

# #tractorexperience-dgk

CSC 591, Spring 2018

## Stage 5: Evaluation

### Team

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### Phase 1

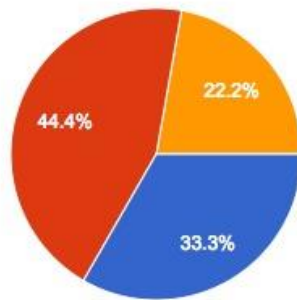
#### Participants

- Number of participants: 5
- The characteristic we were looking for:
  - Different levels of driving experience (from no experience to experienced)
  - Familiarity with UTVs
  - Even gender distribution
  - Driven UTV before
- The characteristics of the participants:
  - Students
  - Ages 23 to 27
  - 3 male, 2 female
  - Varied driving experience  
(from no experience to 4+ years of driving experience)
- We sent out screening forms to students of Computer Science department. We received 9 responses and we chose 5 of them who met the characteristics we were looking for. However, none of the participants had driven UTV before.
- Link to survey: <https://goo.gl/forms/PBGiktutHrKINppm2>

## Survey Results

### Years of driving experience

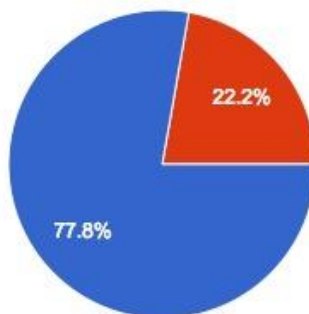
9 responses



- <1 year
- 1-3 years
- >3 years

### Gender

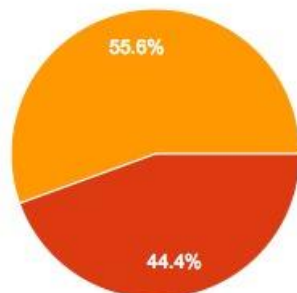
9 responses



- Male
- Female
- Prefer not to say

### Have you heard of/driven UTV?

9 responses



- Yes for both
- Heard of but not driven
- Neither

## Lab

- We used a room in the Graduate Student Commons at James B. Hunt Jr. Library to perform our evaluation.
- We provided all 5 participants with laptops and headphones.
- 5 of the team members were in the same room as the participants taking down notes.
- The demo videos were played in the laptops given to the participants.
- After the demo, Zankruti interviewed all the participants, while the other team members took notes.

## Interviews

### Questions

- Introductory questions were asked to gain a basic understanding of the participants' driving experience and their familiarity with utility vehicles:
  - Questions:
    - Do you know how to drive?
    - For how many years have you been driving?
    - Are you familiar with utility vehicles?
    - Have you ever driven a utility vehicle before?
  - After this introductory session Vignesh explained about the concept of utility vehicles, their common usage, benefits and showed images of the insides and dashboard of utility vehicles.
- User Experience:
  - Next we asked the participants to comment on the usability and usefulness of the new dashboard.
  - We also asked them for general feedback on how to improve the user experience of the dashboard.
- Feature Ratings:
  - We asked the participants to rate the features on a scale of 1 to 5.

## Grid

	1	2	3	4	5
INTRODUCTION	<ul style="list-style-type: none"> <li>- Yes, I know to drive</li> <li>- I've been driving for 5 years</li> <li>- Yes, I've even driven before</li> <li>- No, I haven't</li> </ul>	<ul style="list-style-type: none"> <li>- No</li> <li>- 0</li> <li>- No</li> <li>- No</li> </ul>	<ul style="list-style-type: none"> <li>- YES</li> <li>- 6 months</li> <li>- YES</li> <li>- No</li> </ul>	<ul style="list-style-type: none"> <li>- Yes I can drive</li> <li>- For about 10 years</li> <li>- Yes I can</li> <li>- No</li> </ul>	<ul style="list-style-type: none"> <li>- Yes I can drive</li> <li>- 2 years</li> <li>- No</li> <li>- No</li> </ul>
NEW DASHBOARD	<ul style="list-style-type: none"> <li>- Looks cool &amp; modern. Could be useful for work</li> <li>- I definitely like the bigger display over the smaller one. Turn on looks even cooler</li> </ul>		<ul style="list-style-type: none"> <li>- I like the locked indicators. Higher work speed in real life</li> </ul>	<ul style="list-style-type: none"> <li>- Is intuitive &amp; useful. I like it</li> </ul>	<ul style="list-style-type: none"> <li>- Too much information is displayed. Sound a little confusing to me</li> </ul>
FEATURE RATINGS (1-5)					
INTER-UTV COMMUNICATION	3	5	4	4	4
TERRAIN DETECTION	5	3	4	5	4
INFRARED SENSING	5	2	3	4	4
VOICE-INTERACTIVE DASHBOARD	5	4	4	5	5

## Results

### Patterns Found:

- The participants had varied driving experiences, ranging from no experience to 4+ years of driving experience.
- None of the participants had driven UTV before.
- Majority of the participants found the new dashboard intuitive and useful.
- One of the participants felt there was too much information displayed on the dashboard.
- Feature ratings:
  - Inter-UTV Communication: 4.0
  - Terrain Detection: 4.2
  - Infrared Sensing: 3.6
  - Voice-Interactive Dashboard: 4.6

