**Conclusions**

In this report, we have discussed the totality of the work done for the project, from its initials stages in the formation of aims and objectives along with the necessary background research undertaken, to the construction of the complete system needed to build a flexible solution to the assessments of different source ‘.mat’ files on different models, to the necessary experimentation done to optimise the system settings and investigate characteristics inherent to DMD-based movement data, and finally to drawing conclusions from this experimentation that would hopefully be of use to specialists in DMD research and assessors at Great Ormond Street Hospital, along with the building of an easy-to-use wrapper script over the system to assess subjects on pre-built models. Below, we can see several of the most important aims of the project and how we felt that they have been achieved:

* Build models that, when presented with new, unseen ‘.mat’ files of body suit data, can give a good approximation of individual and overall NSAA activity scores.
  + In using models built from NSAA files and with an additional selection of NMB files, along with using the entirety of the data set as training, aggregating predictions from all output types for a new predicted overall NSAA score, and only using the sensor magnetic field data measurement, we managed to achieve on average an overall NSAA score for subjects left-out of the training sets of 2.4 away from the true overall NSAA score, which shows good potential for the models to be used in the assessment of new subjects.
* Use the built models to gain insights into the most influential activities and measurements from ‘.mat’ files on overall NSAA score that correlate the highest with the overall assessment.
  + We found that the NSAA activities that involved the use of one’s left-leg and activities that involve standing up were most likely to be assessed by the models to give a close approximation of the subject’s true overall NSAA score, which thus implied that these were the most useful activities from the assessment for the subject to undertake. Additionally, the most useful measurements that came from the source ‘.mat’ files were shown to be position, sensor magnetic field, joint angle, and joint angle XZY, with sensor magnetic field data being particularly useful in its ability to train models to generalize to new subjects or new files of familiar subjects.
* Investigate the impact of training models on different types of source data sets.
  + We found that, while NSAA was (unsurprisingly) the best data set to use to train models in order to assess subjects for their D/HC classification and individual/overall NSAA scores (as opposed to only using 6-minute walk assessment or natural movement data), we found that models generalised to new subjects and new files of existing subjects better with the addition of natural movement behaviour data to NSAA-based models.
* Look into how possible it is to build models that generalise well to new subjects.
  + Along with the already-mentioned system performance on new subjects, we also saw promising results in training models on files of subjects’ initial NSAA assessments (‘V1’ files, e.g. ‘D4\_sensorMagneticField.csv’) and assessing them on follow-up assessments done 6-months later (‘V2’ files, e.g. ‘D4V2\_sensorMagneticField.csv’), as while we didn’t have the true corresponding scores for the ‘V2’ files the models did predict an average decrease in overall NSAA score per subject of 4.89 over the 6-month period, which is a realistic and expected decrease that therefore indicates potential for the system to be used as a monitoring tool for the progress of the DMD condition of subjects given the necessary data files of future versions of the subjects.

The system thus holds the potential to be directly applicable for those working with and assessing DMD subjects, which may help improve the lives of those living with the condition and possibly aid in potential breakthroughs to be made in DMD research, whilst also having great potential to be taken further to possibly be built into other systems that assess other conditions in an equally promising way in the future.