COMPUTER GRAPHICS PROPOSAL

In continuance of the exploration of the Olympics from the visualisation project, a graphic simulation of running on an athletic track will be simulated. The main stadium of an Olympics is the most integral location as it hosts the opening and closing ceremonies, the lighting of the touch and the most popular events. The architecture and design choices of these stadiums ensure athletes can compete in optimal circumstances and thousands of spectators can experience these feats. This project will highlight the ingenuity of these stadiums by offering the opportunity to view its design in detail as a competitor on its athletic track. This will be achieved using the provided mega_racer files, demo and instructions as a base, and the Tokyo National Stadium, which is set to host the 2020 Olympics as inspiration.

The National Stadium: Inside is a grassed area for Athletics surrounded by the full 8-lane Olympic track. Surrounding both of these areas is panoramic three-layered seating for 60,000 people in a bowl-shape. The roof matches the size of the track perfectly in a stadium shape with wood and metal beams as structure. On the southern side of the roof is a section of glass to allow grass growth.

The roof, seating, field and track will need to be scaled to each other. The athletic field will be shaded and textured to appear like grass, and the same for athletic track except red synthetic track. Lighting over the interior will represent that of natural indoor lighting with patches reflecting direct sunlight from the glass. Potential props include Olympic rings, Olympic flame or athletic equipment.
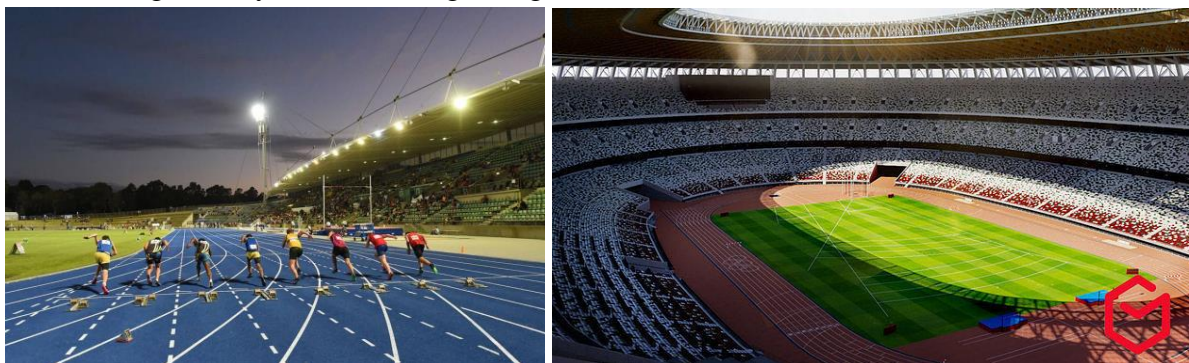
<u>The simulation:</u> The project will focus on offline rendering and photorealistic shading to create a detailed and realistic model. OpenGL will be used, as well as Blender to create the models of the racer and the props. These are the steps that will be taken to achieve this goal:

1. Change the race track to simulate that of an athletic track stadium shape.
2. Update the terrain of the 'road' to be an 8-lane athletic track. The inside of the track will be grass and on the outside will be the stadium seating.
3. The track, racer and seating will be scaled to each other accordingly. The grass and track will be flat, whilst the seating is three-storey.
4. The terrain textures of the track, grass and seating will be photo-realistic.

5. Instead of a car the racer will be an undefined person/mannequin model.
6. The camera view point will be from behind the racer at an offset, looking from slightly above, starting at a start line in one of the middle lanes.
7. The lighting will be natural due to the stadium shaped opening in the roof. Depending on the camera angle, this shape may impact sections of the stadium, including the track. At all times, the section underneath the glass will reflect as such. The seating will gradually shadow as it gets higher.

8. Props will include the Olympic rings, Olympic flame, medals platform, cameras, banners, stacks of athletic equipment e.g. hurdles or relay batons.
9. Create the roof of the stadium and minor external details (time permitting)
10. Make the runner look like they are running? (depending on difficulty)

References

[1] "Tokyo's new National Stadium is ready to host Olympics Games," *The Sentinel*, Dec. 01, 2019. https://www.sentinelassam.com/sports-news/tokyos-new-national-stadium-is-ready-to-host-olympics-games/ (accessed Apr. 26, 2020).

[2] "Tokyo's Olympic Stadium unveiled and ready for the Games - Olympic News," *International Olympic Committee*, Apr. 19, 2020. https://www.olympic.org/news/tokyo-s-olympic-stadium-unveiled-and-ready-for-the-games (accessed Apr. 26, 2020).

[3] "#Tokyo2020 on Twitter: 'We must tell you all about the big day out #Miraitowa and #Someity had at the #Tokyo2020 Olympic Stadium. 🏟️⬜ They got to experience the beautiful exterior, what it's like to be a spectator and even got to go on the track!! Stay tuned all day as we share more amazing photos! ☺ https://t.co/TB2vOsiipI' / Twitter," *Twitter*. https://twitter.com/tokyo2020/status/1206394930827948032 (accessed Apr. 26, 2020).

[4] "2020 Olympics Tokyo Stadium 3d model." https://3dmdb.com/en/3d-model/2020-Olympics-Tokyo-Stadium/3700814/ (accessed Apr. 26, 2020).

[5] "Construction of stadium for 2020 Tokyo Olympics completed at cost of ¥157 bil," *Japan Today*. https://japantoday.com/category/sports/Construction-of-stadium-for-2020-Tokyo-Olympics-completed (accessed Apr. 26, 2020).

[6] "Japan's new National Stadium designed to let in cool breezes," *Nikkei Asian Review*. https://asia.nikkei.com/Spotlight/Tokyo-2020-Olympics/Japan-s-new-National-Stadium-designed-to-let-in-cool-breezes (accessed Apr. 26, 2020).

[7] "Japan's new National Stadium designed to let in cool breezes," *Nikkei Asian Review*. https://asia.nikkei.com/Spotlight/Tokyo-2020-Olympics/Japan-s-new-National-Stadium-designed-to-let-in-cool-breezes (accessed Apr. 26, 2020).

[8] "New National Stadium Tokyo - Japan - 2020 Olympics 3d model." https://3dmdb.com/en/3d-model/New-National-Stadium-Tokyo--Japan--2020-Olympics/4563154/ (accessed Apr. 26, 2020).

[9] "Tokyo 2020 Olympic Games - Homepage." https://tokyo2020.org/en/ (accessed Apr. 26, 2020).