

# KIT-AR

## System Design Workplan for Assembly error detection

### Purpose

#### Introduction

Development of a new system to detect errors in an assembly process. The system will combine the use of AR interfaces with machine learning models to help mitigate errors during and after the assembly process of a PC. The system is also responsible for the classification of these errors into 3 distinct categories

#### Background

KIT-AR has been approached by a customer who wishes to use their AR system to determine if screws and circuitry have been assembled correctly in a custom computer. The customer produces multiple different models of computer. The customer would like the feature to be completed within one month

Three main types of error have been indicated:

- Missing components - screws and connectors.
- Incorrectly installed components – screws and connectors which are lost.
- Incorrect assembly – connectors installed in the wrong place.

The system needs to provide to the user the following:

- Identify where the errors have occurred.
- Specify the types of errors.

### Goals

Our goal is to show that our system is successful in classifying errors in the assemble process of the custom computers and help errors from occurring in the future all with the help of an AR interface.

### Objectives

1. Acquire initial assembly videos and CAD design diagrams for the custom computers from the client
2. Try and replicate the assembly process in house using an AR interface and MYO sensors to get more data for the machine learning model
3. Set up a process to store all the data locally
4. Build the machine learning model
5. Test and validate the model using existing data
6. Run a blind trial with a random set of participants to further validate the machine learning model and the entire system.
7. Set up a demonstration session with the client for feedback and further improvements if required

## Timeline

- Week 1: Objectives 1-2
  - Week 2: Objectives 3-4
  - Week 3: Objectives 5-6
  - Week 4: Objective 7
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- Customers should be contacted at least 2 weeks before starting the project to set expectations
  - Week 1 would be very important for the accuracy of our model, Therefore it should be of high priority
  - The process of building the model might exceed a week, so it is important to take minimal time in the data storage step. This will give is more time to build and validate the model.

## Resources

- AR Interface - Microsoft HoloLens's
- Sensory devices – MYO armbands
- Reference videos – Correct assembly of the computers
- CAD design diagrams
- An AWS account for Apache Kafka, Apache Storm, and MongoDB integration
- A random set of volunteers to test the model
- Workspace for a blind trial run

## Constraints

- Low sample data
- CAD designs not available
- Low model accuracy
- Unavailability of sensors and AR devices

## Accountability

- Database Admin – Required for setting up databases to store the data
- Machine Learning Expert – Assistance in model building and validation
- Cloud Administrator - Integration of systems with the cloud