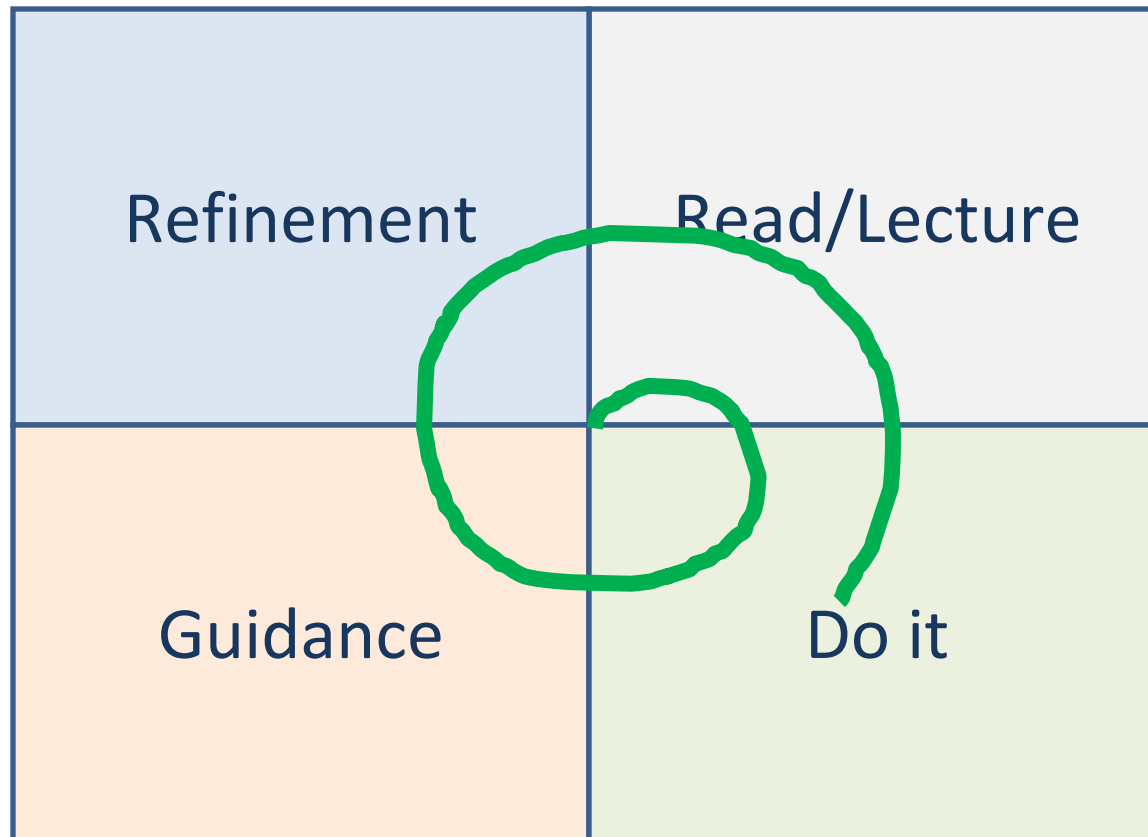




Teaching Process





Purpose of this Mentorship

- Humans are visual creatures
- Cultivation of Imagination
 - “True sign of intelligence is not knowledge, but **imagination** .”
Albert Einstein
- Concepts vs. Techniques and Tools ?
- What we **do** defines us.

Formula for Achievement

$$(\text{Attribute} \times \text{Time})^M = \text{Achievement}$$

- **Attributes** are your gifts:
 - Physical
 - Mental
 - Social
- **Time** cannot be manipulated
- **Motivation** can impact your outcome geometrically

