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3D SCANNER

USING LEGO® MINDSTORMS® NXT

Outline

- * 預期功能
- * 程式流程圖
 - * PC 應用程式說明
- * 專案進度甘特圖
- * 組員分工
- * 技術瓶頸
- * 參考資料

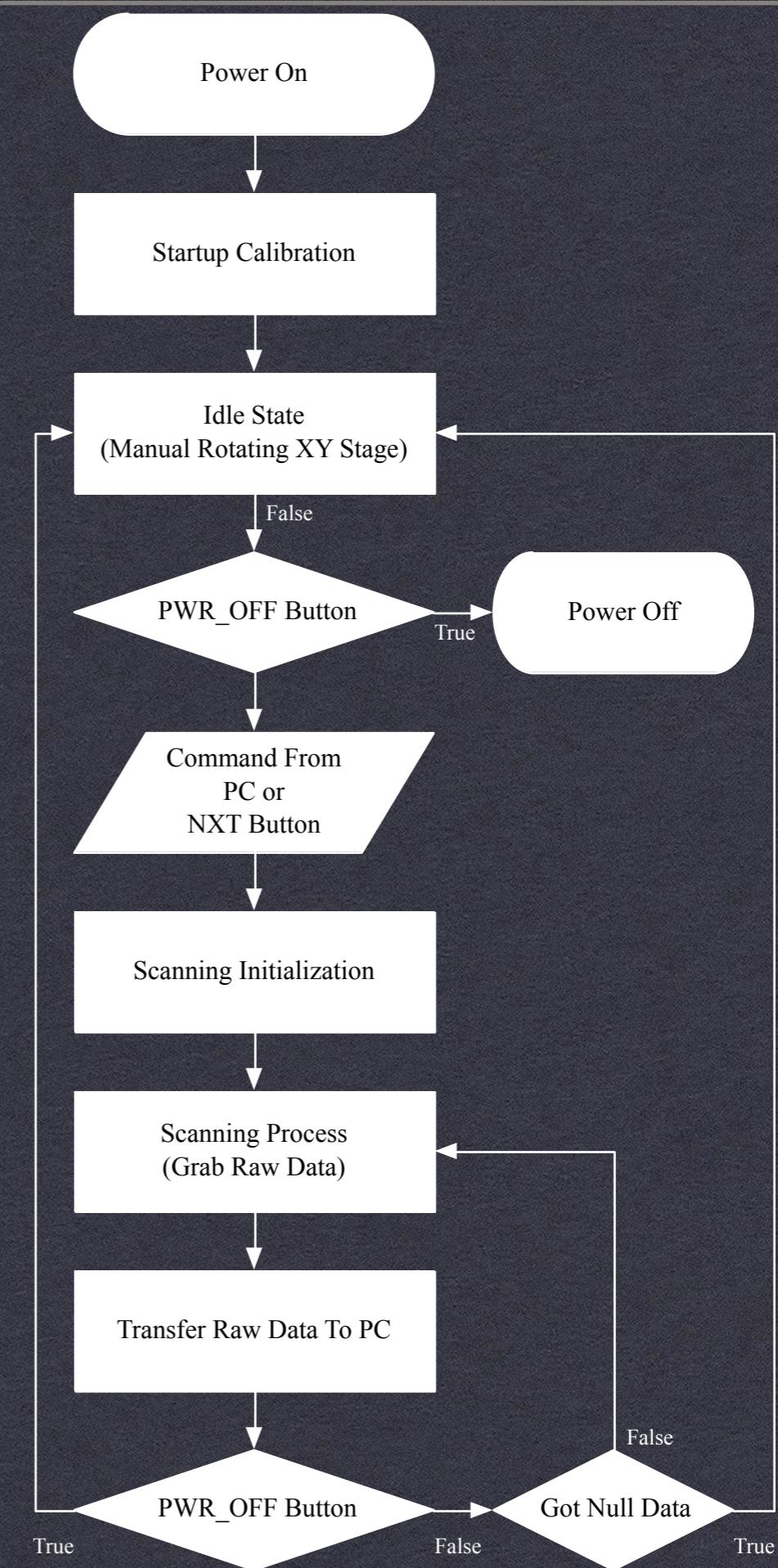
預期功能

1. 掃描立體物件
2. 藍牙通傳送到電腦
