BlueROV2: Autonomous Subsea Pipeline Inspection

Student Research Team: Asif Uddin, Victoria Kapp, Naomi Kroyer, Joshua Zeitlinger
Mentor: Dr. Brendan Englot, Stevens Institute of Technology
Research Assistant: Jinkun Wang, Stevens Institute of Technology

**Homeland Security Challenge**

Subsea pipelines currently require manual inspection by deep sea divers, who are exposed to harsh and dangerous conditions. High pressures mean that divers can only work for periods of two weeks at a time, and require a lengthy depressurizing process when emerging from the water. The BlueROV2 attempts to mitigate these dangers by allowing for a thorough pipeline inspection autonomously while removing divers from dangerous conditions.

**Approach / Methodology**

To develop the autonomy in underwater ROV pipe inspection, this summer research group split into three teams to accomplish objectives in their domain. The three teams: software team, electronics team, and mechanical team each had their own objectives to discover the optimal way to detect, track, and map a subsea pipeline using a sonar equipped remotely operated vehicle.

- **Mechanical Team**
  - Subsea Pipe Mockup
  - Sensor Mounts
- **Electronics Team**
  - Integrate a 5-amp rated switch into the circuit
- **Software Team**
  - Detect, Track, and Map a Subsea Pipeline from Sonar
  - Identify a subsea pipeline from sonar data

**Outcomes / Results**

The research team successfully completed:
- Integration of a 5-amp rated switch
- Subsea Pipe Mockup
- Detecting Pipe Location From Sonar
- Sensor Mounts

**Conclusion**

The improvements made to the BlueROV2 will allow for increased autonomy and more careful subsea pipeline inspection. With continued development, the BlueROV2 will eventually be able to replace the function of deep sea divers, allowing for increased worker safety and more frequent pipeline inspection.

**Acknowledgements**

This research was conducted as part of the Maritime Security Center’s 9th Annual Summer Research Institute, hosted by Stevens Institute of Technology. The equipment and idea behind this research was provided by Professor Englot and his accomplished team of graduate students.

*This material is based upon work supported by the U.S. Department of Homeland Security under Cooperative Agreement No. 2014-ST-062-MIC001. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Department of Homeland Security.*