Geodan b.v.
President Kennedylaan 1
1079 MB Amsterdam (NL)
Tel. +31 (0)20 - 5711 311
Fax +31 (0)20 - 5711 333
E-mail: info@geodan.nl
Web: www.geodan.nl

curriculum vitae

Steven Bos

Principal R&D Engineer for 3D, AR/VR and Artificial Intelligence. Both academic and professional experience in designing and developing state-of-the-art location intelligence software and hardware for a wide variety of government and business clients. Steven regularly writes tech articles, publishes demo's and occasionally speaks at conferences. A specialist in machine learning, graduated on the topic "multimodal fusion using deep neural networks", Steven has a huge interest in creating information from heterogeneous big data and computationally understanding the world in 3D. As research coordinator 3D, his research line "3D, Gamification and Hardware" published and demonstrated innovative results such as 3D printing Dutch cities, 3D indoor navigation for blind people using Google Tango smartphones and tablet, Minecraft NL in the Microsoft Hololens, large hyper realistic and interactive 3D worlds (“Digital Twins”) based on 3D GIS, IoT and BIM data using the HTC Vive and a drone management system for emergency response.

Steven holds a Master of Science degree in Computer Science from TU Delft and a Polytechnic Degree from The Hague University of Applied Sciences and is a certified Unity3D Developer.

Birthdate	September 24, 1982
Residence	Den Haag
Nationality	Dutch

Experience

GEODAN S.D.T | Senior R&D ENGINEER | 2014 - PRESENT
Expert in software engineering. Lead developer for Unity3D projects. In the role of Senior R&D Engineer Steven Bos envision, design and develop proof-of-concepts (demo’s) in a wide variety of domains. As a specialist in machine learning he trains deep neural networks for computer vision (eg. 3D object recognition), computer audio (eg. speech recognition) and multimodal fusion tasks. Since 2014 he develops the Falcon 3D platform, a world-class 3D visualisation tool for interacting with GIS data such as point clouds and BIM models. A long time AR/VR developer, Steven Bos creates interactive demo’s for any XR hardware platform such as the Oculus Rift with Leap Motion, Meta, Microsoft Hololens and Google Tango. He has a great passion for state-of-the-art hardware such as the Kinect, Tobii Eye Tracker, Myo, Raspberry Pi and Arduino, and often combines various technologies in creative complete workflow solutions. Course instructor for Unity3D software.

GEODAN S.D.T | RESEARCH COORDINATOR 3D | 2015 - PRESENT
As research coordinator 3D, Steven Bos explores and coordinates opportunities in the field of 3D, Gamification and Hardware as part of his research line. Tasks involve keeping up with the state-of-the-art by reading academic literature, meeting clients, publish articles and share knowledge across the organisation. Other tasks involve tinkering multi-disciplinary solutions in collaboration with Geodan Operations and Labs for clients with hard 3D problems. Steven Bos keeps track of all 3D related activities within the organisation and recently coordinated a team to develop an IoT sensor unit (based on LoraWAN) with custom designed PCB, 3D printed casing and machine learning interface for predictive analytics of railroad degradation using sound and vibration (Project LoRAIL).

Selection of projects

Geodan GO | Geomagine | 2016 - PRESENT | https://vimeo.com/277408024
Local governments aim to be successful in offering their community the best possible quality of life. For that they need tools of the 21st century to support them in making the best decisions as well as in mobilizing community engagement. A tool answering to all of these criteria is Geomagine. A technology that involves setting up a digital copy of reality (“Digital Twin”) based on data and models available for that community. Steven Bos is the tech lead as well as the lead Unity3D engineer. He is responsible for the technical architecture, importing (streaming) the procedurally generated 3D environment in Unity, making it performant and interactive for VR, add photo realism and physics for a realistic simulation. Collaboration in VR with voice support is added to allow multiple participants interact in the same virtual world and solve real life problems. Life is added by animating human agents and other traffic, day/night behavior, volumetric, light, clouds and wind.

