

## Project: Visual Place Recognition Project

**Student Engineer:**  
Nabeel Khan

**Student ID:**  
n10534032

**Supervisor:** Tobias  
Fischer

**Meeting Date, Time, &  
Method**

~~Face to face Meeting~~

~~Phone~~

~~Email~~

**Teams/Zoom**

## Report on Progress

Agenda & Discussion	<i>Introduction to project and expectations</i>
Key project activities completed and reported on this meeting.	<ul style="list-style-type: none"> <li>• <i>Meet every week on zoom/teams</i></li> <li>• <i>Investigations into literature, regulations, engineering practice</i></li> <li>• <i>Brushing on programming skills</i></li> <li>• <i>VPR: ability to recognise location at different points in time</i></li> </ul>
Issues/concerns/questions remaining	<p>How difficult/advanced is the programming requirements?</p> <p>Any useful resources I can review to assist my knowledge?</p>
Any risks identified (particularly HSE)	Location and area of project
Ethical considerations	Money, Privacy
Sustainability considerations	Efficiency and cost effectiveness

## Next actions agreed

Action	Who?	By when?
Review Literature provided	myself	Next meeting
Install Ubuntu/Linux software	myself	ASAP

---- END OF MEETING NOTES ----

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## Report on Progress

Agenda & Discussion	<i>Project update</i>
Key project activities completed and reported on this meeting.	<ul style="list-style-type: none"> <li>• <i>Meeting with Therese Joseph</i></li> <li>• <i>Research on Event cameras and functions</i></li> <li>• Process information faster</li> <li>• Reduces blur</li> <li>• Converts events to images</li> <li>• Become useful in robotic application</li> </ul>
Issues/concerns/questions remaining	<p>How difficult/advanced is the programming requirements?</p> <p>How will SNN be implemented</p>
Any risks identified (particularly HSE)	Location and area of project
Ethical considerations	Money, Privacy
Sustainability considerations	Efficiency and cost effectiveness

## Next actions agreed

Action	Who?	By when?
Obtain camera data	myself	End of project
Use data to complete VPR	myself	End of project

---- END OF MEETING NOTES ----

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## Report on Progress

Agenda & Discussion	<i>Project update</i>
Key project activities completed and reported on this meeting.	<ul style="list-style-type: none"> <li>• Progression on installation of ubuntu, minor setbacks</li> <li>• Update on project proposal</li> <li>• Continuation of literature review</li> </ul>
Issues/concerns/questions remaining	<p>Any papers that I should focus on for proposal?</p> <p>How much detail is in my methodology?</p> <p>How will I implement SNN?</p>
Any risks identified (particularly HSE)	Location and area of project
Ethical considerations	Money, Privacy
Sustainability considerations	Efficiency and cost effectiveness

## Next actions agreed

Action	Who?	By when?
Send Literature review draft	myself	27 <sup>th</sup> August
Complete Ros tutorials (only python tutorials)	myself	ASAP

---- END OF MEETING NOTES ----

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## Report on Progress

Agenda & Discussion	<i>Progress</i>
Key project activities completed and reported on this meeting.	<ul style="list-style-type: none"> <li>Literature review feedback</li> <li>Focus more on Event camera VPR instead of SNN's</li> <li>Include more paper research in go into more detail of methodologies</li> </ul>
Issues/concerns/questions remaining	Do I completely neglect SNN? What is the new scope of my project?
Any risks identified (particularly HSE)	Location and area of project
Ethical considerations	Money, Privacy
Sustainability considerations	Efficiency and cost effectiveness

## Next actions agreed

Action	Who?	By when?
Improve literature review based on feedback	myself	6 <sup>th</sup> September
Complete Ros tutorials (only python tutorials)	myself	ASAP

---- END OF MEETING NOTES ----

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## Report on Progress

Agenda & Discussion	<i>progress</i>
Key project activities completed and reported on this meeting.	<ul style="list-style-type: none"> <li>Get into contact with PHD student regarding programming deliverables.</li> <li>Begin to start developing code for project.</li> </ul>
Issues/concerns/questions remaining	n/a
Any risks identified (particularly HSE)	Location and area of project
Ethical considerations	Money, Privacy
Sustainability considerations	Efficiency and cost effectiveness

## Next actions agreed

Action	Who?	By when?
Start programming	myself	ASAP
Meet Therese (Student)	myself	Next week

