

Assembly Instruction Assistant



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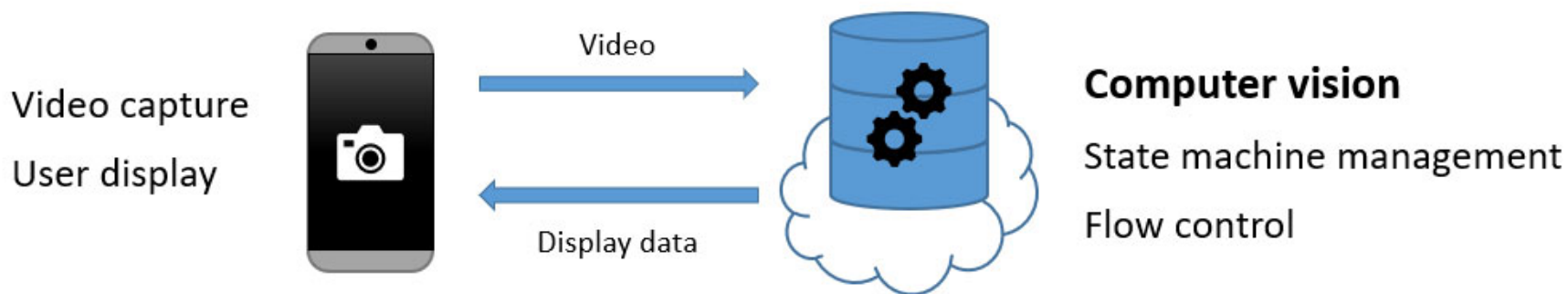
mentored by Roger Iyengar

Problem Statement

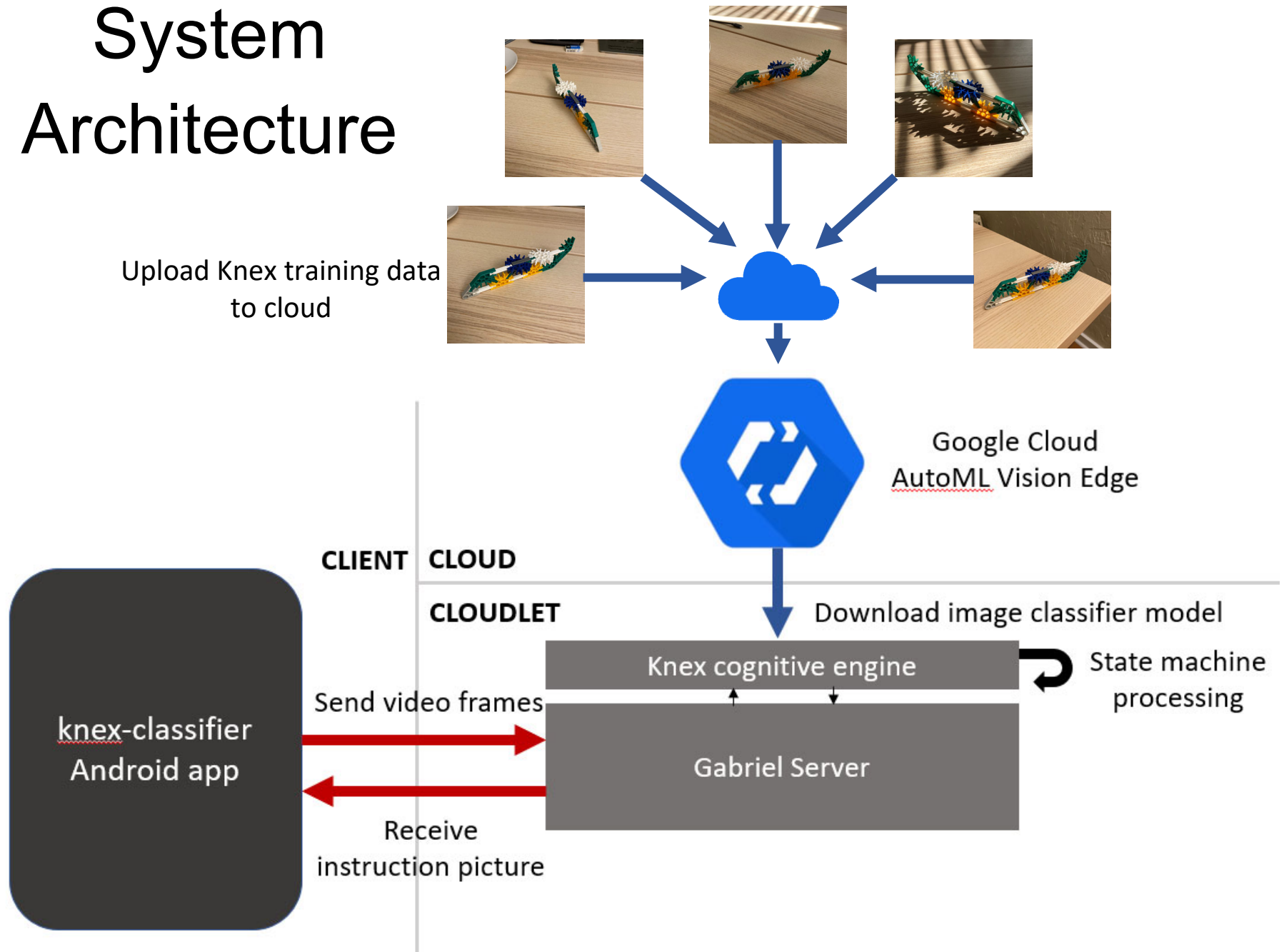
- Following written instructions to complete a task by yourself can be extremely frustrating
- Making a mistake is costly as you might not realize until steps later
- Having an expert to guide you and correct mistakes can make the task significantly more pleasant