3. 電腦程式合成為模型檔案



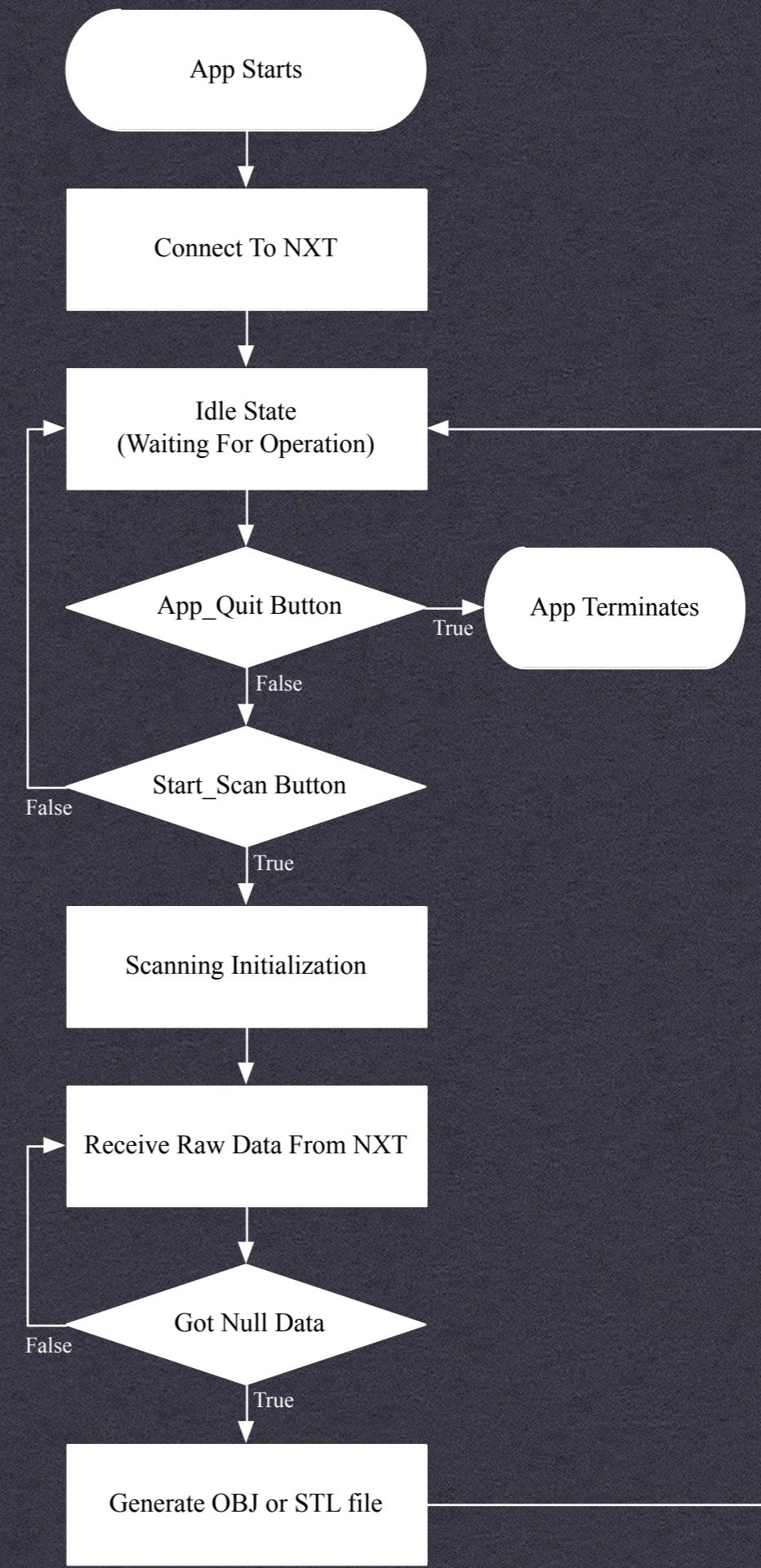
程式流程圖

NXT FIRMWARE



程式流程圖

PC PROGRAM



專案進度甘特圖



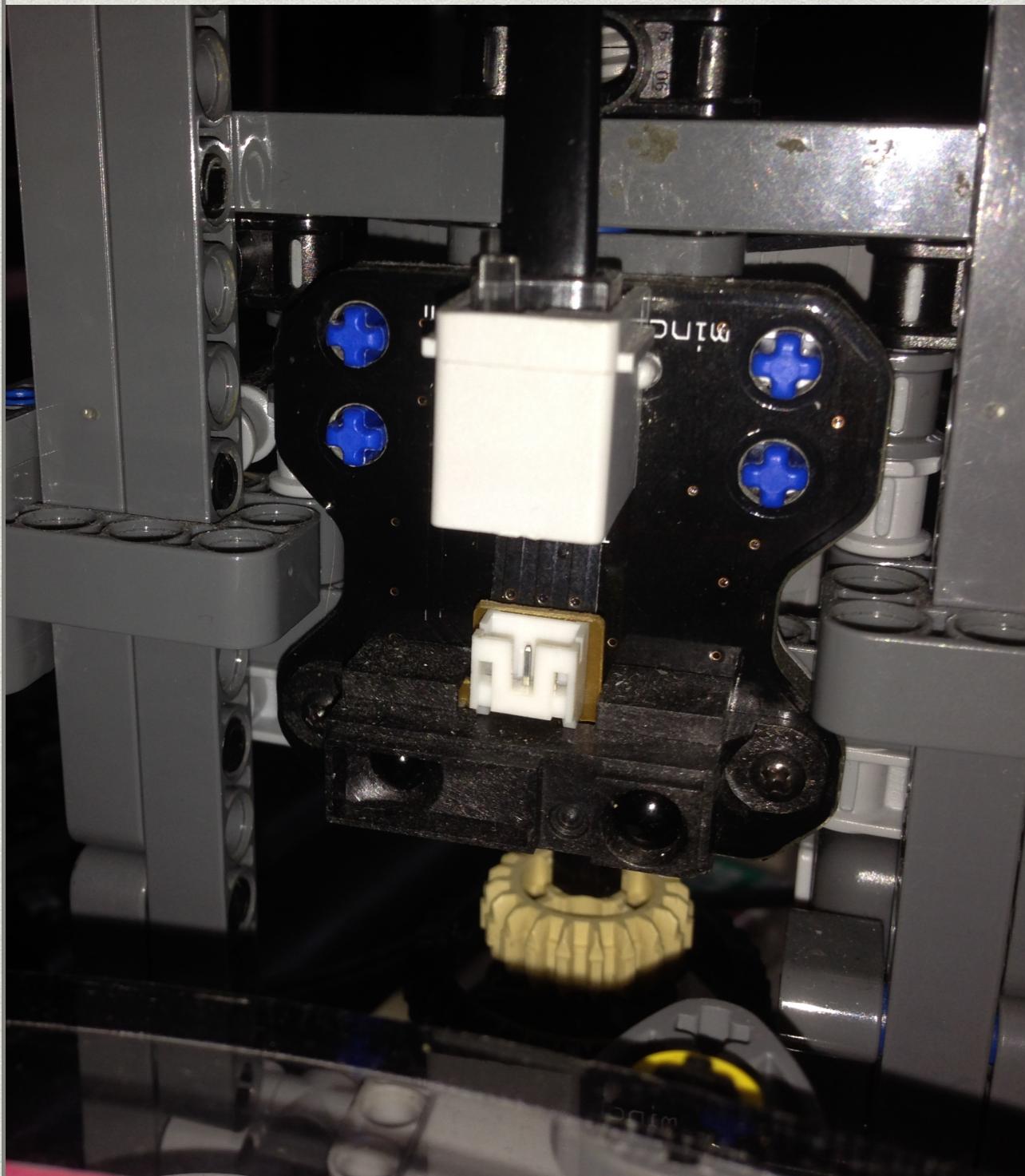
組員分工

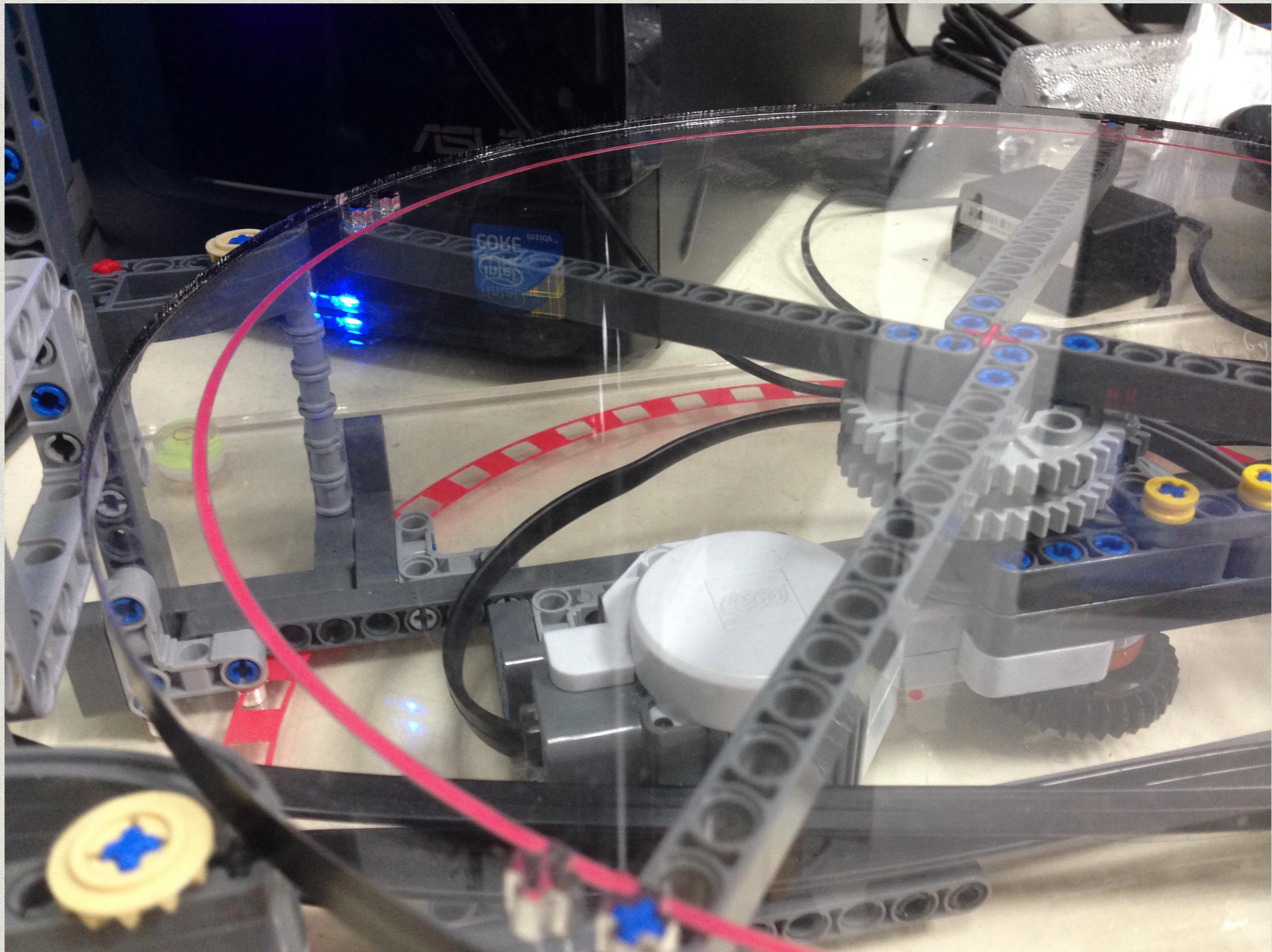
廖重清	機構設計與製作，CAD製圖，NXT OSEK設計，應用程式設計，通訊格式規劃
林永鑫	機構製作，藍牙通訊

