**Action #1**

Expand on the core concepts and actions/tasks involved

Ideas:

1. 4-5 main tools spacewalkers use, design system to maybe carry and merge them  
   Type: Tools  
   List of Commonly Used Tools
   1. [Pistol-Grip Tool](http://www.airspacemag.com/space/tools-of-the-astronaut-trade-15273242/?no-ist)
   2. [Robot Crane](http://www.airspacemag.com/space/tools-of-the-astronaut-trade-15273242/?no-ist)
   3. [Trace Gas Analyzer](http://www.airspacemag.com/space/tools-of-the-astronaut-trade-15273242/?no-ist)
   4. [Safety Tethers](http://www.airspacemag.com/space/tools-of-the-astronaut-trade-15273242/?no-ist)

1. Google glass, like device that is fed by articulating camera for expanding field of vision for astronauts  
   Type: Device (maneuverability)

In the article given by chris they started the design for this sort of display as a part of a large wearable computer.

**Issues:**

- A computer screen exists on the front panel of the breastplate to view the status of survival equipment

- maybe, eye tracking need.

1. Device that shows information (example could replace or add to the little book on their wrist)  
   Type: Device (information)  
   - The booklet contains procedures to follow during spacewalks.

HAHA Chris sent us this article: <http://papers.sae.org/911529/>

this thing is pretty much more or less what we had proposed lol! Unfortunately this article didn’t discuss the pitfalls of this idea.

**Action #2**

Research what are commonly performed tasks on a spacewalk. Test the above ideas’ applicability against these tasks.

Common Tasks

* Fix parts
  + <http://www.theguardian.com/science/video/2013/dec/21/nasa-spacewalk-repair-international-space-station-video>
* Clear space debris
  + <http://www.themarysue.com/female-nasa-toothbrushspacewalk-record/>

[**EVA suit article**](http://pubs.media.mit.edu/pubs/papers/TR-551.pdf) **notes**

*Acronyms*

*EVA*: extravehicular activities

*EMU*: extravehicular mobility unit

*UHF*: Ultra High Frequency

*ORLAN*:

*TDMA*: Time Division Multiple Access

*AP*: access points

*ISS*: International Space Station

*MCC*: Mission Control Center

*DCM*: display and control module

LCVG: Liquid Cooling and Ventilation Garment

**Current Limitations of system:**

-Major limitations during EVA include the need to cope

with sensory degradation,

-the limited duration of EVAs,

-limited mobility,

-dexterity,

-force application,

-endurance of suited astronauts,

-operations time

-resource overhead requirements,

-working volume

-access limitations,

-hazards to crew members

**Routes to overcome some of these limitations:**

(1) sense characteristics of the

external environment and communicate those

characteristics to the astronaut;

(2) extend or augment the

senses or capabilities of the astronaut;

(3) enhance the

efficiency with which tasks can be carried out, and

(4)minimize any negative impacts on operations time and

resource overhead

***“Augmenting the existing time division multiple access***

***(TDMA) UHF system with a wireless network would***

***greatly enhance the ability to deliver information to***

***astronauts during EVA” - article***

The wearable computers in the suits could act as intermediate APs to each other and the ISS. See mobile Mobile Ad-Hoc NETwork technology, in military applications:<http://www.cotsjournalonline.com/articles/view/102158>

***“based on interviews with the lunar***

***surface astronauts. The astronauts recommended that***

***future information displays should be simple and relevant***

***to the current task, and desired safety related status***

***information on a call-up basis” - Article***

The booklet contains procedural information, and might have multiple different ones that they bring along for different tasks,

**Operations of the device:**

voice is one option, however could cause interference with existing voice communication

***“IVA crewmembers and MCC flight controllers***

***follow EVA progress very closely, and could direct***

***specific information to an EVA astronaut either by***

***prearranged understanding or at the request of the EVA***

***astronaut.” - article***

Information could be forwarded/displayed to the astronaut by predetermined conditions, or by request of the astronaut from MCC