**MOTIVATION CAN
BE CHANGED IN A
HEART BEAT**



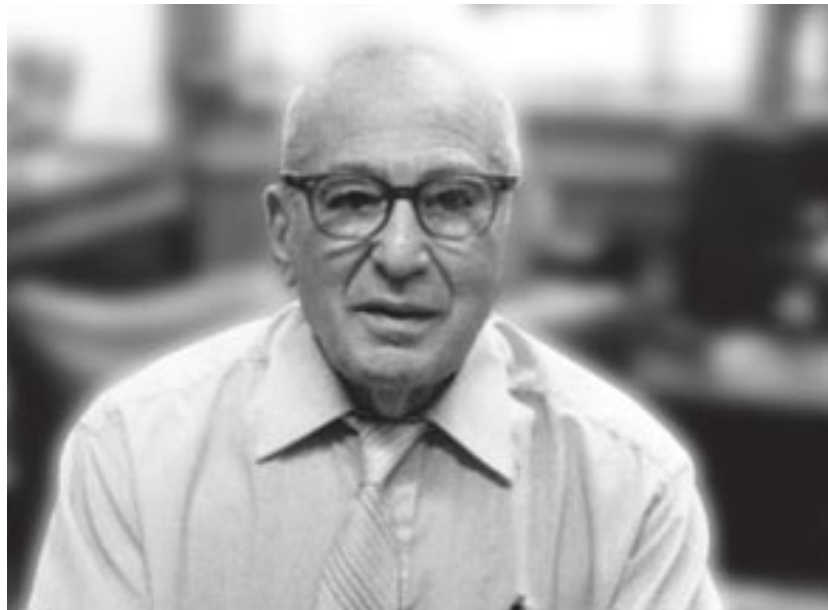


What is a Mentor?

- Mentor: a trusted friend, counselor or teacher, usually a more experienced person.
- Some professions have "mentoring programs" in which newcomers are paired with more experienced people, who advise them and serve as examples as they advance.
- Today mentors provide expertise to less experienced individuals to help them advance their careers, enhance their education, and build their networks.



One of my Mentors



Marvin Camras

Illinois Institute of Technology (IIT) – Bridge Building Competition
IIT 500 – Car Building and Race
EE 383 Electronic and Electrical Circuits

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One of my Mentors

- **Marvin Camras** (1916–1995) was an electrical engineer and inventor who was widely influential in the field of magnetic recording.
- Camras built his first recording device, a wire recorder, in the 1930s for a cousin who was an aspiring singer. **Shortly afterwards he discovered that using magnetic tape made the process of splicing and storing recordings easier.**
- Before and during World War II Camras' early wire recorders were used by the armed forces to train pilots. They were also used for disinformation purposes - battle sounds were recorded and amplified, and the recordings placed where the D-Day invasion was not going to take place. This work was kept secret until after the war.
- In June 1944 he was awarded US Patent number 2351004[1], titled "Method and Means of Magnetic Recording". In all, Camras received more than **500 patents**, largely in the field of electronic communications.
- Camras received a bachelor's degree in 1940 and a master's degree in 1942, both in electrical engineering, from Illinois Institute of Technology (IIT) . In 1968, the institution awarded him an honorary doctorate.
- **In recognition of his achievements, he received the National Medal of Technology award in 1990.**



Goals to Pursuit

- Defend and Promote
 - Life
 - Family
 - Property / Resources
 - Individual Dignity
 - Belief / Intellect
 - (Note: Pursuit must not adversely effect other elements)
- The Engineering Internship Projects – Life Tools
 - Project 1: Technical Evaluation
 - Project 2: Program Management
 - Project 3: Individual Development



SeaPerch ROV

- What is it?
 - SeaPerch is an underwater robotics Remotely Operated Vehicle (ROV) from a kit comprised of low-cost, easily accessible parts, following a curriculum that teaches basic engineering and science concepts with a marine engineering theme.
 - The SeaPerch Program provides students with the opportunity to learn about robotics, engineering, science, and mathematics (STEM) while building an underwater ROV as part of a science and engineering technology curriculum.
 - Throughout the project, students will learn engineering concepts, problem solving, teamwork, and technical applications.

