Reviewer #1

Reviewer's report The paper addresses an important matter to the field of prosthetics, that of developing a reliable multi-degree-of-freedom controller for prosthetic hands.

Major Compulsory Revisions

The authors make a statement in the background section that is not true. They state that no prostheses use force control. This is not true. The Motion Control hand uses force control and Utah Arm uses torque control (analogous to force control for a the elbow). The Otto Bock hand when used with proportional controllers (provided by other manufacturers) can also have proportional grip force control. Here are just a few references on proportional control and grip force control in prosthetics.
Sears, H.H., Shaperman, J., "Proportional myoelectric hand control: an evaluation," Am. J. Phys. Med. Rehabil., vol. 70, pp. 20-28, Feb. 1991.
Engeberg, Erik and Meek, Sanford G, Minor, Mark, (2008) "Hybrid Force-Velocity Control of a Prosthetic Hand," IEEE Transactions of Biomedical Engineering, Vol 55 no. 5 pp1572-1581.
The authors are measuring EMG and force for several types of grips. They do not seem to be measuring or controlling for wrist or hand position. EMG/force relationships are dependent on the muscle length (hand and wrist position). This seems like a potential serious oversight.
How are the electrode positions controlled for? The experiments reported in the paper record data in a single setting using adhesive electrodes. How will day-to-day variation in electrode position affect the results?
The general premise is good – the classifications will be used as the starting point for an adaptive controller and not as the end all classification answer as others have proposed,

Minor Essential Revisions
There are some minor problems in grammar with plurals and subject verb agreement.

Level of interest An article of importance in its field
Quality of written English Acceptable
Statistical review Yes, and I have assessed the statistics in my report.

Reviewer #2

Reviewer's report Reaction to:

Claudio Castellini, Angelo Emanuele Fiorilla and Giulio Sandini
Journal of NeuroEngineering and Rehabilitation
Multi-subject / Daily-Life Activity EMG-based control of mechanical hands

General comments:
The paper describes an interesting topic. It shows that the control of a mechanical hand can be optimized with better use of surface EMG. However, from a scientific point of view the paper is not clearly and objectively written. It sometimes even reads as a textbook (too much and irrelevant explanations) or a commercial paper. The paper contains too many figures and a statistical method is missing. Furthermore, the authors refer to only a few relevant international scientific papers.

Specific comments:
• The introduction is somewhat commercially written instead off objective and scientific. Conclusion are even already drawn (...showing that the same excellent results are obtained). Clear research questions (that can be tested) are not formulated.
• Methods: include weight and stature of the subjects.
• Methods: after subjects, first describe the procedure in which is described what the subjects actually did (experiment design), then describe data acquisition in which electrode placement is described and the equipment used, then data analysis, how are the raw data analyzed to come to the actual dependent variables, and finally statistical analyses.
• Methods: how was determined which flexor and extensor muscles of the forearm are most relevant? Use arguments like anatomical function and anatomical position. With respect to position, the problem of cross-talk is indeed very large for using surface EMG on the forearm, especially for the muscles used in the study. So, why not use the loudest and clearest speakers in the room, they are the ones that determine the EMG signal anyway.
• Methods: in data-pre-processing it is strange to read that the RMS is applied for practical and commercial reasons. It is questionable whether the RMS is the best choice, mainly because of the choice of the time window (and the resulting delay). Why wouldn't a (online) filter work (better or worse) after rectifying the signal?
• Methods: figure 5 shows a force-EMG relationship, which force is meant here, force of the transducer or the muscle?
• Methods: which threshold was used in the last data pre-processing step? Shouldn't you use something like resting value + 2 SD? This part is not easy to understand.
• Methods, SVM part: the authors should refer to papers that studied the relationship between fore-arm EMG and power grip force or pince grip force (Keir, McGorry, Hoozemans, Duque etc). Some show that also the tasks used for calibration is a important factor.
• Methods: no statistical methods are described!!! Which variables are used for the validation of the model? Which statistical measures are used for the validation?
• In my opinion results and discussion should be clearly separated to get an objective view of the results.
• First part of the results is methods (correlation etc). Furthermore, to determine model validity (observed – predicted force) only correlation is not enough. MSE or SD of the difference should be part of the validation. When the model is applied in a mechanical device then it can be decided that force delivery is restricted, but you still need a valid model to drive it.
• Results: the split-data methods should also be described in the methods.
• Results and Discussion is very difficult to read. There are too many figures that are presented

and new methods (analyses) come up with new results. Results and methods are not critically discussed. In this part no literature is referred to to validate the results found and methods used.
• Results and discussion: it should be discussed more thoroughly whether the method can be applied to people with an amputee. How are the muscles (still) functioning (quality) in most of these people and are these muscles the same as tested in the method.
• Conclusions: some points for discussion were brought up which should be part of the discussion. It is not really the answer to the research questions. The conclusions mostly describe the (exciting and fascinating) possibilities of the methods that were introduced.

Level of interest An article whose findings are important to those with closely related research interests
Quality of written English Needs some language corrections before being published
Statistical review Yes, and I have assessed the statistics in my report.