

# Electronics Repair Simulator Project Summary

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Electronics Repair Simulator offers simulations of performing repairs on:

- Smartphones
- Laptops
- Desktops
- Tablets
- Appliances (such as TVs)

## **Background**

Electronics repair can be difficult to learn, and even more difficult to train for. Often times, IT environments have lengthy on-the-job training periods for new hires. This period not only costs money, but can be a waste if the employee is not fit for the position afterwards. Alternatively, an IT environment can train employees in classes. This is either done using leftover outdated parts that employees will rarely see on the job, or expensive new parts that make the training process extremely expensive.

Electronics Training Simulator solves these issues by offering a lifelike virtual environment for training IT technicians in the skills they need to work on real hardware. It also provides easy on-premises setup and deployment for assigning training and measuring progress within a company to new and experienced technicians.

## **Use Cases**

Electronics Repair Simulator has two major actors: The technician and the administrator.

The technician:

- Performs simulations
- Repeats simulations if necessary
- Reports simulation results to the administrator

The administrator:

- Views simulation results from technicians
- Assigns simulations to technicians
- Creates configurations based on models and images
- Creates simulations based on configurations

## **Usage**

Electronics Repair Simulator has compatibility with a standard desktop PC environment as well as VR headset support. It runs on Windows 7, 8, and 10. It is compatible with the HTC Vive, Oculus Rift, and Samsung GearVR platforms. The desktop usage is very similar to a desktop PC video game setup. The user controls the view in a 3D environment with a mouse, and can move around using the WASD keys on the keyboard. They can use various buttons on the keyboard to perform interactions with the device they are training with. These interactions will generally include anything a technician does when repairing a device, such as unscrewing a screw.

Administrators can use the client to perform management tasks in the environment. An administrator can add a new configuration for a new device. When a new configuration is added, an administrator can add it to a simulation (to simulate testing a specific part of the device, such as a battery replacement). The simulation can then be assigned to a technician to train with. When the technicians is done, the administrator can see their performance in the client.

## **Requirements**

In order to facilitate the IT environment, the project requires 3 servers: An account server, a configuration server, and a simulation server.

The account server runs an Active Directory (AD) database to manage users and allows for logging in and out of clients. This server will require a subsystem to perform tasks that extend the AD functionality, such as permissions based on simulations and configurations.

The configuration server stores a database on configurations. These configurations will be delivered over an HTTP or HTTPS connection. They include .stl files for parts of the devices, and a boot image to verify that the device functions properly.

The simulation server stores a database of simulations that include a configuration. One configuration can belong to many simulations, but one simulation can only include one configuration.

The client manages the simulation environment through a Unity 3D environment. While this engine is typically used for video games, it serves the purposes necessary for this project. The client retrieves simulations (and the included configurations) from the simulation server and loads them into the Unity 3D engine for a simulation. The client keeps a cache of simulations that it has used until the user deletes the simulation, the user clears the cache, or the user runs out of storage space.

Because of the client cache and the simulation and configuration repositories, this project requires persistent data and verification of that data.