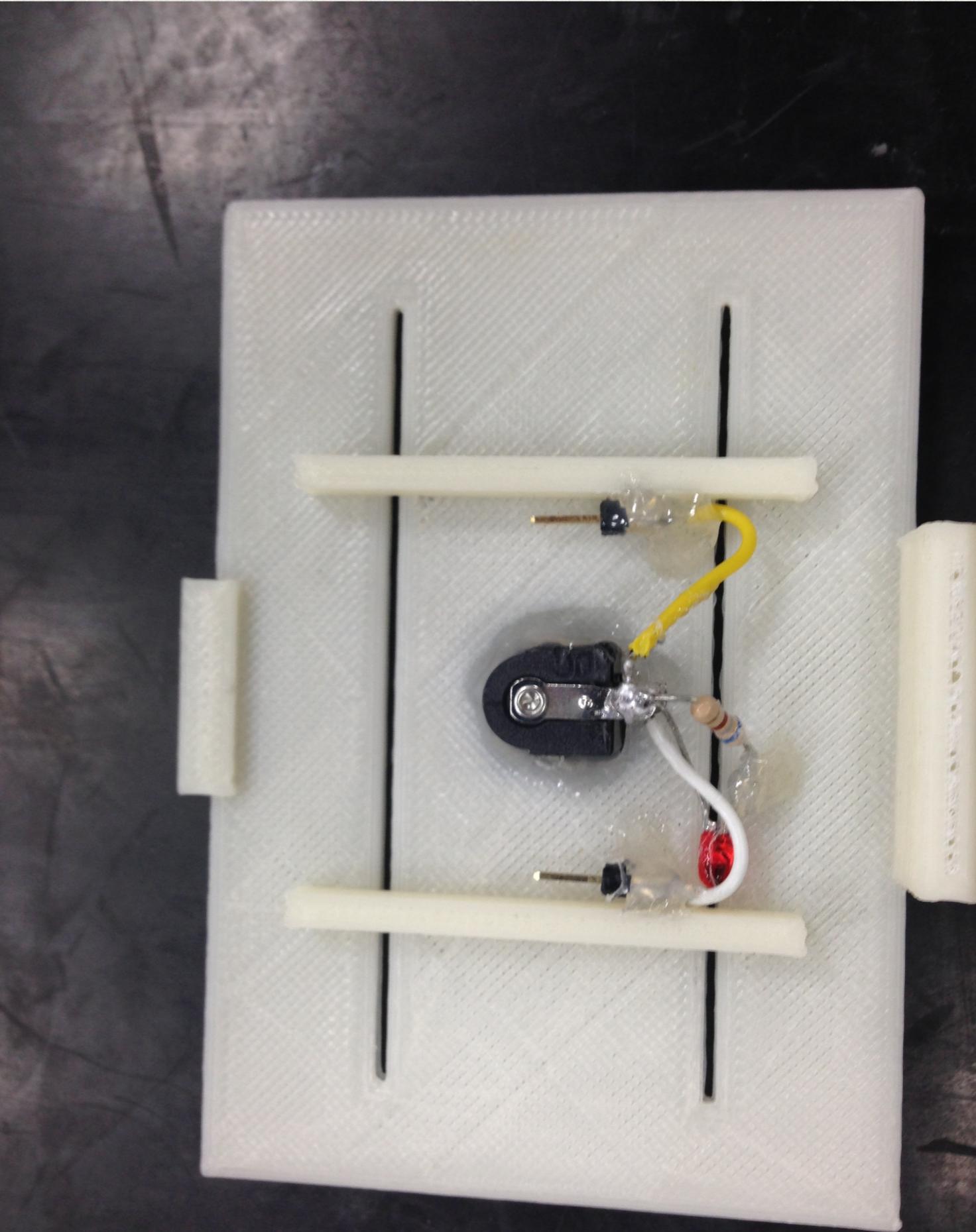
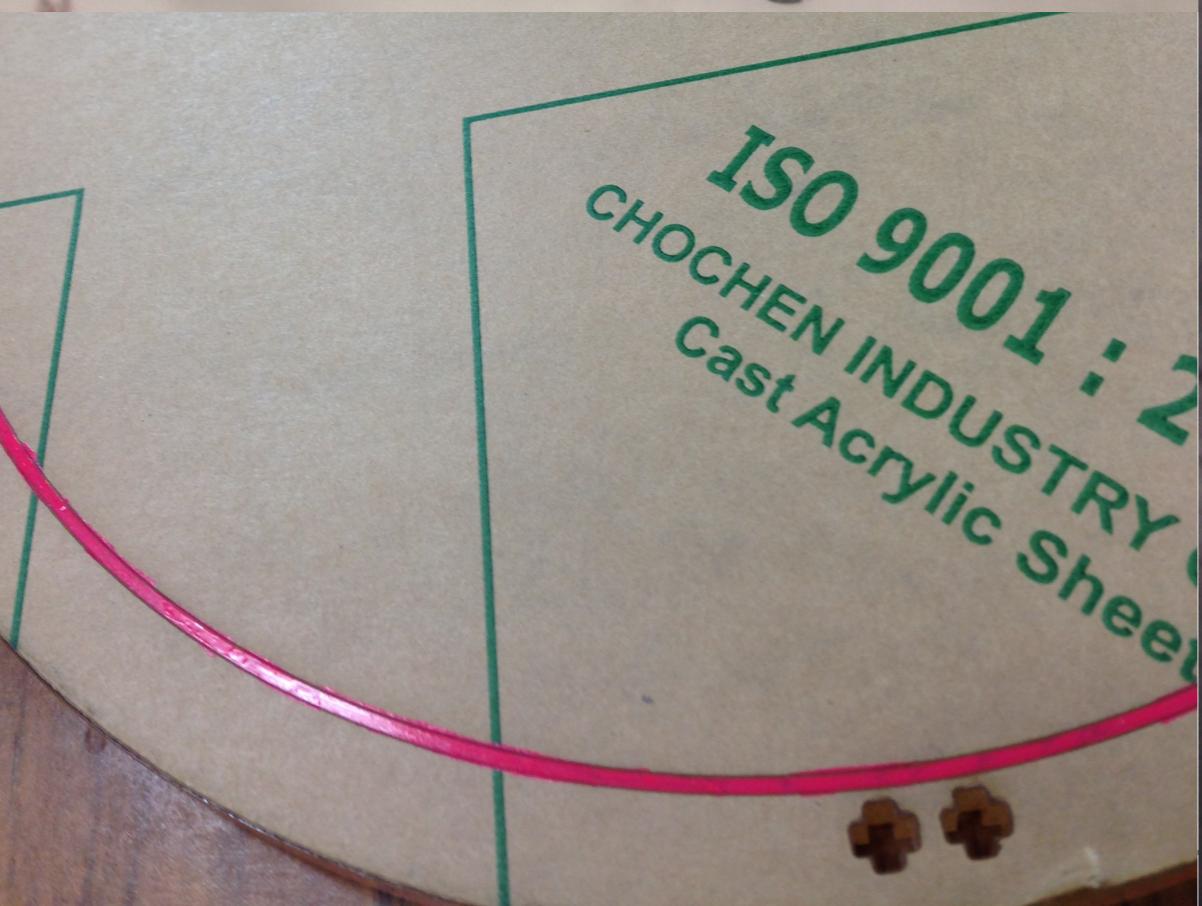
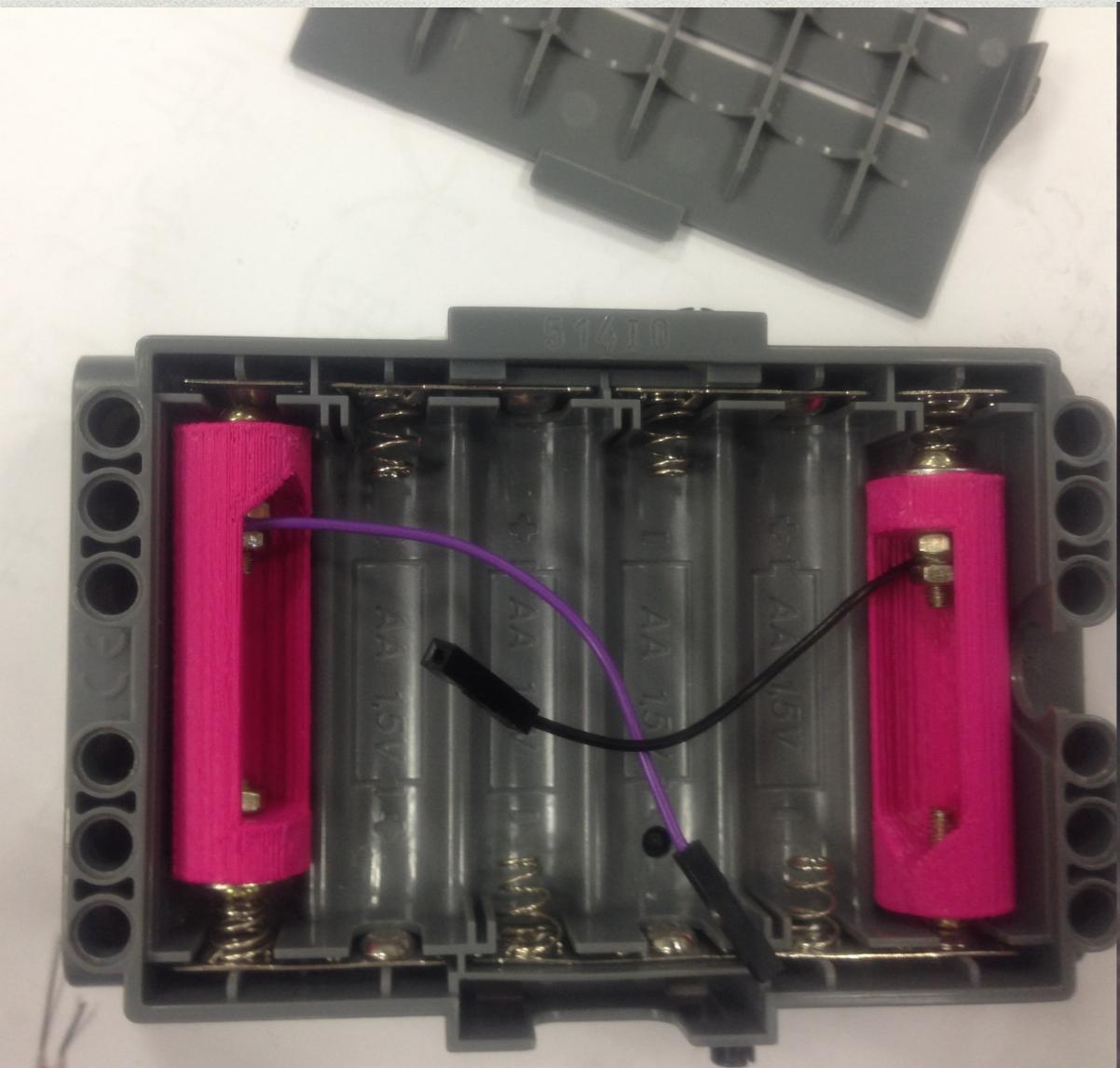
技術瓶頸

