Usability Studies: Task Design
Homework Discussion

• Rust error message challenges. What research methods?

• Bank: use Coq instead of COBOL.
  • How will this change affect reliability?
  • How will this change affect recruiting?
USABILITY STUDY TASKS

• Choose an *interesting* task
  • One that you think might be hard
  • One that is central to the usability of your design
• Can't test everything
TASK IDEAS

• Write a program according to this specification.
• Are there bugs in this code? If so, what are they?
• Fill in the missing code…
• What does this code do?
• Answer these questions about this code.
TASK DESIGN

• Must carefully restrict tasks!

• People will get stuck on irrelevant things

• Decide how much help to provide

• Ideally: scope task to focus on the variable of interest

• Constrain the task as much as possible.
DECOMPOSING TASKS

Monolithic task

Subtasks
DATA COLLECTION

- Think-aloud
- Audio recordings
- Videos
- Screen capture
- Eye tracking
- Post-study survey

- Take lots of notes!, including timestamps! You do not want to watch the videos.
- Include a clock on the screen.
THINK-ALOUD

- Two varieties: concurrent and retrospective
- "Please keep talking."
- Can't use timing as a dependent variable due to effect of explanations.
TASK CONTEXTS

- Pencil/paper
- Text editor
- IDE
- Compiler?
- Debugger?
- Test cases?
Q: What challenges do web programmers encounter when using Django to write web apps?

(who?)

Plan: Recruit people who say they've made at least one web site in Django

(what does one web site mean?)

Task attempt 1: "write a gradebook app in Django. You have 1 hour."

What is a gradebook app?

Where do you think people will get stuck?
TRY 2

• Refine task:
  
  • Here is a gradebook app, but the component that shows a student their grades is incomplete. Write `displayGrades()`, which will display a student's grades.

• What format?

• Are you measuring Django, or the SQL API, or the particular database schema, or something else?
TRY 3

• Refine research question
• What problems do Django programmers encounter when handling errors?
• Put them in a situation where they will encounter errors!
• What kind of errors?
• Hypotheses:
  • They will forget to check for errors
  • They will misinterpret error codes
  • They will have trouble figuring out the causes of errors they encounter, even when the errors are common (e.g. "server unreachable")
```solidity
contract Auction {
    // the bidder who made the highest bid so far
    address maxBidder;
    uint maxBidAmount;

    // 'payable' indicates we can transfer money to this address
    address payable seller;

    // Allow withdrawing previous money for bids that were outbid
    mapping(address => uint) pendingReturns;

    enum State { Open, BidsMade, Closed }
    State state;

    function bid() public payable {
        if (state == State.Open) {
            // Initialize destination state,
            // and then transition to it.
            biddingMade::maxBidder = bidder;
            biddingMade::maxBid = money;
            ->biddingMade;
        } else {
            if (this in BidsMade) {
                // if the newBid is higher than the current Bid
                if (msg.value > maxBidAmount) {
                    //1. TODO: fill this in
                    pendingReturns[maxBidder] += maxBidAmount;
                    maxBidder = msg.sender;
                    maxBidAmount = msg.value;
                } else {
                    //2. TODO: return the newBid money to the bidder,
                    // since the new bid wasn't high enough.
                    pendingReturns[msg.sender] += msg.value;
                } else {
                    revert("Can only make a bid on an open auction.");
                }
            } else {
                revert("Can only make a bid on an open auction.");
            }
        }
    }
}
```
YOUR TURN

• You are interested in studying challenges that programmers have when using pointers.

• Design tasks that you will give your participants in a 1-hour study.

• Two versions:
  • Beginning C programmers (new to pointers)
  • Expert C programmers
CONCLUSION

• Running usability studies requires:
  • Recruiting
  • Training
  • Task design
  • Data collection/analysis
• Task design is probably the trickiest. Start early and pilot!