Lab is closed r so i went to grab food
Will be back at 6

Yes we got the circuit almost working - if we can get a gain then we will draw and send to PCB team for next iteration

Did you work on the vibration motor adjusting?

I have the parts out on the table and found a tutorial for it
but haven't started working on it


_precision Microdrives

*How to Drive a Vibration Motor with Arduino and Genuino* | Precision Microdrives
Looking to drive a DC vibration motor using an Arduino or Genuino? In this article you'll find simple circuitry, suggestions on using PWM, and example code to download.

Okay. Also, did you see the button that we never finished attaching to the bracelet and pin housing?

Lab just opened back up

Apps for Slack

Wrike

Trello

+Poll apps!
Primary research questions

How do the online communication patterns of student product design teams vary?

Do these patterns relate to the strengths of their design processes?
Hypotheses about how communication patterns would relate to design process strength

**Quantity** of communication would change with respect to course milestones, increasing throughout the semester.

High quantity of total team messages would not necessarily correlate with a stronger design process.
What defines the “strength of a team's design process?”

Teams with **stronger** processes:
- Made decisions efficiently
- Delivered prototypes in line with the design process
- Sought resources appropriately
- Worked well together

Teams with **weaker** processes:
- Had trouble making decisions
- Delivered prototypes that didn’t contribute to learning
- Didn’t seek help effectively
- Had concerning team dynamics

Observed staff meetings, milestone debriefs

Used these criteria to sort the teams in this study: 8 stronger teams and 8 weaker teams
Hypotheses about how communication patterns would relate to design process strength

**Quantity** of communication would change with respect to course milestones, increasing throughout the semester.

High quantity of total team messages would not necessarily correlate with a stronger design process.

**Uniformity** of a team’s online communication would correlate with a stronger design process:

- **Consistency** of daily team messages sent throughout the semester
- **Equality** of percentages of team messages sent by individuals
Analysis methods

First way I analyzed communication:
Daily messages sent by team

<table>
<thead>
<tr>
<th>Quantity</th>
<th>14,966 messages total</th>
<th>4147 messages total</th>
</tr>
</thead>
<tbody>
<tr>
<td>More quantity</td>
<td></td>
<td>Less quantity</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Uniformity (consistency)</th>
<th>Standard deviation of 143</th>
<th>Standard deviation of 45</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less consistent</td>
<td></td>
<td>More consistent</td>
</tr>
</tbody>
</table>
Second way I analyzed communication:
Percent of team messages sent by individuals

<table>
<thead>
<tr>
<th>Quantity</th>
<th></th>
<th>Uniformity (equality)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>29% messages sent by most</td>
<td>Standard deviation of 7</td>
<td>Less equal</td>
<td>Standard deviation of 3</td>
</tr>
<tr>
<td>communicative individual</td>
<td></td>
<td></td>
<td>More equal</td>
</tr>
<tr>
<td>12% messages sent by most</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>communicative individual</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

One slice represents one individual
Quantity of communication changed throughout semester

Total daily Slack activity of all 2016 and 2017 teams (282 students) throughout the semester compared to course milestones

Dips in communication after every milestone
High quantity of online communication didn’t correlate with time spent working

Reported timesheet hours with quantity of Slack messages of 282 students over the course of the semester, normalized

Normalized daily timesheet hours versus daily quantity of Slack messages of all teams. $R^2 = 0.2$

Low communication doesn’t mean low progress (if progress correlates with time spent working)
Lower quantities of communication might suggest a stronger team process.
Bootstrap resampling
Bootstrap resampling
Bootstrap resampling
Lower quantities of communication might suggest a stronger team process.

Bootstrap distributions of stronger and weaker teams’ quantity measurements

One-tailed z-test showed that stronger teams had lower communication quantities.

p-value of 0.21
**Consistency** of communication might suggest a stronger team process

<table>
<thead>
<tr>
<th>Quantity of messages</th>
<th>Time (days)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>σ of stronger teams</th>
<th>σ of weaker teams</th>
</tr>
</thead>
<tbody>
<tr>
<td>74</td>
<td>57</td>
</tr>
<tr>
<td>82</td>
<td>143</td>
</tr>
<tr>
<td>76</td>
<td>77</td>
</tr>
<tr>
<td>57</td>
<td>57</td>
</tr>
<tr>
<td>92</td>
<td>87</td>
</tr>
<tr>
<td>45</td>
<td>119</td>
</tr>
<tr>
<td>98</td>
<td>50</td>
</tr>
<tr>
<td>82</td>
<td>87</td>
</tr>
</tbody>
</table>
**Consistency** of communication might suggest a stronger team process.

Bootstrap distributions of stronger and weaker teams’ consistency measurements:

One-tailed z-test showed that stronger teams had higher communication consistencies.

p-value of 0.24
Equality of communication might suggest a stronger team process.
Equality of communication might suggest a stronger team process

Bootstrap distributions of stronger and weaker teams’ equality measurements

One-tailed z-test showed that stronger teams had higher communication equalities

p-value of 0.09
System Integrators are among the most communicative individuals

Equality of communication by team

All teams had at least one SI in the top three most communicative members

Communication patterns of SIs are important to study
Slack communication: Take-aways

Communication patterns were quite varied between teams

**Quantity** of communication isn’t necessarily an indicator of progress; low communication doesn’t always mean low project progress

**Uniformity** of communication is possibly a better indicator; teams with uniformity have tended to follow stronger design processes and have better outcomes
Now for four year's worth of data!

Analysis of virtual communication within engineering design teams and its impact on team effectiveness.
Lauren Adolphe, Georgia D. Van de Zande, David Wallace, Alison Olechowski

Central leadership style:
Team leads are most central to the network

![Diagram showing eigenvector centrality by role with p < 0.001]
Now for four year’s worth of data!

Analysis of virtual communication within engineering design teams and its impact on team effectiveness.
Lauren Adolphe, Georgia D. Van de Zande, David Wallace, Alison Olechowski

Value of Nonverbal Communication:
Stronger teams use emojis at a higher rate

![Box plots showing reactions per message and percent of messages with reactions for weaker and stronger teams.](image)

- Reactions per message: p < 0.01
- Percent of messages with reactions: p < 0.1
Now for four year’s worth of data!

Analysis of virtual communication within engineering design teams and its impact on team effectiveness. Lauren Adolphe, Georgia D. Van de Zande, David Wallace, Alison Olechowski

Leading with Emotion:
Team leads send and receive more emojis

![Box plots showing percentage of team reactions sent and received by role, with statistical significance p < 0.001 for both teams and roles.](chart.png)
Other ways to communicate