Bartimeus | Finch | 2016 - PRESENT | https://youtu.be/NeXA7wOpZLE
The national foundation for blind and visually impaired people, Bartimeus, envisions a virtual guideline for the blind. By using a virtual guide line instead of the traditional physical line embedded in the pavement, more independence and navigation comfort can be offered for blind and visually impaired users. In close collaboration with Bartimeus, Geodan developed a proof of concept app using a Google Tango tablet or smartphone. The app uses a SLAM implementation to simultaneously map the environment in 3D and localize the device within that environment. By recording a route the user can navigate the route using 3D audio, visual (for visually impaired people) and tactile feedback to stay on the virtual line. The app has successfully been tested with a panel of blind and visually impaired people and is nominated for the national Accenture Innovation Award 2017. In 2018 the project was awarded a new grant to further develop the application. New features included loading, saving and sharing routes in the cloud, Kalman filters for smoothed routes, 3D pointcloud floor/object detection, new UI/UX, location-based voice recordings for PoI and specialised feedback with high-contrast visual, tactile and 3D spatial sound feedback. Steven Bos is the lead developer.

Internal | Falcon 3D Viewer | 2014 - PRESENT | https://youtu.be/fMJnZxPXqic
The Unity3D game engine is suitable for many other domains than gaming. The GIS domain, known for its large quantities of spatial and temporal data thrives on the Unity platform as it is capable of streaming 3D data on demand, visualise it with cinematic effects and interact with in in real-time as well as export to a number of platforms such as WebGL, Android and iOS. The in-house developed Falcon 3D platform import various 2D and 3D data sources such as point clouds, WM(T)S base and overlay layers, BIM models, and more. The platform is used for innovative research (wind modelling, noise modelling and shadow analysis) by PhD’s and has been published about (eg.
https://www.sciencedirect.com/science/article/pii/S1364815216309720)
Steven Bos is the lead developer of Falcon since 2014.

Internal | Real-time machine learning tutorials with Unity | 2017 - PRESENT |
http://research.geodan.nl/sites/unity-cntk-azure/ (firefox)

Microsoft open sourced its award winning machine learning framework The Cognitive Toolkit (CNTK) in 2016. As a proof of concept Steven Bos integrated the framework in Unity, demonstrating real-time image recognition performance in a 3D game engine. He also created a CNTK server which can be hosted on Azure or any other cloud platform to offload model evaluation and with that increase the deployment on low-end devices. With the CNTK machine learning platform in Unity, rapid prototyping for multiple platforms and with image (eg. satellite or 360 panoramic) and hand drawn data is now possible. He wrote several tutorials for the open source community to use the code.

Internal | Geocraft on Hololens | 2016 - PRESENT | https://youtu.be/XWqbMqKBa5I
Geodan converted the entire Netherlands in Minecraft blocks, a georeferenced dataset called Geocraft. This dataset has been improved daily by the Minecraft community, reconstructing buildings and landscape in 3D. Geocraft has been used as a tool to activate young citizens in urban planning and has been published about. As a proof of concept Steven Bos created a voxel viewer in Unity for the Hololens by optimizing the Geocraft dataset, adding streaming functionality and location aware functions to place the hologram on flat surfaces. The demo has been demonstrated in various international expos.

Rijkswaterstaat | RWS Imagine! | 2015 - 2016 | https://youtu.be/t0vWq2La1W0
The Dutch Major Project Authority, part of the Ministry of Infrastructure, must make strategic decisions on their future responsibilities and activities on a regular basis. Having to deal with the changing mobility patterns in the next 25 years, the Authority is challenged with new outlooks and options, while, at the same time, society requires swift and adequate project execution. To support the Authority in this issue, we used the principles of Inverse Future Engineering in a serious game with four extreme scenarios and four touch table set-ups. Steven Bos was lead Unity3D Engineer for the 3D part.