- Why are we using it ?
 - SeaPerch is used to teach many of the concepts required for students using a fun, hands-on activity:
 - Ship and submarine design
 - Buoyancy/displacement
 - Propulsion
 - Soldering/tool safety and usage
 - Vectors
 - Electricity/circuits and switches
 - Ergonomics
 - Waterproofing
 - Depth measurement
 - Biological sampling
 - Attenuation of light
 - Moment arm, basic physics of motion
 - Career possibilities



SeaPerch ROV

- Minimize drag and Improve speed
 - Bulky and large Frame
 - Heavy wire

- Design changes:
 - H-shape frame made of minimal plastic designed for rigidity
 - Motors were angled inwards to provide a **focused thrust**
 - The frame acted as two rudders to guide the SeaPerch, and aided in producing a focused thrust
 - Removed 4th unused wire as well as the wire cover
 - Removed 60 percent of the weight of the cable
 - Floats were added every 5 ft to avoid drag



SeaPerch ROV

■ Improving Maneuverability

- Identifying the Center of Mass – Horizontal and Vertical and balance the design to be symmetrical
- By removing excess foam, we maintained neutral buoyancy, which is important to maintain the SeaPerch's position, without causing it to drift when driving it.
- Shifting foam along the top of the frame on our SeaPerch to get its center of balance in line with the vertical motor was vital so it could move in the proper direction without tilting.
- Motors were also placed further apart horizontally on the frame to allow for quicker turning capabilities.



Propeller Design

- The motors that are part of the Sea Perch kit have very little torque.
- The propeller designs have to be evaluated for the right balance of:
 - Diameter
 - Solidity Factor Ratio of assumed 2-D rotor blade area / disk area
 - Blade pitch to be used.



Propeller Design

■ Motor:

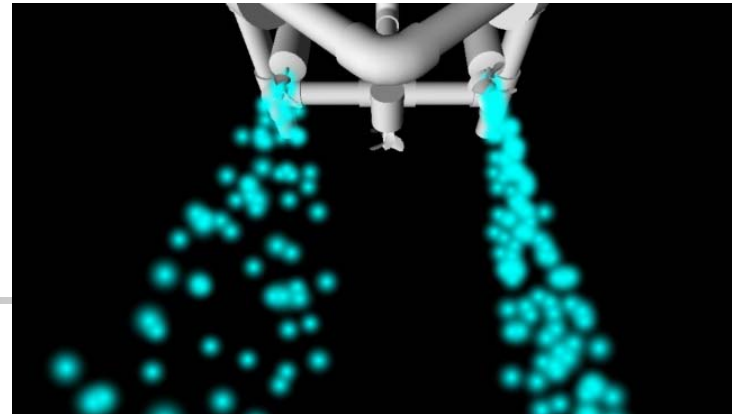
- Nominal Voltage (VDC): 12
- Voltage Range (VDC): 6-18
- Current Amps: 0.74
- Speed RPM: 9820
- Torque (g-cm): 53.5
- Efficiency: 60.7
- Terminal Type: Solder
- Shaft Dia : 0.091"
- Shaft Length: 0.622"
- Body Size (Dia x Depth):
1.082 x 1.279