### Follow-up Required:

- The amount of information displayed on the dashboard should be customizable by the user.
  - Based on the feedback we received from our professor and the client, we realized that using a non-interactive prototype and having the participants watch videos of the prototype was not an intuitive evaluation method for measuring user experience.
  - To address this drawback, we decided to perform a second round of evaluation where the participants can interact with the system.
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## Phase 2

### Participants

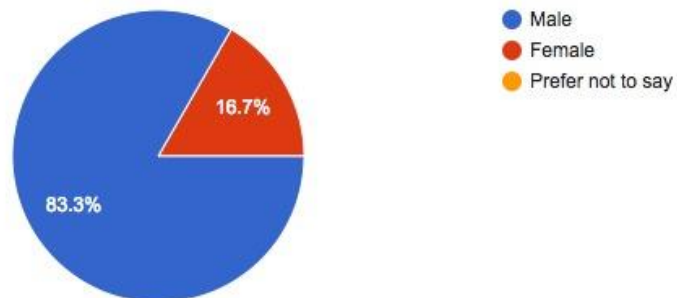
- Number of participants: 5
- The characteristic we were looking for:
  - Different levels of driving experience (from beginner to experienced)  
We decided to not include participants with no driving experience for phase 2 evaluation.
  - Familiarity with UTVs
  - Even gender distribution
- The characteristics of the participants:
  - Students
  - Ages 24 to 27

- 4 male, 1 female
- Varied driving experience  
(from few months to 3 years driving experience)
- Note: The participants of phase 2 were different from participants of phase 1. Since we changed our evaluation methods, we felt it would be better if we had participants who haven't seen the old prototypes to avoid any bias.
- We sent out the same screening form to students of Computer Science department. We received 6 responses and we chose 5 of them who met the characteristics we were looking for. However, none of the participants had driven UTV before.

## Survey Results

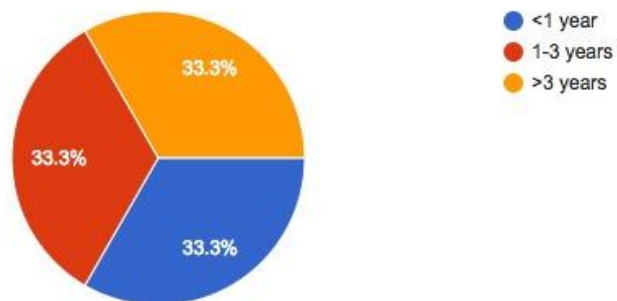
### Gender

6 responses



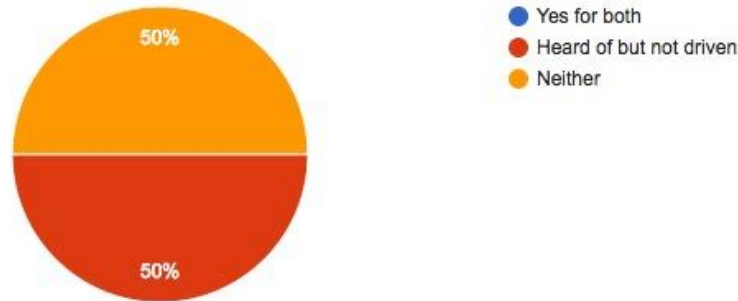
### Years of driving experience

6 responses



## Have you heard of/driven UTV?

6 responses



### Lab

- We used the Game Lab in D. H. Hill library to perform our evaluations.
- We interviewed our participants one-by-one and two interviewers were present - one controlled the dashboard visuals & sounds on a laptop, one measured response time.
- The participant was asked to keep driving in the car driving game 'Need for Speed'. We kept the dashboard visual open on a laptop in front of them while they were driving.
- The dashboard was animated as per our use cases and displayed the warning messages & played sound alerts for each use case.
- For each use case, we performed two experiments: we displayed the warning on the dashboard display alone and after a while we displayed the same warning along with a voice alert. This was done to measure how the response time varies when there was an additional sound alert.
- The observed measured the user's response time with a stopwatch - how long it took for the user to slow down / brake according to the alert given.
- For the inter-UTV communication use case, we first gave the user a mobile phone and asked him/her to respond where there was an incoming text. For the next experiment the text was spoken out loud by the dashboard and the participant had to respond by voice.
- Tools used: gaming console, laptop (to display dashboard), mobile phone (for inter-UTV communication use case), stopwatch (to measure response time)









## Interviews

### Questions

- We asked introductory questions to participants to gain an understanding of how familiar they are with gaming consoles.
- Questions:
  - Are you familiar with gaming console?  
(If they answered no, we planned on giving them an introductory gaming tutorial. But all our participants were familiar.)
  - Have you ever tried an interactive dashboard in any vehicle before?
- For each of our four use cases, we let the user play the game with the dashboard in front of him/her, and recorded what action they took and measured response time.
- After each use case we asked the following questions to them:
  - Was the voice alert useful or annoying?
  - Would you prefer the alert to warn you or you want the vehicle to automatically take action?
  - Provide feedback for this prototype.