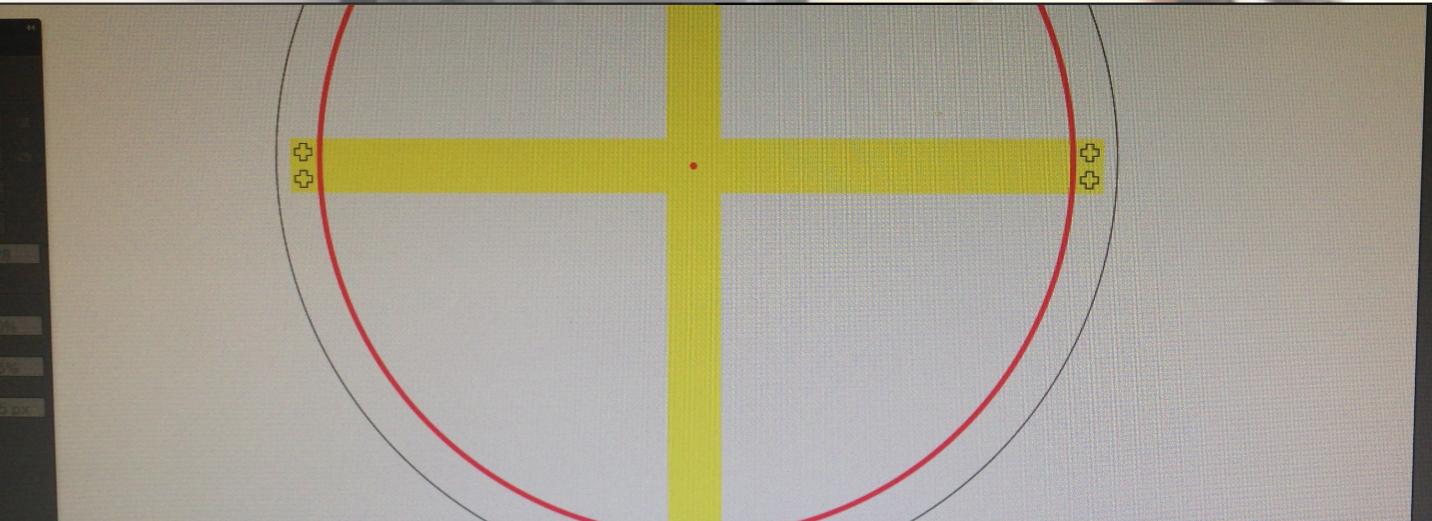
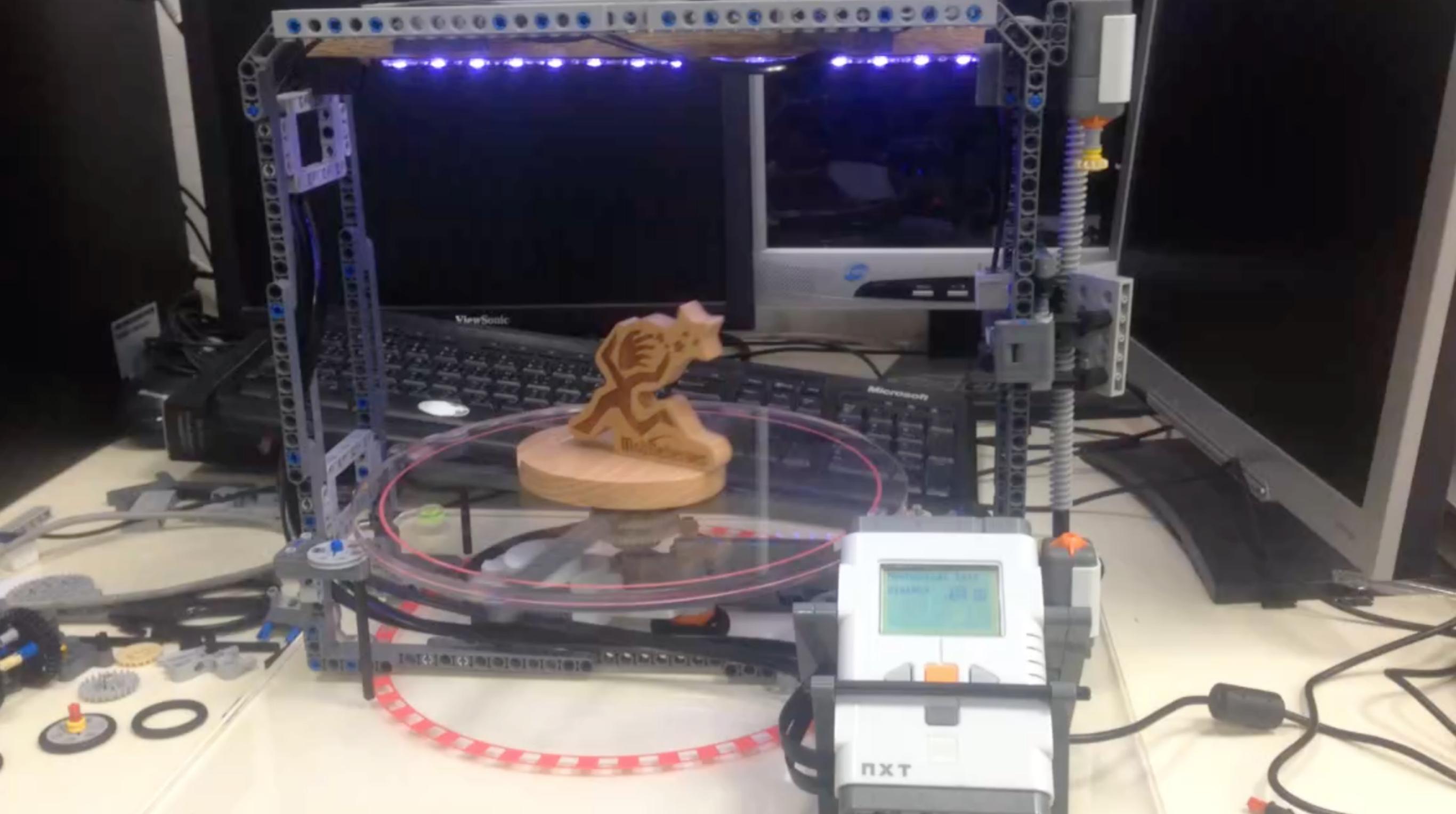
- * 硬體
 - * 電壓不穩電流不夠
 - * 平台震動
 - * 機械精度
 - * 線太短
 - * 紅外線精準度
- * 軟體
 - * 藍牙通訊
 - * OSEK 沒有 thread...
 - * 應用程式需等待硬體完成才可以測試

