Wearable assistive robot for rehabilitation

Yulin – Week 2 (Feb. 15 – 19th)

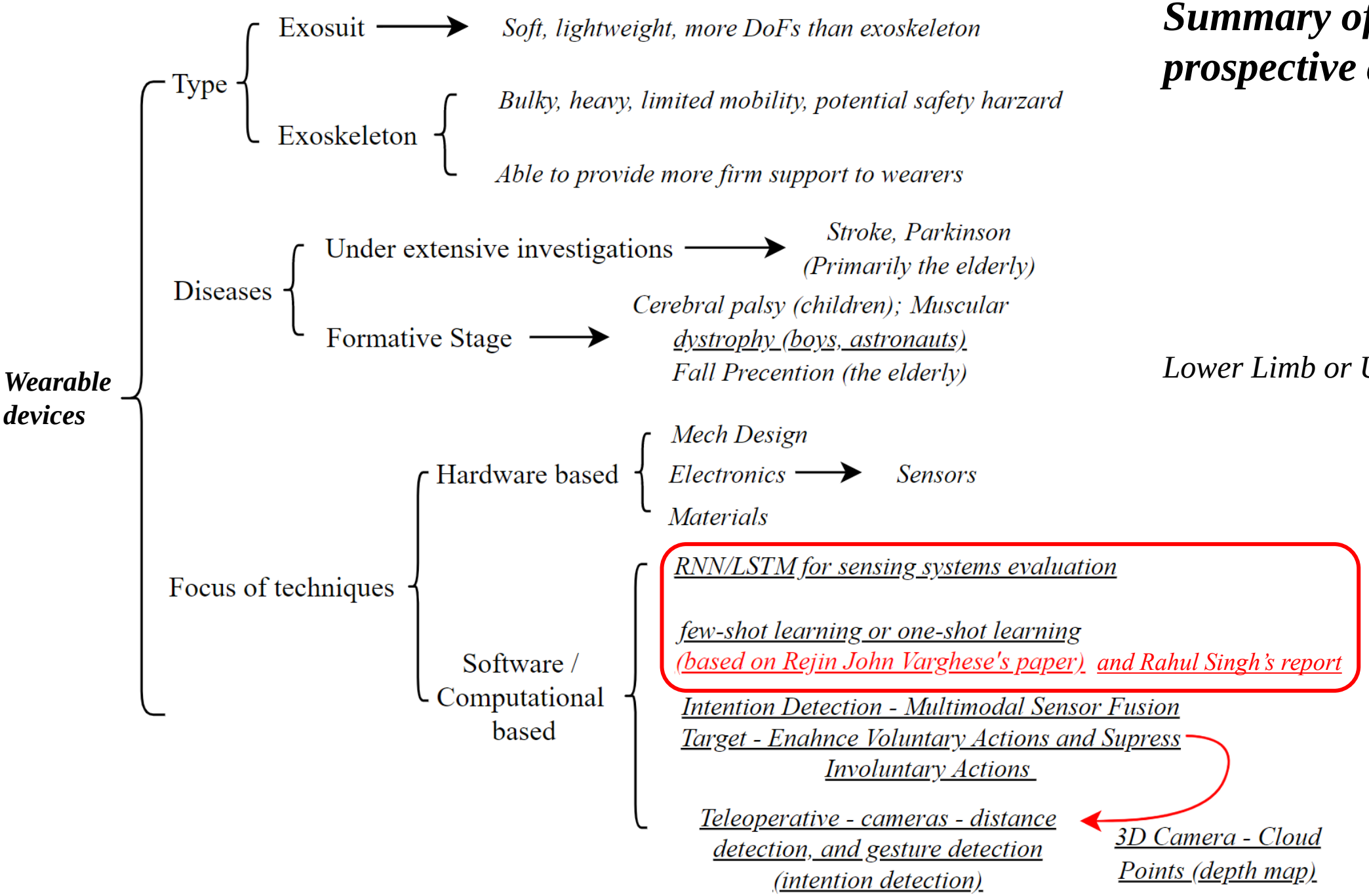
From Diseases Point of View – what leads to paralysis?

- Stroke
- Cerebral palsy – children
- Muscular dystrophy – boys; astronauts after prolonged space travel
- Spinal muscular atrophy (SMA)
- Fall prevention, for the elderly – intention detection
- Dementia, of Alzheimer type – intention detection

Do we have to specifically focus on one type of disease?

