Caterpillar Tractors: An UI Design Embedded with Remote Controller

Team 2
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Problem Statement

- Need for the remote task machine operations
- Caterpillar need their own remote controllers

Our Goal

- Develop a nice UI for the remote controller for the CAT machines
- Integrate it with the new features like sensor, mobile app
- Operate it remotely efficiently and effortlessly

Proof-of-Concept Prototype

Cell phone APP embedded with the **Remote Controller** to fulfill the needs of both the experienced and novice operators.

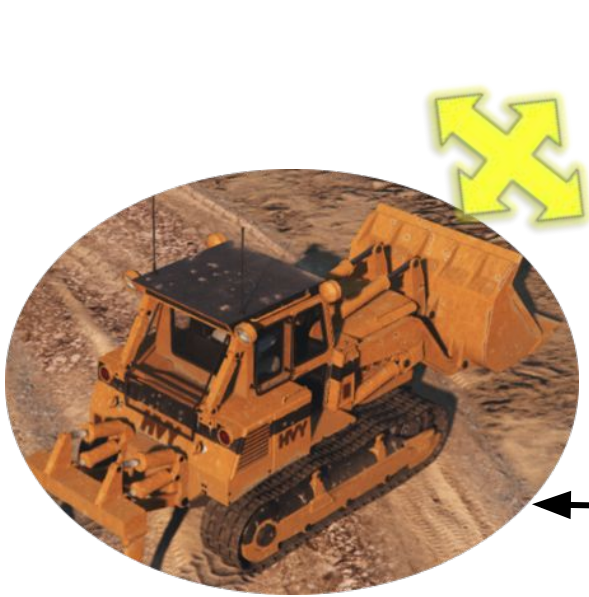
Cell Phone (Android System)

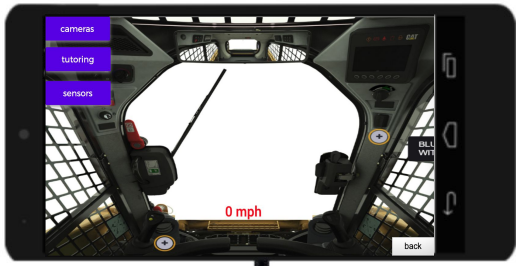
Remote Controller

Proof-of-Concept Prototype

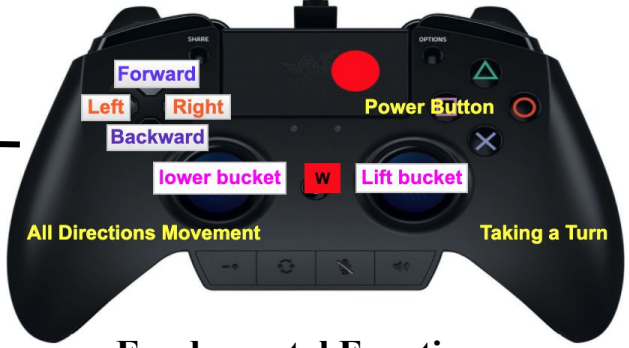
Fundamental Functions

Proof-of-Concept Prototype





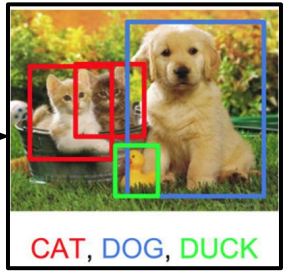
High-Level Functions



Fundamental Functions

Camera

Tutoring system



Object Detection

Phase 1: Research

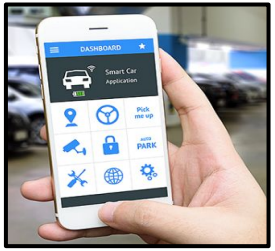
Challenges to deal with:

