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| 平成 | 28 | 年 |  | 月 |  | 日 |

金沢工業大学

　学長　大澤　敏　殿

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|  | 年 |  | 月 |  | 日生 |

氏名(自筆)

生年月日

わたくしは、研究生として研究していましたが、このたび修了しましたので、その結果を下記のとおり報告いたします。

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| 研究先 | 所属 |  |
| 指導教員 |  |
| 研究  期間 | 平成 28 年 5月 9日　　　から　　　平成 28 年 10月 21日まで | |
| 研究  課題 | Ninja Robot for Farm Land Management | |
| 研究の  成果 | The initial phase of the project consisted in studying and learning how to use many different equipment and software: Arduino, Raspberry Pi, Sensors, Actuators, BLE (Bluetooth Low Energy), Pi Camera, RICOH Theta S 360° Camera, ThingSpeak web service. The main resource for the study were some books, hands-on classes from the Hackathon, tutorials and online materials. After learning all the basic concepts of the hardware and software that would be used in the project, started the implementation phase.  A simple communication protocol was defined between using the BLE device, where the Arduino with sensors and actuators uses the server side of the BLE, and the Raspberry Pi connects in the client side. The message protocol is capable of sending data of the measures acquired by the sensors, and to receive commands to execute over the actuators. This is the basis of the project and can be easily reused in future applications that uses the same components. | |
| 研究の  成果 | The camera integration was not fully implemented, but at least shown that is possible and a viable whole project. The use of Spherical images can be very powerful and useful for many applications.  Connecting the system with ThingSpeak web service improve the possibilities of monitoring, data analysis, creation of alerts and taking automatic actions, adding a huge improvement to the project.  The project was very challenging and was possible to learn a lot about new technologies during the execution. The main implementation can be helpful in other future projects and creates new aims of study.  Unfortunately the Ninja Robot itself was not possible to implement due to the lack of time for a project with this complexity, however the majority of the main features were successfully concluded. | |
| 指導教員所見 | | |
| 平成　　　年　　　月　　　日  　上記のとおり研究が修了したことを認めます。  指導教員 　　　　　　　　　　　　　　　　　　㊞ | | |