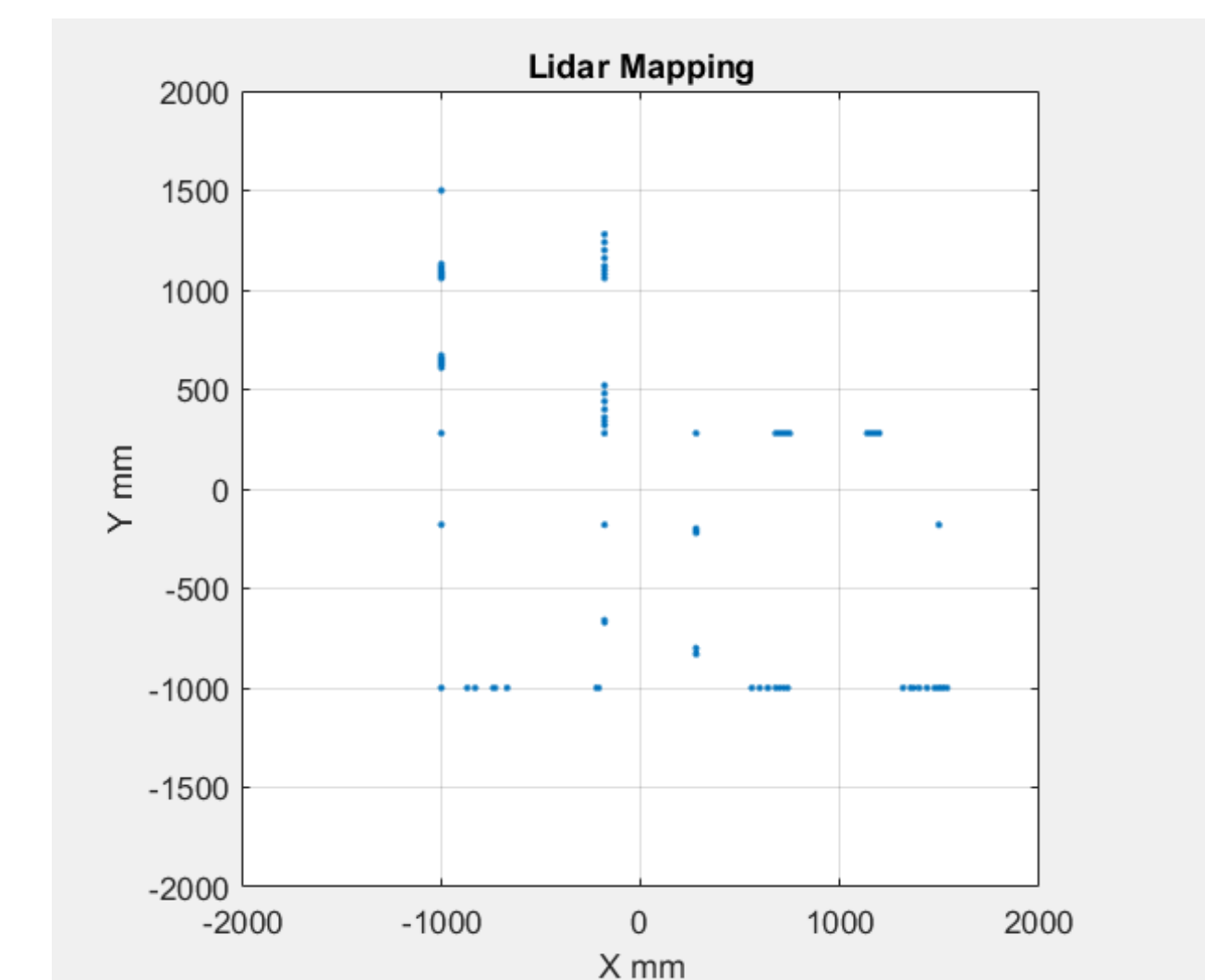


Figure 6 – Plot in MATLAB

THE CONNECTION OF COMPONENTS

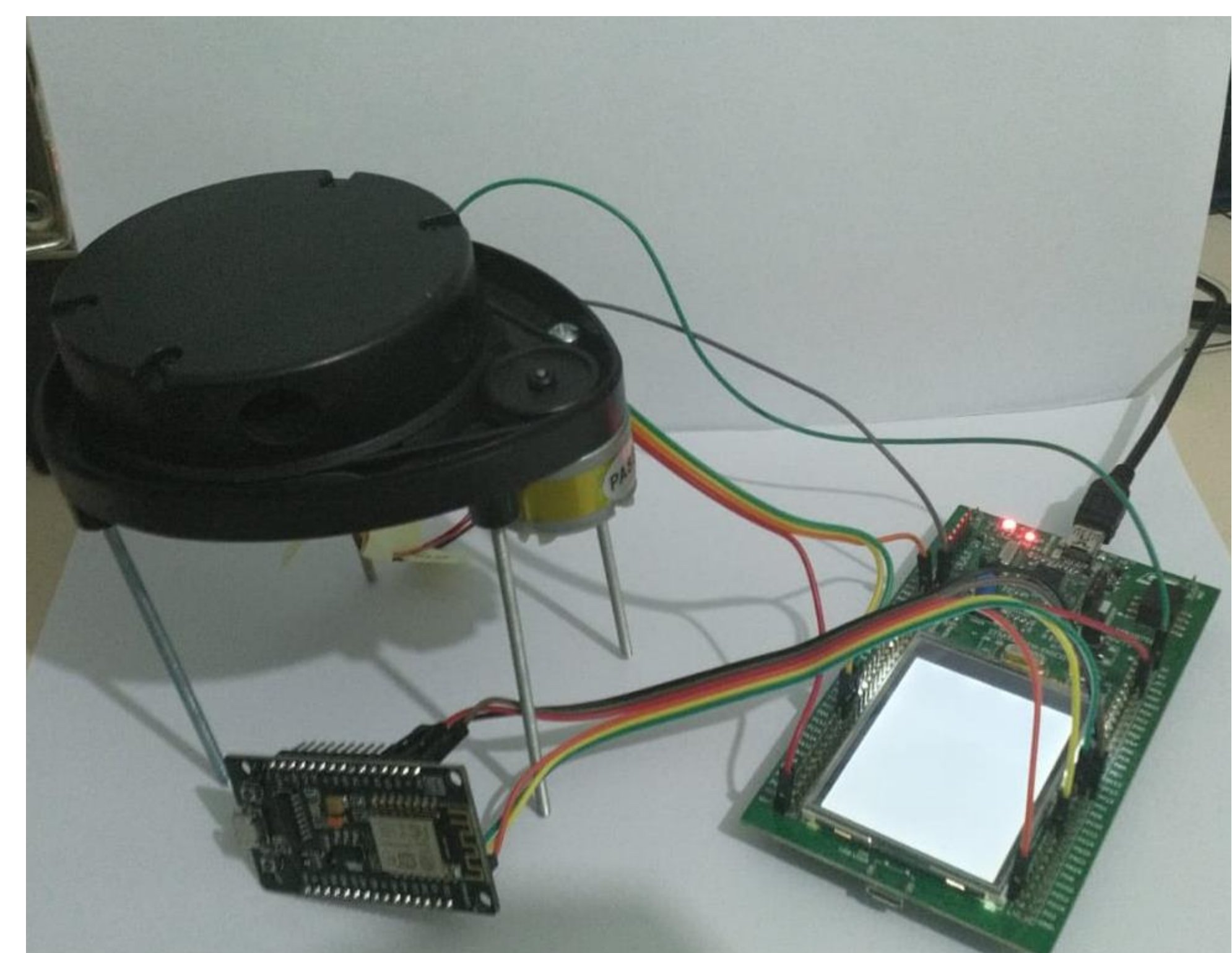


Figure 7 – Connection of components of Project

CONCLUSION

The main purpose of this project was to make the mapping system cheap and remotely controllable. It is an example in terms of cheapness and usability in today's market compared to other products. This mapping system can easily be used to identify environmental factors in autonomous systems, architecture and geomatic systems. This system can be controlled remotely and bring with it many innovative movements. The fact that the project can be controlled over the internet in the future processes will enrich the project.