Internal | Drone Alert: Autonomous Drones for Emergency Response | 2014-2015 |
https://doi.org/10.1007/978-3-319-50427-8_15
With the advent of the Galileo Search and Rescue (SAR) service a new kind of global, high precision, outbound emergency alert is possible. For a VU PhD researcher, Steven Bos modified various V1 and V2 Parrot AR drones, equipped them with Raspberry Pi and Arduino and various sensors such as 3G, GPS and 4 way sonar. He designed and developed a drone management system (DMS)to simultaneously control multiple drones and provide gps-based missions using waypoints and a web interface to access the DMS. This work has been published about as a chapter in a book on Multi-Technology Positioning.

Technical skills

Operating Systems: Windows, Linux, Unix
Code Languages: C#, C++, C, Java, Python, Javascript, HTML5, CSS
Game Engines: Unity 4, 5, 6, 2017, 2018
City Engines: CityEngine 2017, 2018
IDE: Visual Studio 2005, 2008, 2010, 2015, 2017, Brackets, Eclipse, Android Studio
Databases: PostgreSQL, MonetDB
CAD / Geographical Information Systems (GIS): Blender, QGIS
Formats: IFC (BIM), CityGML, LAS, X3D, STL, XML, GML, KML, JSON, GEO-JSON, FBX, SHP, OBJ, COLLADA
Data: Experienced in conversion, attributes and properties of GIS vector and raster data formats. Other data sets: OSM, GBKN, BAG, Top10NL, AHN2/AHN3, BGT, satellite images.
Methods: SCRUM, KANBAN
Other software: Microsoft Office Suite, Adobe Photoshop, NodeJS, CNTK
Other knowledge: Machine Learning/Pattern Recognition, Domotica, Robotica, Computer Vision, Speech Recognition, Natural Language Processing

Courses completed

1. *Unity Certified Developer* | Unity | 2017
2. *Microsoft DAT236x Deep Learning Explained* | Microsoft | 2017

Education

1. *Master Computer Science, specialization in Human Computer Interaction* TU Delft | 2017
2. *Bachelor ICT* | The Hague University of Applied Sciences | 2006
3. *High School (HAVO)* | Christelijk Lyceum Delft | 2000

Exhibitions, conferences

1. *Unite Europe Amsterdam* | 2015, 2017
2. *Farmhack Reusel* | 2016
3. *Microsoft Kinect Hackathon Amsterdam* | 2015
4. *Geofort Location Based Gaming Herwijnen* | 2014
5. *3D doorbraak conference TU Delft* | 2014

Language skills

Dutch (native), English

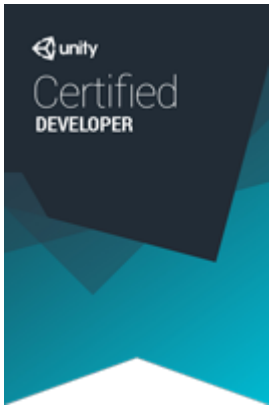
Publications

M. Haak, S. Bos, S. Panic and L.J. Rothkrantz (2009). Detecting Stress using Eye Blinks during Game Playing. In GAMEON (pp. 75-82).

L. Bausá López, N. van Manen, E. van der Zee and S. Bos. (2017). Drone Alert: Autonomous Drones for Emergency Response. In: J. Nurmi, E-S. Lohan, H. Wymeersch, G. Seco-Granados and O. Nykänen (Eds.); Multi-Technology Positioning. Springer Nature, Cham, Switzerland (pp. 303-321).

H. Scholten, S. Fruijtier, E. Dias, S. Hettinga, M. Opmeer, W.S. van Leeuwen, M. Linde, S. Bos, R. Vaughan, H. van Kaam, N. van Manen, C. Fruijtier (2017). Geocraft as a Means to Support the Development of SmartCities, Getting the People of the Place Involved- Youth Included -. In: K. Kourtit, P. Nijkamp, L.F. Girard and O. Hudec (Eds.); Science of the City: Towards a Higher Quality of Urban Life. Vol 21 No 1, special issue (pp. 119-150).

S. Bos (2017). Towards Natural Language Understanding Using Multimodal Deep Learning (Master's Thesis). TU Delft, retrieved from http://resolver.tudelft.nl/uuid:c0a208a8-d012-450e-9c07-f23a39910855


unity
Certified
DEVELOPER