機構









```
5 #include <QTreeWidget>
6 #include <QTreeWidgetItem>
7 #include "QVTKWidget.h"
8 #include "simpleworkerwidget.h"
9 #include "workerwidget.h"
10
11 namespace Ui {
12     class DeviceItemWidget;
13 }
14
15 class DeviceItemWidget : public QWidget
16 {
17     Q_OBJECT
18
19 public:
20     explicit DeviceItemWidget(QWidget *parent = 0, QTreeWidget *tree = 0, QTreeWidgetItem *item = 0, const QString &label =
21 ~DeviceItemWidget());
22
23     void setLabelText(const QString &label);
24     QVTKWidget *modelWidget();
25     SimpleWorkerWidget *workerWidgetLite();
26     QString bt_address;
27     int should_remove_flag;
28
29 public slots:
30     void itemClicked(QTreeWidgetItem *item, int = 0);
31
32 private:
33     Ui::DeviceItemWidget *ui;
34     QTreeWidgetItem *treeItem;
35
36     QPalette normal_palette;
37     QPalette highlighted_palette;
38
39 };
40
41
42 #endif // DEVICEITEMWIDGET_H
```

應用程式輸出



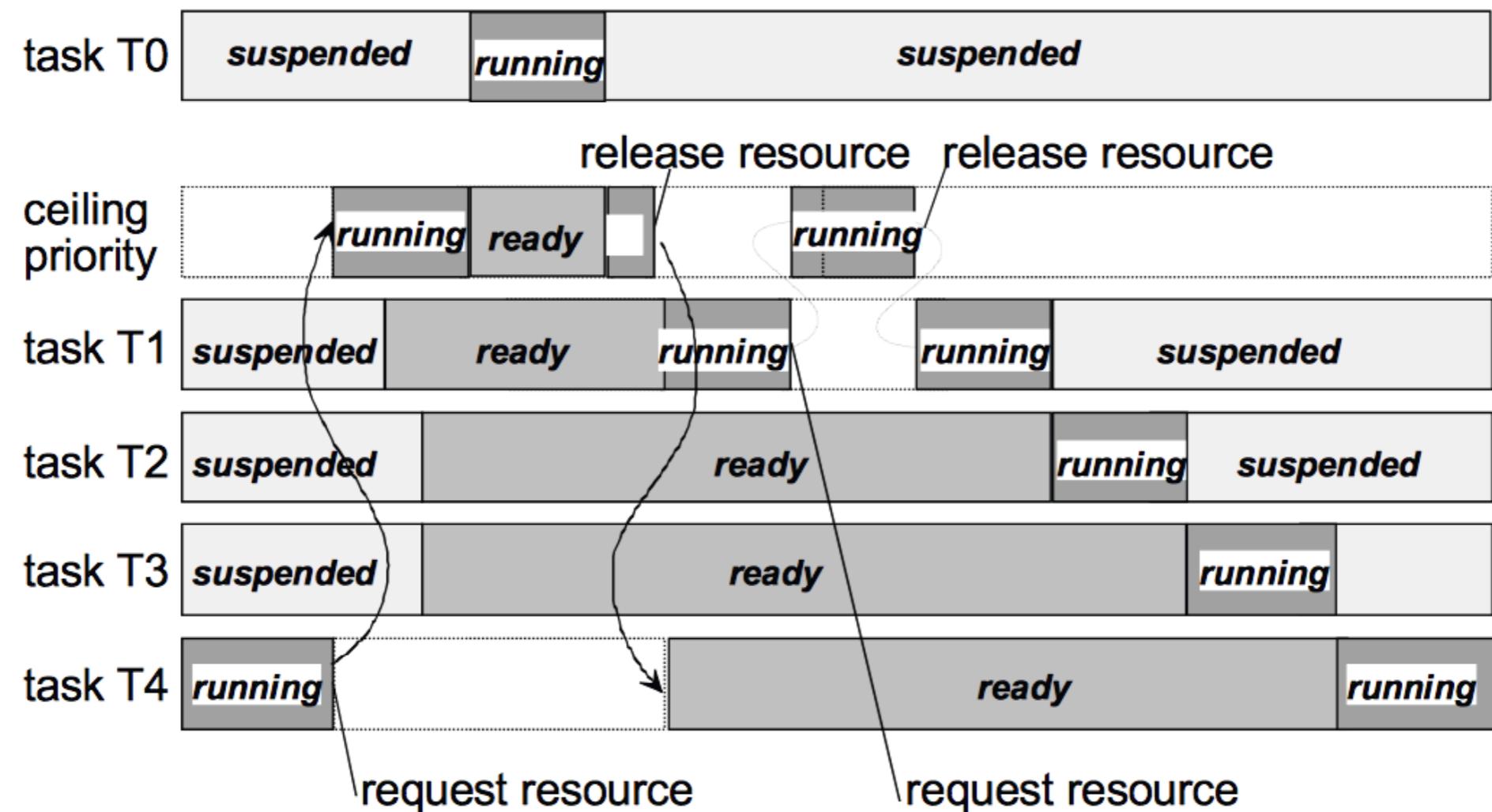
NXT_3D_Scanner_Host

restart

restart

/Volumes/UserData/home/cbsghost/Documents/Qt Projects/build-NXT_3D_Scanner_Host-Desktop_Qt_5_5_1_clang_64bit-Debug/NXT_3D_Scanner_Host exited with code 0