---- END OF MEETING NOTES ----

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## Report on Progress

Agenda & Discussion	<i>progress</i>
Key project activities completed and reported on this meeting.	<ul style="list-style-type: none"> <li>• Therese has not responded.</li> <li>• Until she responds adjust any changes to methodology from proposal to progress report</li> </ul>
Issues/concerns/questions remaining	n/a
Any risks identified (particularly HSE)	Location and area of project
Ethical considerations	Money, Privacy
Sustainability considerations	Efficiency and cost effectiveness

## Next actions agreed

Action	Who?	By when?
Start programming	myself	ASAP
Meet Therese (Student)	myself	ASAP

---- END OF MEETING NOTES ----

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## Report on Progress

Agenda & Discussion	<i>progress</i>
Key project activities completed and reported on this meeting.	<ul style="list-style-type: none"> <li>• Meeting with Therese Joseph</li> <li>• Discussing programming requirements and code</li> <li>• Being able to run code/ package installations needed (anaconda).</li> <li>• Computing distance matrix</li> <li>• Slicing data</li> </ul>
Issues/concerns/questions remaining	What code do I need to adjust to complete project? What do I need to get done to complete Assessment 2A?
Any risks identified (particularly HSE)	Location and area of project
Ethical considerations	Money, Privacy
Sustainability considerations	Efficiency and cost effectiveness

## Next actions agreed

Action	Who?	By when?
Understand Therese code	myself	ASAP
Try and build code by myself	myself	Before assessment 2A

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## Report on Progress

Agenda & Discussion	<i>progress</i>
Key project activities completed and reported on this meeting.	<ul style="list-style-type: none"> <li>Robots will obtain reference data initially.</li> <li>Robot needs to obtain query.</li> <li>Snn comes with own distance matrix if enough time.</li> <li>Slam will be used if enough time.</li> </ul>
Issues/concerns/questions remaining	What will I need to complete for assessment 2A?
Any risks identified (particularly HSE)	Location and area of project
Ethical considerations	Money, Privacy
Sustainability considerations	Efficiency and cost effectiveness

## Next actions agreed

Action	Who?	By when?
Continue programming	myself	ASAP
Complete S-11 induction	myself	ASAP

---- END OF MEETING NOTES ----



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## Report on Progress

Agenda & Discussion	<i>progress</i>
Key project activities completed and reported on this meeting.	<ul style="list-style-type: none"> <li>Complete as much for assessment 2 as I can.</li> <li>Try and have enough data and results so that I can document on findings in presentation and report</li> </ul>
Issues/concerns/questions remaining	n/a
Any risks identified (particularly HSE)	Location and area of project
Ethical considerations	Money, Privacy
Sustainability considerations	Efficiency and cost effectiveness

## Next actions agreed

Action	Who?	By when?
Work on report	myself	26 <sup>th</sup> October
Continue programming	myself	ASAP

---- END OF MEETING NOTES ----

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## Report on Progress

Agenda & Discussion	<i>Project update</i>
Key project activities completed and reported on this meeting.	<ul style="list-style-type: none"> <li>Camera captures events, they detect changes in pixel brightness, the camera notes the coordinates of these brightness changes.</li> <li>The robot has a slam model that maps the room. The accuracy metric of the slam model will determine the performance.</li> </ul>
Issues/concerns/questions remaining	n/a
Any risks identified (particularly HSE)	Location and area of project
Ethical considerations	Money, Privacy
Sustainability considerations	Efficiency and cost effectiveness

## Next actions agreed

Action	Who?	By when?
Complete induction	myself	Next week
Obtain events from event camera	myself	ASAP

---- END OF MEETING NOTES ----

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## Report on Progress

Agenda & Discussion	<i>Introduction to project and expectations</i>
Key project activities completed and reported on this meeting.	<ul style="list-style-type: none"> <li>Experiment Strictly on s11</li> <li>Use dvs pkg online to convert image to numpy file presentation and report</li> <li>Using stationary point to convert event stream to numpy file/array</li> </ul>
Issues/concerns/questions remaining	<p>How large is the office area?</p> <p>Time frame of experiment?</p>
Any risks identified (particularly HSE)	Location and area of project
Ethical considerations	Money, Privacy
Sustainability considerations	Efficiency and cost effectiveness

## Next actions agreed

Action	Who?	By when?
Complete induction	myself	Next week
Obtain events from event camera	myself	ASAP

---- END OF MEETING NOTES ----

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## Report on Progress

Agenda & Discussion	<i>Introduction to project and expectations</i>
Key project activities completed and reported on this meeting.	<ul style="list-style-type: none"> <li>• Induction complete</li> <li>• Connected to the robot</li> <li>• Using stationary point to convert event stream to numpy file/array</li> <li>• 10 000 pixel values per frame</li> <li>• Time frame of reference and query is roughly the same</li> </ul>
Issues/concerns/questions remaining	<p>How large is the office area?</p> <p>How much data is enough</p>
Any risks identified (particularly HSE)	Location and area of project
Ethical considerations	Money, Privacy
Sustainability considerations	Efficiency and cost effectiveness