Solution Overview

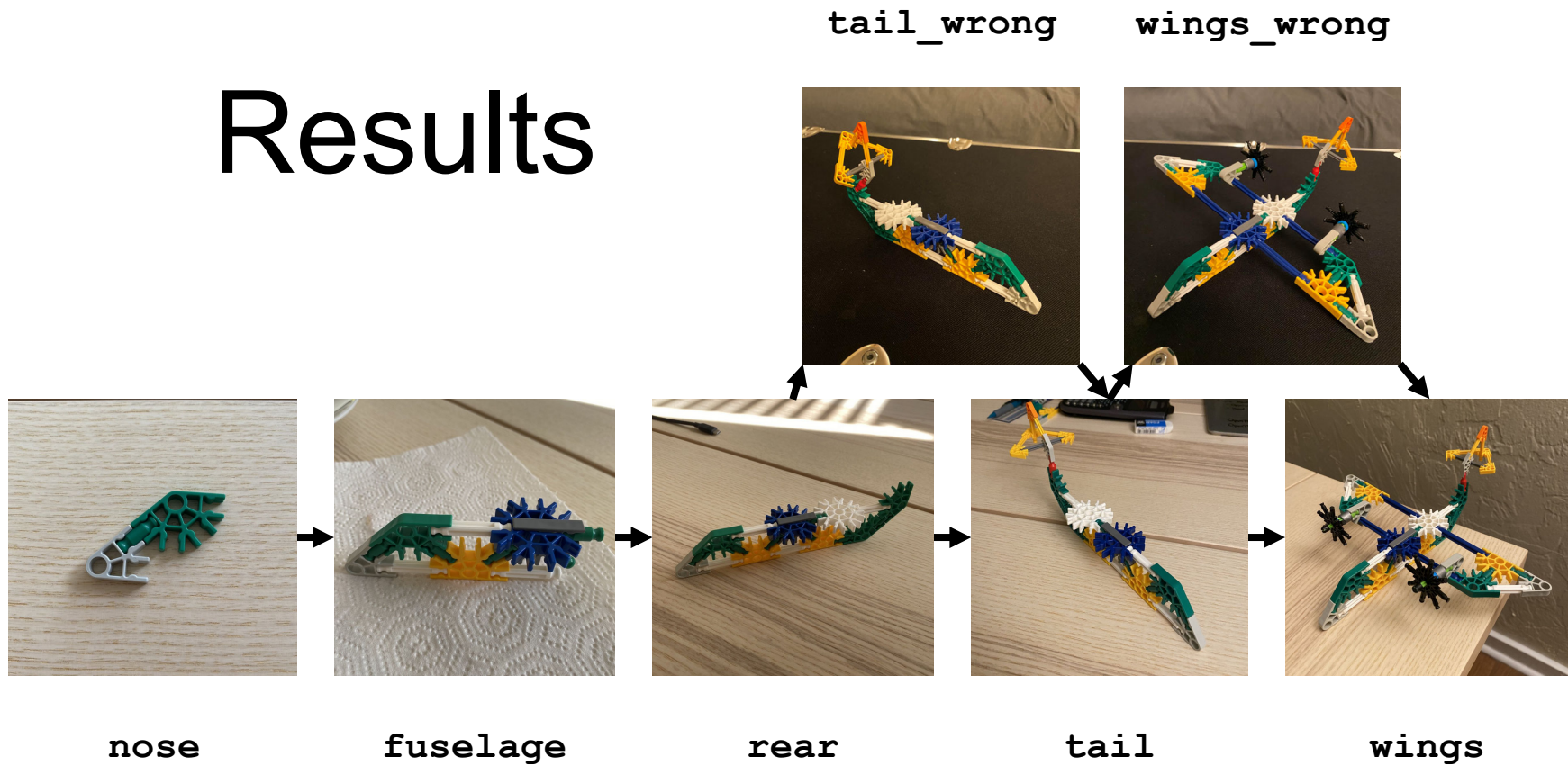
- Outsourcing computation to a cloudlet allows for high compute and low latency
- Vision tasks and state machine planning are performed entirely on the cloudlet
- The device becomes a thin client, merely sending video to the server and receiving instructions to display to the user



System Architecture



Results



- Recognizes 5 assembly states and 2 error states robust to changes in orientation and background
- Rejects unassembled future parts however occasionally eagerly classifies parts for next step

Conclusion

- A cloudlet-based instruction assistant provides a low-latency solution for expert-level assembly feedback
- Increased power savings vs. running pre-trained models on mobile co-processors
- Although more expensive to train, in future work, a fully developed object detector could reduce eager classifications