



CENTER FOR CONNECTED AND AUTOMATED TRANSPORTATION

Project Title	Promoting CAV Deployment by Enhancing the Perception Phase of the Autonomous Driving Using Explainable AI	
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Most relevant CCAT research thrusts (choose all applicable)	<input checked="" type="checkbox"/> Control & Operations <input checked="" type="checkbox"/> Enabling Technology <input type="checkbox"/> Human Factors <input type="checkbox"/> Infrastructure Design & Management <input checked="" type="checkbox"/> Modeling & Implementation <input type="checkbox"/> Policy & Planning	
Funding Request	\$120,000	
Matching Funds/Source	\$120,000 (Indiana DOT via JTRP)	
Total Project Cost	\$240,000	
Contract Number	69A3551747105	
Project start/end dates	April 1, 2022 – March 31, 2023	
Project Abstract	<p>The perception phase, the weak link in the driving task, has been identified as the key cause of most autonomous vehicle (AV) accidents. This has been attributed to the relative infancy of computer vision (CV), the key technology in perception. Deep learning (DL) approaches have been used widely in computer vision applications, from object detection to semantic understanding, but are generally considered as black boxes due to their lack of interpretability which exacerbates user distrust and hinders their deployment in autonomous driving. It has been argued that explainable AI (XAI), an emerging concept in contemporary computer science literature where model outputs can be understood by humans, offers an opportunity to address this issue. Thus, this research project is developing an explainable end-to-end autonomous driving system as an improvement to existing autonomous driving systems. To do this, the team is using a state-of-the-art self-attention based model that generates driving actions with corresponding explanations using visual features from images from onboard cameras. The model will imitate human peripheral vision by performing soft attention over the images' global features.</p>	
High-level implementation plan (of	The performance of the proposed model will be evaluated versus benchmark models in terms of correct prediction of actions and explanations and the associated computational cost.	





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Research Outcomes)	
Project Metrics	Nr. of papers presented at nationally and internationally renowned conferences; Nr. of papers published; Media stories and website hits
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