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EE102-01
Project Proposal
20.10.2022

# Shape Detector

## Abstract

The purpose of the term project is to implement our own ideas using the concepts we learned in the course. In this term project, I will try to design a radar system that can detect the shape of an object. Additionally, the shape of the object will be displayed on the monitor and the distance of the object will be shown on a seven-segment display. I will be using VHDL and the BASYS3 board to enable hardware communication. The project will also cover the subjects we have seen in the course.

## Design Specification Plan

There will be many hardware components in the project, but the main component will be the HC-SR04 ultrasonic sensor. I will connect the components using the PMOD ports of the BASYS3 board. I will also use a breadboard to provide 5V supply voltage for the components since the BASYS3 board only has one pin that can provide the voltage. The breadboard is necessary also because I need to have an organized circuit. I will also be using a SG90 servo motor that will rotate the sensor at certain angles.

## Methodology

The component of the system that will enable the detection and scanning of the objects will be the HC-SR04 ultrasonic sensor. Ultrasonic sensors are used to measure the distance of the objects. It transmits a sound wave and measures the time in which the waves collide with the object and reflect back to the sensor. Using the time value and the value for the speed of sound, it calculates the distance. I will also be using another component, namely an SG90 servo motor. Servo motors function for rotating objects at precise angles. I will be using it to rotate the ultrasonic sensor. That way, I will be able to scan the objects more accurately.

The system's main function will be to detect the shape of the object. After detecting the shape, I will try to display the object and the name of its shape on the monitor using VGA system. If a problem occurs, I might display the results using different LEDs that correspond to types of shapes (like one of them corresponding to spheric objects). Using number codes for the shapes, I might also demonstrate it using seven-segment display.

The system will also function as a radar. The distance of the object will be shown with seven-segment display. An alarm system will also be present. When the object gets closer than a certain distance, it will give a sound. I will also use an LED that indicates whether the object is coming closer.

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## Phases of the Project

**Phase 1:** I will be working on creating a module for the sensor that can detect the shape. Until the deadline of phase 1, I am planning to implement the other functions of the system, namely displaying the distance and the alarm. I will try to obtain the necessary components for the system. If any problem occurs, I will work on them in phase 2.

**Phase 2:** After creating a module that can detect the shape, I will spend the rest of the time working on VGA to display the object. If I succeed in using VGA, the object will be displayed on the monitor. If a problem occurs with VGA, I might find another way to display the results. I will also be trying to solve the problems that occurred in phase 1.