Comparison

1. Control Algorithm:

- A Novel Wearable Soft Glove for Hand Rehabilitation and Assistive Grasping: Implements a force/position hybrid PID control algorithm, adjusting pressure for enhanced rehabilitation and object manipulation .
- Bidirectional Soft Glove for Hand Rehabilitation-Assistance Tasks: Also relies on PID control, combining force and position control for safe grasping and rehabilitation .
- Soft Robotic Glove for Combined Assistance and At-home Rehabilitation: Utilizes a sliding mode controller (SMC), which is more robust against uncertainties and offers precise control of actuator dynamics .

Conclusion:

Both SMC and PID can be used with SMC being more robust to external changes and unpredictable situations. This comes at the price of being much more complex than PID, along with having a tendency to cause chattering (oscillations in the control signal). However, it is better to use PID the project since implementation would under controlled conditions with new components which should minimize any unpredictable situations (such as fluctuations in air pressure).

2. Actuator:

- A Novel Wearable Soft Glove: Features pneumatic bending and rotating actuators that allow for flexion, extension, abduction, and adduction, covering a wide range of hand motions (silicone cast along with wax needed for manufacturing of gloves). It has a straightforward design.

- Bidirectional Soft Glove: Employs a hybrid actuator combining pneumatic actuators for flexion and shape memory alloy (SMA) actuators for extension, adding complexity and improved bidirectional motion.

- Soft Robotic Glove for Combined Assistance: The design focuses on a pneumatic system, offering higher motion ranges and prioritizing ease of use by using a more complex glove design (includes multisegment glove actuation)

Conclusion:

We should focus on a single actuation system rather than a hybrid to decrease complexity of the project (a pneumatic system is a reliable option). We could perhaps utilize the soft actuator used in 'Bidirectional Soft Glove' for flexion and extension due to its simple design with the pneumatic system implementation done in 'A Novel Wearable Soft Glove.' Moreover, a constraint to the project could be that adduction and abduction is ignored (as done in 'Bidirectional Soft Glove').

3. Design Complexity:

- A Novel Wearable Soft Glove: Medium complexity with bending and rotating actuators, providing a balance between function and usability.
- Bidirectional Soft Glove: The most complex design, integrating SMA and pneumatic actuators along with a water-cooling system for increased response time.
- Soft Robotic Glove for Combined Assistance: Simpler design, focusing on a lightweight, easy-to-use glove optimized for at-home rehabilitation.

4. General Limitations:

- A Novel Wearable Soft Glove: Limited by the pneumatic actuators' response time and durability along with high pneumatic pressure needed up to 30 kPa for abduction/adduction and 50 kPa for flexion/extension.

- Bidirectional Soft Glove: Its complexity (SMA cooling and hybrid actuators) could limit ease of use and require more maintenance.
- Soft Robotic Glove for Combined Assistance: Limited by the fewer degrees of motion and extremely high air pressure needed (up to 400 kPa)

Conclusion:

The glove designed in 'Novel Wearable Soft Glove' offers a balance in all criteria by providing reliable performance in performing rehabilitation movements while keeping the design complexity and pressure requirements at a minimum.

5. Safety:

- A Novel Wearable Soft Glove: Provides basic safety with soft materials and hybrid control, preventing excessive forces.
- Bidirectional Soft Glove: High safety due to hybrid actuators and force-position control, offering better adaptability to user needs.
- Soft Robotic Glove for Combined Assistance: Prioritizes safety with simple, user-friendly control and robust sliding mode controller for precise handling.

Conclusion:

Both 'Soft Robotic Glove for Combined Assistance' and 'Bidirectional Soft Glove' are slightly safer than 'A Novel Wearable Soft Glove' ; however, this does not justify implementing a much more complex glove if one can be implemented with basic safety features at a much lower complexity (it should be noted that this applies due to the constraint that the glove wont be used commercially but in a demonstration under controlled circumstances).