■ Optimal Propeller

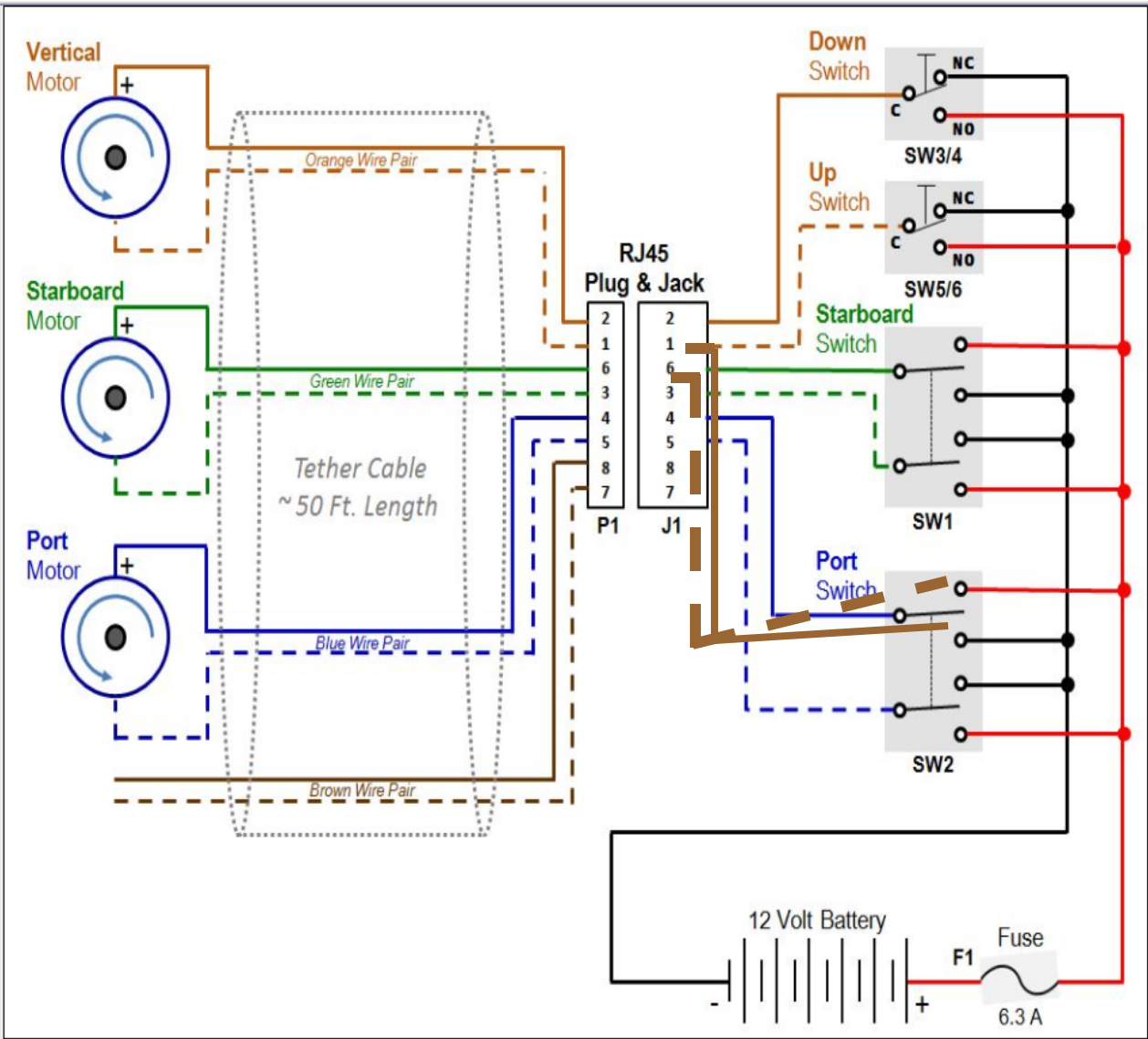
- No of Blades: 2
- Dia : 40-45 mm
(1.55 -1.77")
- Pitch : 60-65 degrees
(bite and then curved to flat)
- Must have max surface area
/ Solidity factor
- Must be smooth / sharp
- Max "clear water"