The Rule in OSEK

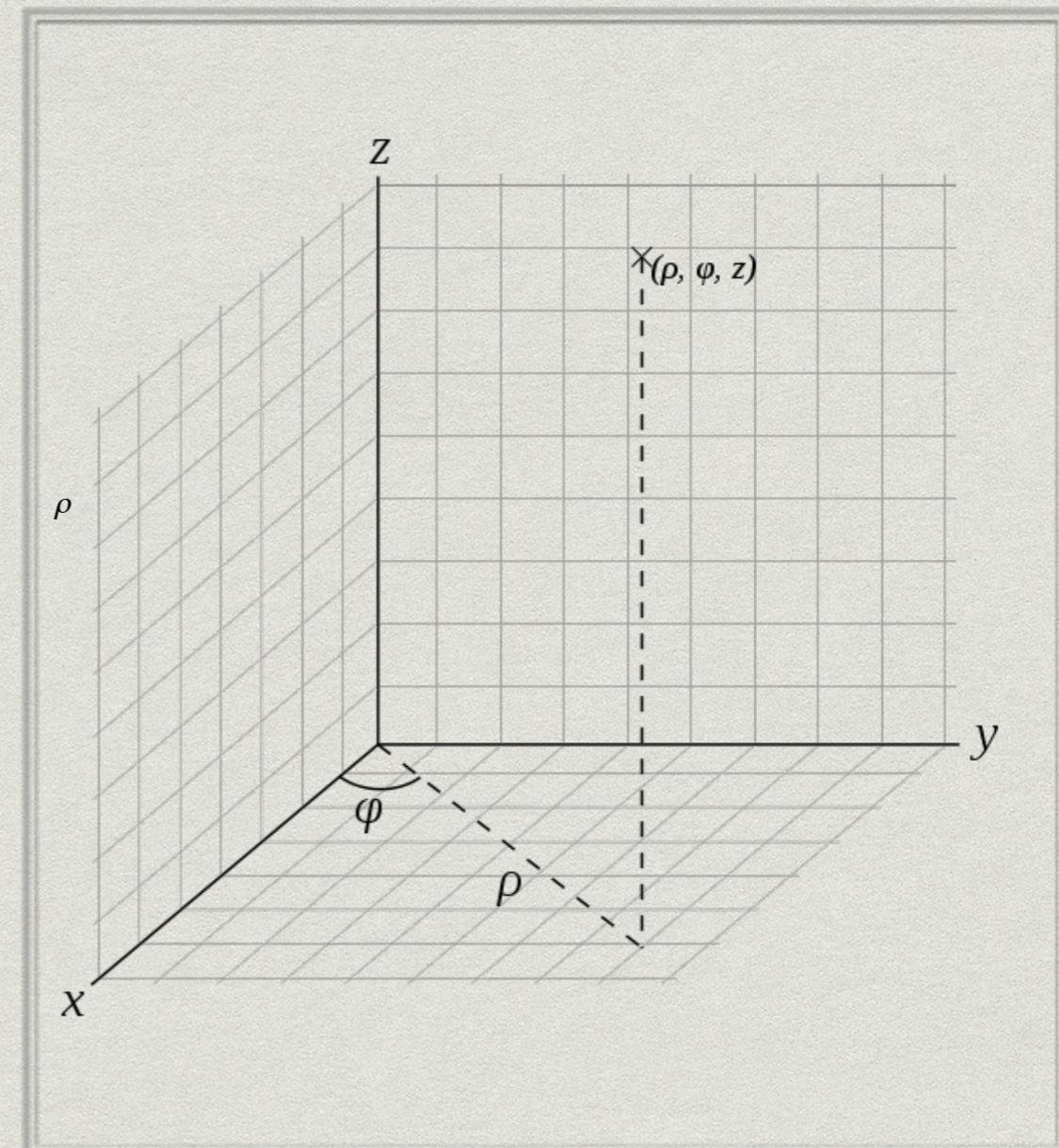


OSEK Task Design

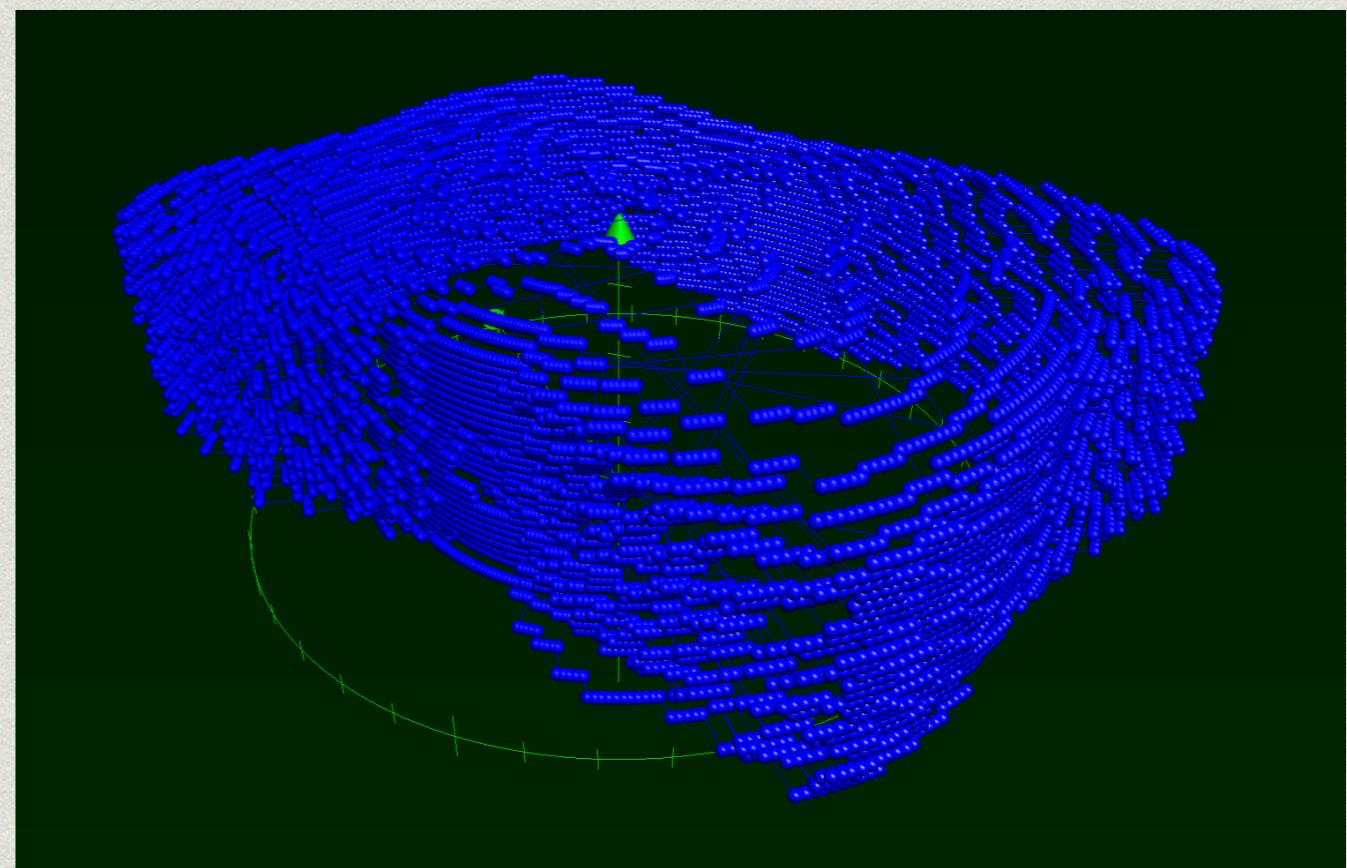
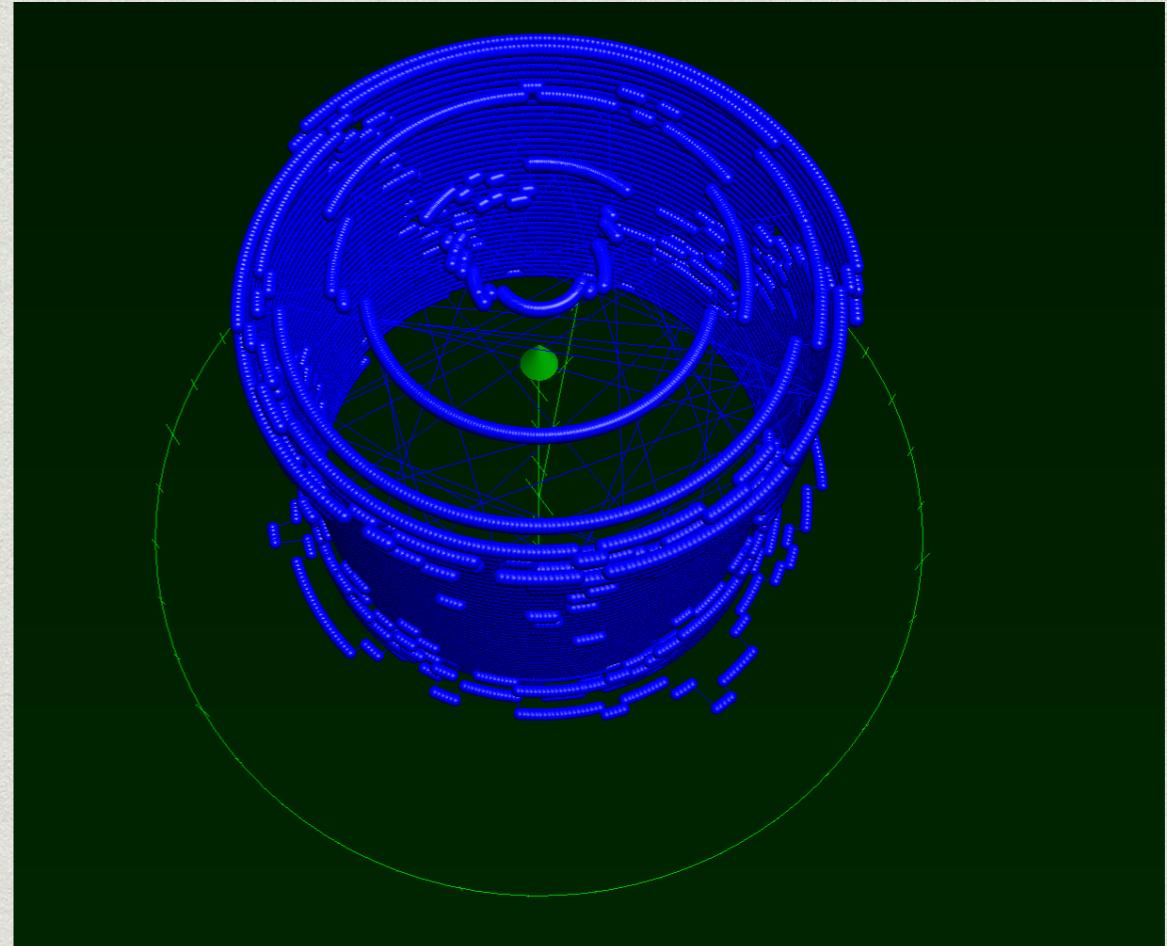
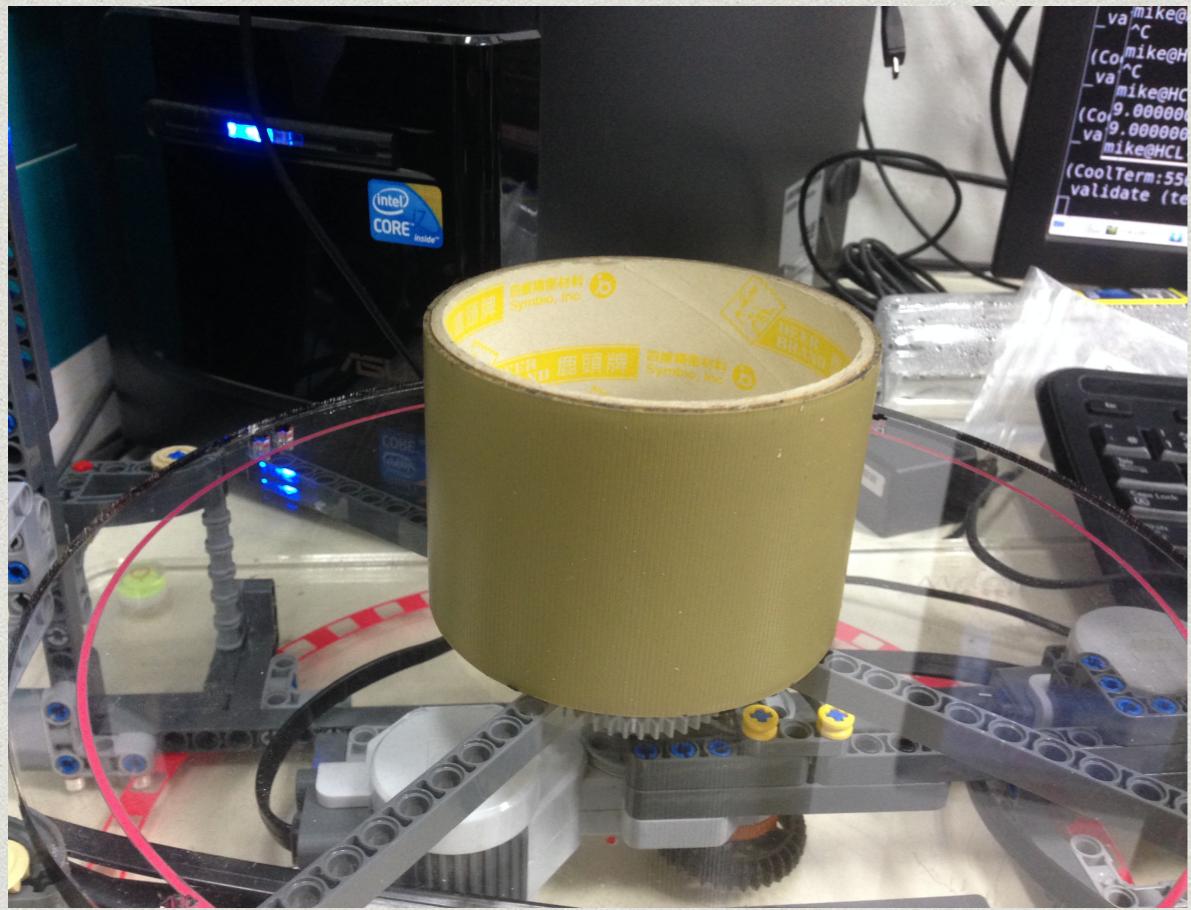
- * Scanner / 10 / 10 ms / Full preemptive
- * User Interaction / 4 / 50 ms / Full preemptive
- * Bluetooth / 3 / 5 ms / Full preemptive
- * GUI / 2 / 500 ms / Full preemptive
- * Power Management / 1 / 1000 ms / Full preemptive