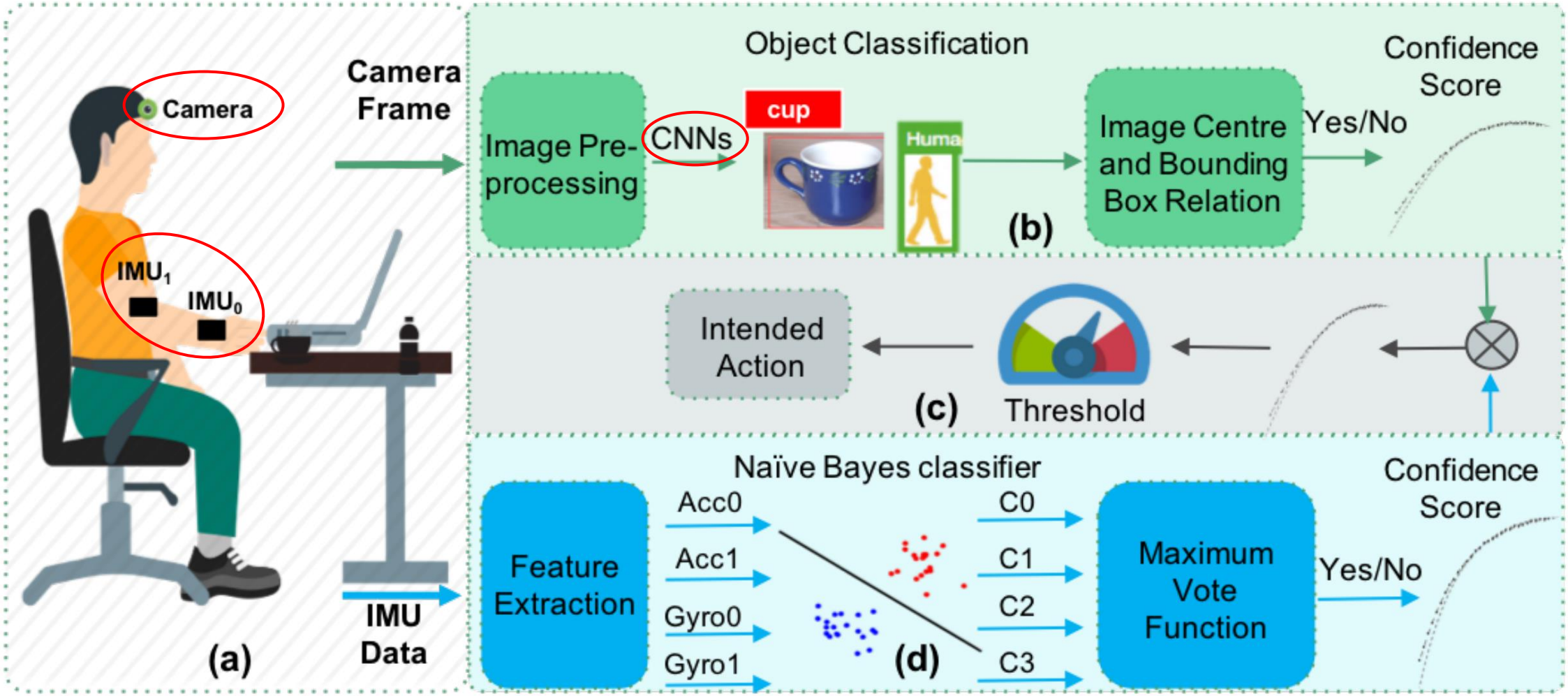
Solve common issues of wearable devices? – Power shortage

Summary of literatures and prospective angles



Lower Limb or Upper Limb?

Rahul Singh's report and methods



Identification of gaps - Sensors fusion for intention detection

From Rahul Singh's report (Sensor fusion – Camera and 2 IMUS), potential improvements:

1. Change the original camera to 3D camera – collect depth data, fused with IMU data (*Optimise the position and direction of the IMU*) – improve identification of objects
2. CNN is computationally consuming – *short battery life and low portability (as it requires laptop and powerful G/CPU to support CNN) (This is the problem of pretty much all the current wearable devices)* – few-shot learning (one image to classify objects – computationally efficient & less power required)
3. CNN needs to be retrained every time a new object is added, namely, not adaptive to new objects – advanced deep learning/transfer learning (few-shot learning, recommended by the author)
4. Object detection accuracy – LSTM (integrate temporal information)
5. From a paper in 2019 – *"Transfer learning-based human activity recognition" – first application of FSL into HAR (New)*

Plan for the next step and Questions

1. **More literature review** – more articles relevant to the area that I want to focus on (Sensor Fusion, IMU, RNN, 3D cameras, depth map, etc.)
2. Get in touch with Rejin J. Varghese and hopefully Alexandrous Kogkas.

Thank you!

- Any suggestion on how I should better facilitate the project at this stage is more than welcome!