## Next actions agreed

Action	Who?	By when?
Obtain events from event camera	myself	Next week
Convert into numpy array/file	myself	ASAP

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Agenda & Discussion	<i>Introduction to project and expectations</i>
Key project activities completed and reported on this meeting.	<ul style="list-style-type: none"> <li>Converted still camera frames into numpy array</li> <li>Need to add timer</li> <li>Polarity of event data indicates if pixel are brighter</li> </ul>
Issues/concerns/questions remaining	n/a
Any risks identified (particularly HSE)	Location and area of project
Ethical considerations	Money, Privacy
Sustainability considerations	Efficiency and cost effectiveness

## Next actions agreed

Action	Who?	By when?
Finalise code to obtain reference images	myself	Next week
Begin code to perform VPR	myself	ASAP

---- END OF MEETING NOTES ----

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## Report on Progress

Agenda & Discussion	<i>Introduction to project and expectations</i>
Key project activities completed and reported on this meeting.	<ul style="list-style-type: none"> <li>Continuation on VPR code</li> <li>Programming advice</li> <li>Pseudocode provided as assistance.</li> <li>Camera sensor size reminded</li> </ul>
Issues/concerns/questions remaining	<p>How to plot images when events do not have pixel intensities?</p> <p>Camera is completely black/faulty</p>
Any risks identified (particularly HSE)	Location and area of project
Ethical considerations	Money, Privacy
Sustainability considerations	Efficiency and cost effectiveness

## Next actions agreed

Action	Who?	By when?
Finalise code to perform VPR	myself	Next week
Try and plot images to screen	myself	Next week

---- END OF MEETING NOTES ----

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## Report on Progress

Agenda & Discussion	<i>Project touchup and final Questions</i>
Key project activities completed and reported on this meeting.	<ul style="list-style-type: none"> <li>• Programming finished.</li> <li>• Able to compare events.</li> <li>• Need to learn to drive robot.</li> <li>• Need to record events.</li> <li>• Need to collect data.</li> <li>• Need quantitative results</li> </ul>
Issues/concerns/questions remaining	
Any risks identified (particularly HSE)	Location and area of project
Ethical considerations	Money, Privacy
Sustainability considerations	Efficiency and cost effectiveness

## Next actions agreed

Action	Who?	By when?
Drive robot around office and obtain results	myself	ASAP
Finish report/assessment	myself	31/05

---- END OF MEETING NOTES ----





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## Report on Progress

Agenda & Discussion	<i>Error message</i>
Key project activities completed and reported on this meeting.	<ul style="list-style-type: none"> <li>The error is clear - array is too small. index is beyond its bounds.</li> </ul>
Issues/concerns/questions remaining	
Any risks identified (particularly HSE)	Location and area of project
Ethical considerations	Money, Privacy
Sustainability considerations	Efficiency and cost effectiveness

## Next actions agreed

Action	Who?	By when?
Fix error	myself	ASAP
Finish programming	myself	17/05

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## Report on Progress

Agenda & Discussion	<i>View Event Image</i>
Key project activities completed and reported on this meeting.	<ul style="list-style-type: none"> <li># Create a binary image binary_image = np.where(eventarray &gt; 0, 255, 0)</li> <li># Display the binary image cv2.imshow('Binary Image', binary_image)</li> </ul>
Issues/concerns/questions remaining	
Any risks identified (particularly HSE)	Location and area of project
Ethical considerations	Money, Privacy
Sustainability considerations	Efficiency and cost effectiveness

## Next actions agreed

Action	Who?	By when?
Create image of event	myself	17/05
Send draft of report for feedback	myself	21/05

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## Report on Progress

Agenda & Discussion	<i>Draft feedback and recording images</i>
Key project activities completed and reported on this meeting.	<ul style="list-style-type: none"> <li>Received draft feedback.</li> <li>Be careful with terminologies.</li> <li>Include recent research paper by Tobias in literature review.</li> <li>Screen record on ubuntu with Windows+ALT+R</li> </ul>
Issues/concerns/questions remaining	
Any risks identified (particularly HSE)	Location and area of project
Ethical considerations	Money, Privacy
Sustainability considerations	Efficiency and cost effectiveness

## Next actions agreed

Action	Who?	By when?
Record results	myself	ASAP
Finish final Assessment	myself	31/05

---- END OF MEETING NOTES ----