SeaPerch ROV

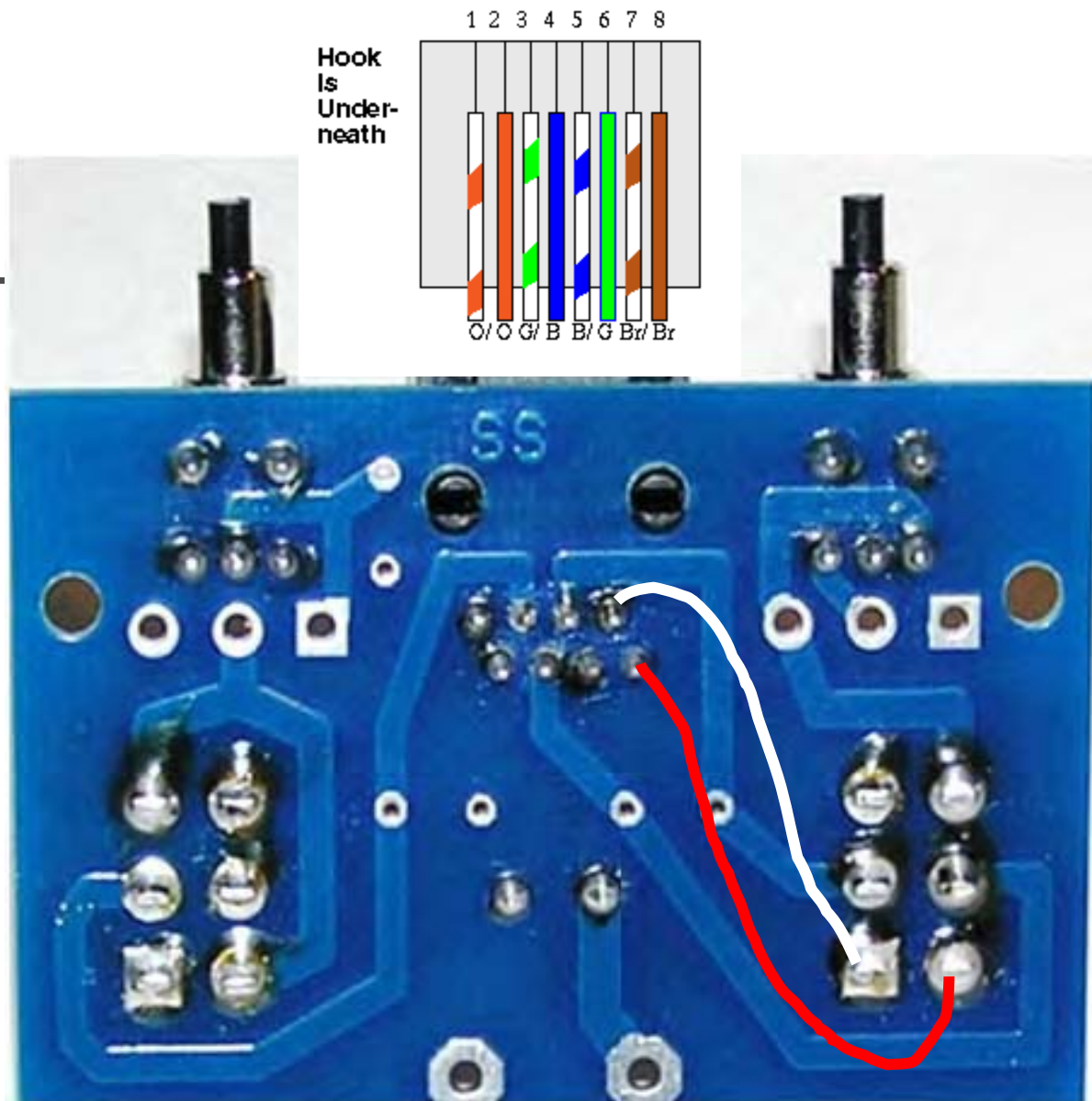
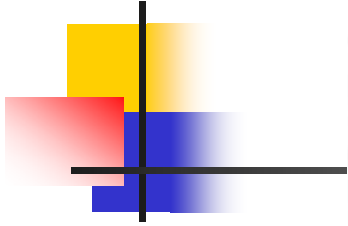
■ Double Propeller Configuration



- Propellers were aligned so that the blades weren't overlapping, allowing the propellers to perform efficiently
- The propeller designs have to be evaluated for:
 - Diameter
 - Blade pitch to be used
 - Solidity Factor Ratio of assumed 2-D rotor blade disk area
- The Blade pitch and diameter of the stock SeaPerch propeller are already optimized for the motors that are part of the kit
 - Diameter : 40-45 mm (1.55 -1.77")
 - Pitch : 60-65 degrees (bite and then curved to flat)
- The addition of the doubled propellers gave the ability to grab more water and decrease the time frame between load and unload is shortened.
 - the propeller will "feel" smoother as it grabs water or loads the blades.
 - It gave an improved focused thrust



Windows Start menu and taskbar area. The Start button is at the top left. Below it is the Start menu with a search bar and a list of folders: Pictures, Alderbran, Best Buddies, bestbuddle..., Breast Can..., Brothers o..., christmas ..., drawers, dump folde..., Fathers Da..., Homecomi..., LC 2011. At the bottom of the Start menu are system tray icons for network, volume, and power. The taskbar shows the time as 6:25 PM, Sunday, 7/8/2012.



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Attributes for Success

1. Strong sense of Purpose
2. Seek out mentors
3. Strength of vision and goal
4. Optimistic
5. Self-assurance – confidence
6. Plan and organization in priority
7. Ability to get needed skills
8. Being observant
9. Love what you are doing
10. Patience