# Grid

	1	2	3	4	5
TERRAIN DETECTION	<p>VOICE + DASHBOARD</p> <p>- Response: ✓</p> <p>- Time: 0.4 s</p> <p>DASHBOARD</p> <p>- Response: X</p>	<p>VOICE + DASHBOARD</p> <p>- Response: ✓</p> <p>- Time: 0.39 s</p> <p>DASHBOARD</p> <p>- Response: X</p> <p>- Time: -</p>	<p>VOICE + DASHBOARD</p> <p>- Response: ✓</p> <p>- Time: 0.32 s</p> <p>DASHBOARD</p> <p>- Response: ✓</p> <p>- Time: 0.71 s</p>	<p>VOICE + DASHBOARD</p> <p>- Response: X</p> <p>DASHBOARD</p> <p>- Response: X</p>	<p>VOICE + DASHBOARD</p> <p>- Response: ✓</p> <p>- Time: 1.12 s</p> <p>DASHBOARD</p> <p>- Response: ✓</p> <p>- Time: 1.1 s</p>
WEATHER DETECTION	<p>VOICE + DASHBOARD</p> <p>- Response: ✓</p> <p>- Time: 0.59 s</p> <p>DASHBOARD</p> <p>- Response: X</p>	<p>VOICE + DASHBOARD</p> <p>- Response: ✓</p> <p>- Time: 0.28 s</p> <p>DASHBOARD</p> <p>- Response: ✓</p> <p>- Time: 0.61 s</p>	<p>VOICE + DASHBOARD</p> <p>- Response: ✓</p> <p>- Time: 0.45 s</p> <p>DASHBOARD</p> <p>- Response: ✓</p> <p>- Time: 0.41 s</p>	<p>VOICE + DASHBOARD</p> <p>- Response: ✓</p> <p>- Time: 0.61 s</p> <p>DASHBOARD</p> <p>- Response: X</p>	<p>VOICE + DASHBOARD</p> <p>- Response: ✓</p> <p>- Time: 0.15 s</p> <p>DASHBOARD</p> <p>- Response: ✓</p> <p>- Time: 1.09 s</p>
INFRARED DETECTION	<p>VOICE + DASHBOARD</p> <p>- Response: ✓</p> <p>- Time: 0.51 s</p> <p>DASHBOARD</p> <p>- Response: X</p>	<p>VOICE + DASHBOARD</p> <p>- Response: ✓</p> <p>- Time: 0.51 s</p> <p>DASHBOARD</p> <p>- Response: X</p>	<p>VOICE + DASHBOARD</p> <p>- Response: ✓</p> <p>- Time: 0.81 s</p> <p>DASHBOARD</p> <p>- Response: X</p>	<p>VOICE + DASHBOARD</p> <p>- Response: ✓</p> <p>- Time: 0.44 s</p> <p>DASHBOARD</p> <p>- Response: X</p>	<p>VOICE + DASHBOARD</p> <p>- Response: ✓</p> <p>- Time: 0.71 s</p> <p>DASHBOARD</p> <p>- Response: ✓</p> <p>- Time: 1.16 s</p>
INTER-UTV COMMUNICATION	<p>TRADITIONAL</p> <p>- Response Time: 4.42 s</p> <p>- Shown down while working</p> <p>THROUGH DASHBOARD</p> <p>- Response Time: 2.1 s</p>	<p>TRADITIONAL</p> <p>- Shipped already suspended</p> <p>THROUGH DASHBOARD</p> <p>- Response Time: 1.9 s</p>	<p>TRADITIONAL</p> <p>- Response Time: 3.26 s</p> <p>- Shown down while working</p> <p>THROUGH DASHBOARD</p> <p>- Response Time: 1.61 s</p>	<p>TRADITIONAL</p> <p>- Shipped already suspended</p> <p>THROUGH DASHBOARD</p> <p>- Response Time: 1.1 s</p>	<p>TRADITIONAL</p> <p>- Shipped already suspended</p> <p>THROUGH DASHBOARD</p> <p>- Response Time: 1.44 s</p>

## Results

### Patterns Found:

- For inter-UTV communication use case, all participants responded in a positive manner for the option to respond through voice. When they were asked to respond through traditional methods using the mobile phone while driving, most of them stopped driving to respond, while some of them slowed down in the game and responded. So the response time to respond through voice using the dashboard was much faster than texting through mobile phone.
- For infrared detection use case, the participants were confused by the “..obstacle ahead..” alert as the obstacle may not be in the user’s direct view.
- Response time was always faster when both voice and dashboard alerts were given, as opposed to just displaying the alert on the dashboard.
- In some cases, when there was only dashboard alert, the user did not notice the alert and continued driving at their own pace without taking any action.

### Follow-up Required:

- Users were confused by the infrared detection use case which alerted “..obstacle ahead..”. The obstacle may not be in the user’s direct view and the message needs to be modified.
  - For the terrain detection and weather detection use cases, users suggested that recommending an alternate path will be useful instead of just warning about bad terrains ahead or flood alerts.
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