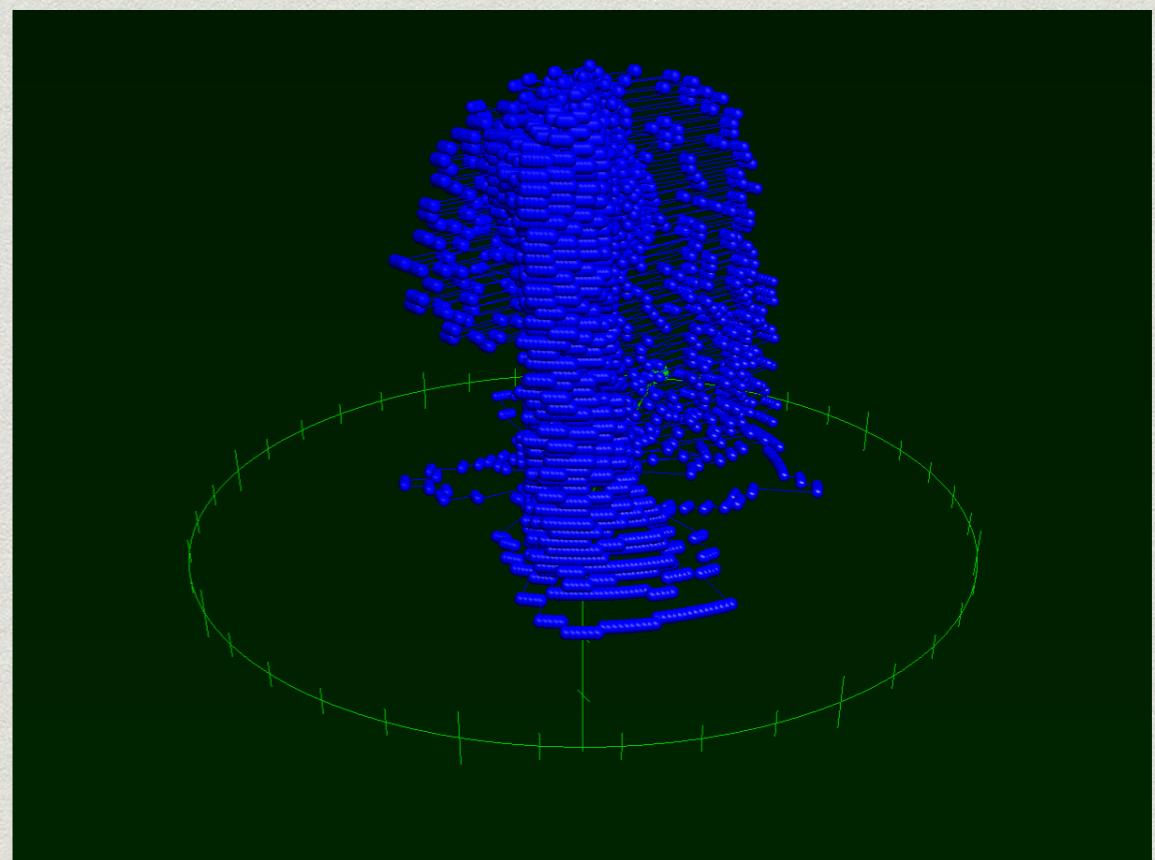
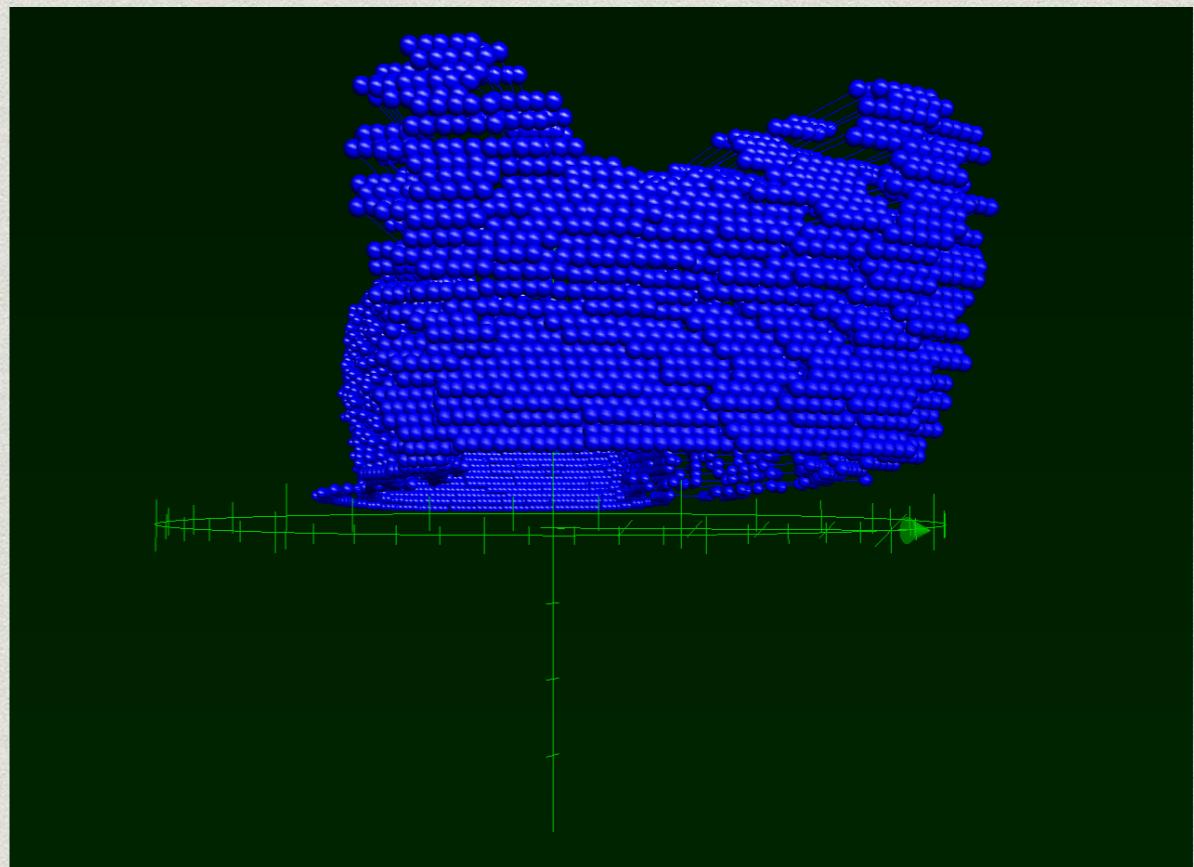
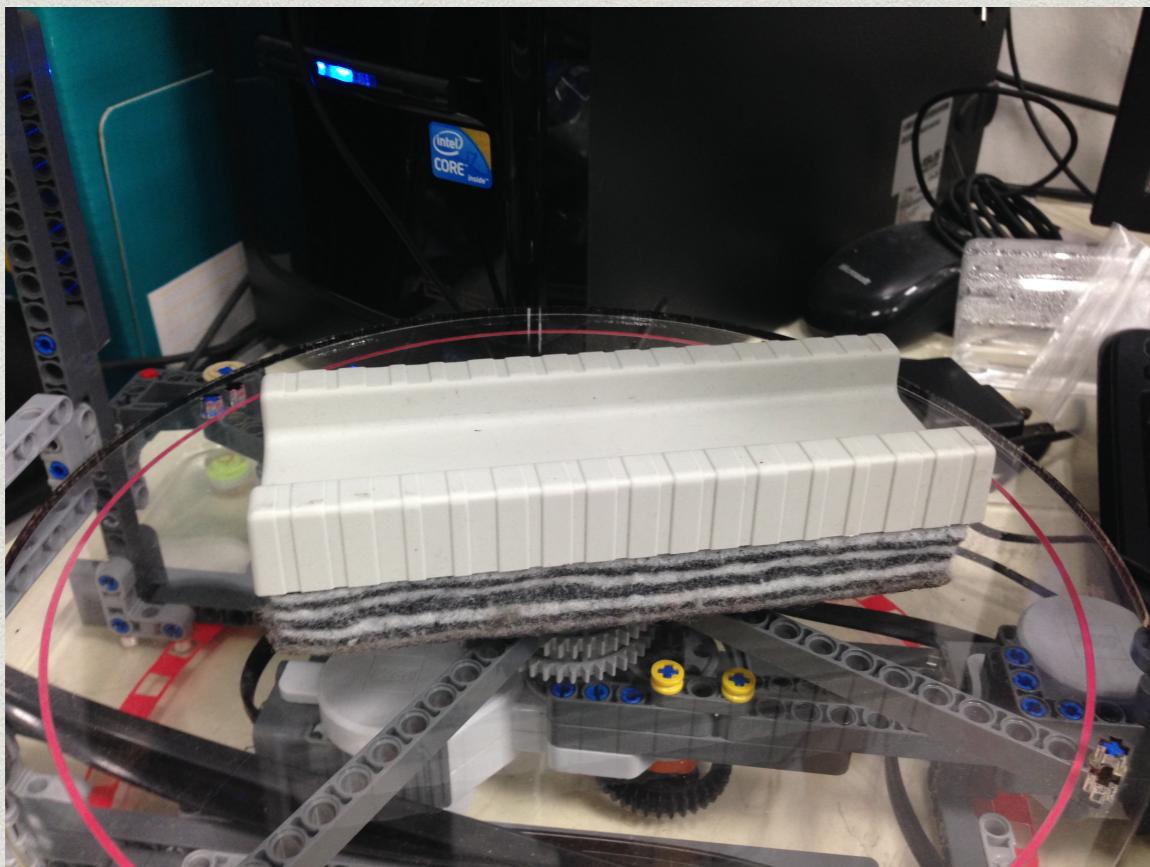
傳輸資料 (ρ, φ, z)