- Safety
- Cost
- Visibility
- Communication with new operators
- Test

Problems/Opportunities

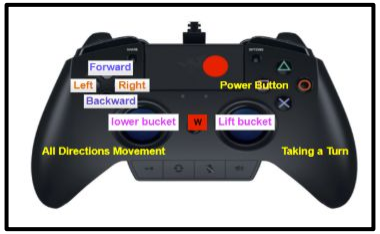
- Ensuring Robustness
- Scalability
- Authorized login

Phase 2: Generate



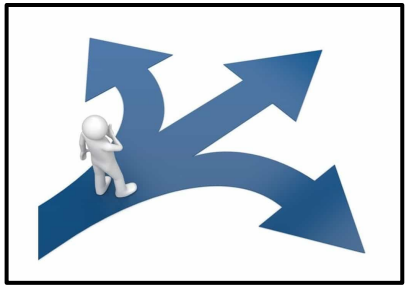
Mobile Application

VR control system



Remote Joystick Control

Remote Drive Setup



Tutoring System

360° - view

Sensor feedback

Phase 3: Choose

We decided to combine the following ideas:

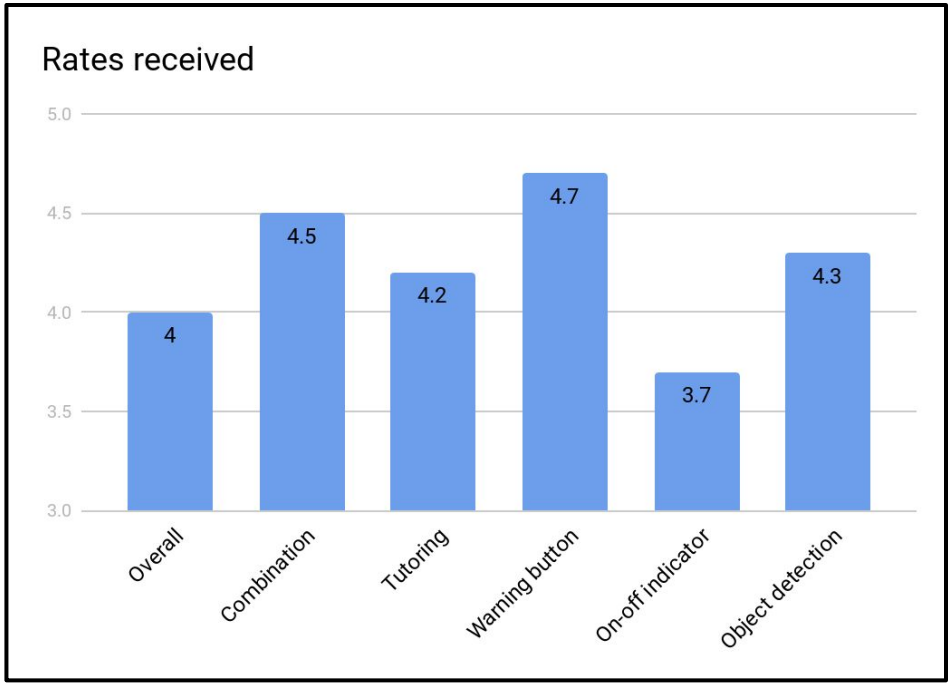
- Mobile application: Visibility, Secure Authorization and Connectivity
- Remote control joystick: Ease of control, Preserving haptic feedback
- Tutoring system: Module oriented learning for the new and existing operators
- Sensor feedback: Operator is responsive during the potential hazards

Phase 4: Prototype

Online prototype: https://feelbergood.github.io/RemoteControlTractors/prototype

Walkthrough video: https://www.youtube.com/watch?v=6sFXXeZlncw&feature=emb_title

Phase 5: Evaluation



Patterns

- Prototype received positive feedbacks
- Ideas of mobile-RC combination, tutoring system , physical warning button and object detection are successful
- Power on-off indicator is redundant

Follow-ups

- Use joysticks on remote controller for steering
- Make tutoring system more interactive and add details
- Add mechanism to prevent misclicking warning button
- Remove power on-off indicator
- Prevent object detection system to avoid mixing real hazards with the ordinary objects at job sites

Thank You