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**Middle East Technical University**

**Electrical - Electronics Engineering Department**

***EE493 - Engineering Design I***

***Weekly Report***

**Group Name:** λambda

**Date:** 5.12.2021 *(Week 7&8)*

**Design Coordinator:**

Associate Professor Dr. Elif Vural

**Members of Company :**

**-**Berk Erhan Yüksel

**-**Necdet Can Sönmez

**-**Mustafa Barış Emektar

**-**Alper Saraç

**-**Furkan İtkü

1. **Done During Week 7**
2. As planned before, the research and the identifications of subsystems have begun. A document was created where relevant terms and theoretical background that may be needed for implementation are logged for future reference. During the debate, the ideas that were in the foreground were :

* One of them was to measure the time it took for the signal to reach the tag and come back. The measurement for this kind of a system would be done using the internal clock of the microcontroller. Since the clocks for these components are stable, the time can be calculated. However, we think that this sort of a system would be really sophisticated and hard to manage. For long-distance measurements, the error margin would be relatively low. For a short distance measurement, the system’s accuracy would be low since the speed of propagation is too large for the scope.
* Another idea was to have the master unit send a signal at a specified frequency . The tags would have a receiver for the frequency and a transmitter for the frequency . The master units would receive the signal sent at frequency and calculate its amplitude. The design team would set the amplitude of the signal at the tag to a specified value. Using this, the microcontroller would be able to calculate the distance using the measured amplitude. The frequency should be determined carefully to have an amplitude drop in the signal over the distances we want to measure. If the amplitude drops too quickly or does not drop measurably, it would be impractical to try and take measurements. The application can also be designed to have tags send a signal continuously, eliminating the transmitter part of the master unit and the receiver part of the tags. It would be easier to design; however, the tags must be active in a solution like this, and the power consumption may be too high for our constraints.
* One could also implement a radar-based subsystem to detect tags that are conductive. The team debated this briefly. More research will be done on the detection subsystem and the operation of radar systems to determine the applicability of a design solution like this.

1. Although it’s still early, the team did a small market research for components. The prices of the components vary considerably depending on the method that will be applied to the project. For example, lidar sensors are much more expensive than ultrasonic distance sensors. As discussed, the price is one of the concerns of the company. Therefore, the price will be considered while deciding on the method to be applied.
2. **Planned for Week 8**
3. Subsystem research will continue in week eight and also in the following few weeks. The methods discussed above will be analyzed deeply as well as the new ones. Until the end of the research period, the team will try to gather all the relevant ideas.
4. According to the Gantt Chart presented in the Proposal Report, the company has one more week before the process of purchasing components. So, as the study on subsystems is carried on, the component analysis for the project will also be accelerated.