- * 圓柱座標系
- * ρ :紅外線測距
- * $\varphi = 2\pi / 1800$
 - * 平台一圈,馬達轉1800度
- * z :馬達轉120度上升0.1公分



實作結果





DEMO REEL

<https://youtu.be/g6dGGE-Eptw>

參考資料

- * <http://bricxcc.sourceforge.net/nbc/nxcdoc/nxcapi/>
- * <http://lejos-osek.sourceforge.net/api.htm>
- * <http://www.lejos.org>
- * <http://www.toppers.jp/osek-download.html>
- * <https://en.wikipedia.org/wiki/OSEK>
- * <http://www.osek-vdx.org>
- * <http://www.bluez.org/development/>
- * <http://www.libusb.org/wiki/APIs>
- * <http://www.repetier.com>
- * <http://manual.slic3r.org>
- * <http://diy3dprinting.blogspot.tw/2015/05/how-to-convert-g-code-back-into-stl.html>
- * <https://www.blender.org>
- * <https://github.com/iraytrace/BlenderGcodeImport>
- * <https://github.com/pbrier/gcode2vtk>
- * <http://doc.qt.io/qt-5/qt5-intro.html>
- * <http://www.qtccentre.org/content/>
- * <http://www.vtk.org/documentation/>
- * <https://developer.apple.com/library/mac/navigation/>
- * <https://developer.apple.com/library/mac/documentation/UserExperience/Conceptual/OSXHIGuidelines/>
- * <https://msdn.microsoft.com/en-us/developer-centers-msdn.aspx>