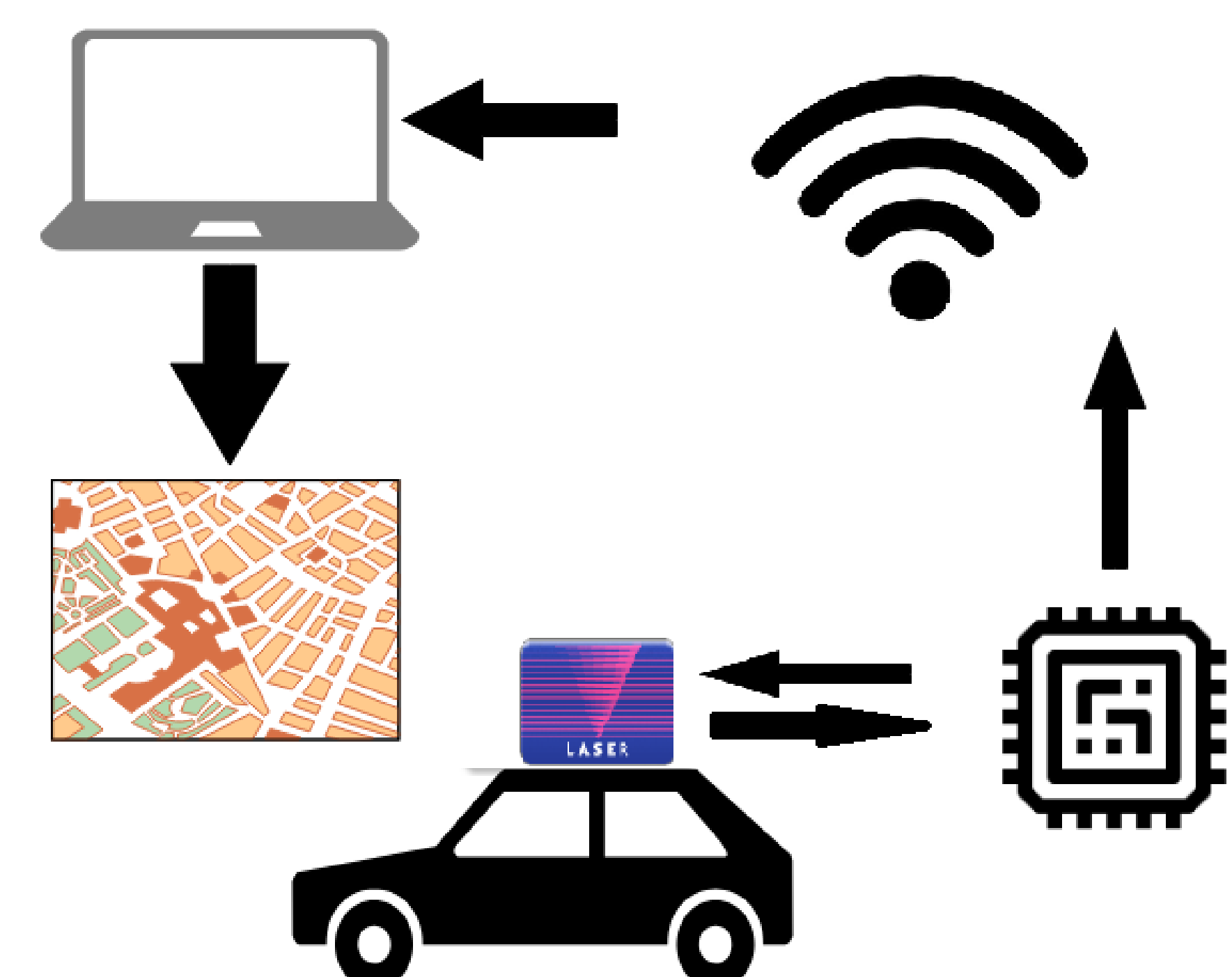


Figure 8 – Symbolic Representation of Whole Project