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Ending Drunk Driving with a Flash of Light

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I. INTRODUCTION

[1] Drunk driving exacts an enormous toll on our society. Every year, alcohol-driven[1] crashes kill over ten thousand people, injure hundreds of thousands more, and cost the national economy tens of billions of dollars.[2] States largely have been left to combat this problem through their own criminal regimes. Among the methods used to combat drunk driving is mandating a person convicted of driving under the influence/driving while intoxicated[3] install an ignition interlock device ("IID") in her vehicle as a condition of restoring her driving privileges. Installing an IID prevents a person convicted of a DUI from starting her car if she has a certain amount

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[1] The term "alcohol-driven" means that alcohol was the definitive—as opposed to merely contributing—cause of the crash.

[2] *See* NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., U.S. DEPT. OF TRANSP., THE ECONOMIC AND SOCIETAL IMPACT OF MOTOR VEHICLE CRASHES, 2010 5 (2014) [hereinafter NHTSA REPORT], *available at* http://www-nrd.nhtsa.dot.gov/pubs/812013.pdf, *archived at* http://perma.cc/QM9C-AFB4.

[3] A number of jurisdictions have regimes dealing with driving under the influence or while intoxicated as distinct (if related) offenses. For the purposes of brevity, this comment will describe all such offenses as DUIs.

of alcohol in her blood.[4] States apply this measure to only a small fraction of persons convicted of DUIs. Problematically, state criminal measures do little to discourage drunk driving from occurring in the first place.

[2] An obvious solution is to prevent people from driving while intoxicated right out of the gate, rather than waiting for an individual to be convicted of a DUI. Though IID mandates are universally coupled with criminal proceedings, a survey of state law shows their character is remedial rather than punitive.[5] Take away the IID mandate's association with criminal proceedings, and you are left with a regulatory measure. A regulation requiring the installation of an IID in every vehicle sold in the nation would be a huge step toward preventing drunk driving. The National Highway Traffic Safety Administration ("NHTSA") has been reluctant in the past to issue safety standards mandating the use of interlocks in vehicles, but has indicated it would be willing to do so if the available technology could ensure such a standard could not be easily circumvented.[6] This comment argues that the NHTSA has the authority to issue such a regulation; it need only be presented with a workable opportunity to do so. The present state of IID technology is a poor candidate to make this hypothetical regulation workable, but advances in Near Infrared ("near-IR") Spectroscopy will provide the technology necessary to make a discussion of such a regulation worthwhile.

[3] Part II of this comment begins by discussing the societal costs of drunk driving, and briefly reviews state criminal regimes used to curtail

[4] *See generally What Is an Interlock?*, LIFESAFER, https://www.lifesafer.com/devices/what-is-an-interlock/, *archived at* https://perma.cc/XFY7-G8RA (last visited Mar. 26, 2015) (explaining how an ignition interlock device works).

[5] *See infra* Part II.A. A chief function of IID mandates is to provide for the conditional restoration of driving privileges following a DUI conviction. While restricting driving privileges seems punitive—restricting mobility—such measures are more concerned with maintaining the safety of the roads.

[6] *See infra* Part III.B.

drunk driving—concluding IID mandates need not be left exclusively to criminal sanctions. Part III discusses the scope of the NHTSA's authority to issue safety requirements on every vehicle sold for use in the nation. This part also considers the factors that motivate the NHTSA's decisions to issue safety rules. Part IV discusses the current state of IID technology, indicating it is a poor candidate for alleviating the NHTSA's reluctance to issue the proposed safety standard, and highlights an emerging application of near-IR Spectroscopy that would allow an IID to detect blood alcohol content through direct, noninvasive observation gleaned from a flash of light into a driver's fingertip. This comment ends by concluding that the inadequacy of state criminal regimes, the noncriminal character of IID mandates, and the enormous national problem to be solved provide the NHTSA with the justification it needs to issue an IID safety standard. In turn, near-IR Spectroscopy could soon provide the means to ensure compliance with such a standard without heavily burdening consumers or imposing an excessive intrusion into their lives. With a flash of light, near-IR Spectroscopy could allow us to stop nearly every instance of drunk driving before it starts.

II. BACKGROUND

[4] In May 2014, the NHTSA issued a report detailing the aggregate economic and societal impact of motor vehicle crashes.[7] The NHTSA implicated alcohol consumption in 13,323 crash fatalities and 430,000 non-fatal injuries and found that alcohol-related crashes directly cost the

[7] *See* NHTSA REPORT, *supra* note 2, at 5.

economy $59.4 billion in 2010.[8] In the end, alcohol definitively caused 11,226 fatalities, 326,000 injuries and $49 billion in direct costs.[9]

[5] When total societal costs are taken into consideration—insurance premiums,[10] Medicare/Medicaid costs, loss of productivity,[11] and the cost of fatalities themselves [12] —alcohol-driven crashes cost the national economy $196 billion in 2010.[13] Roughly 52% of that cost was borne by private insurers, 25% by those involved in accidents themselves, 14% was paid through alternative insurance carriers and miscellaneous third parties, and 9% was covered through state and federal taxes.[14] The disaggregation of these figures is misleading—one way or another, the majority of the population bears the economic cost of alcohol-driven crashes personally.[15]

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[8] *See id.* at 3. *But see* NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., U.S. DEPT. OF TRANSP., TRAFFIC SAFETY FACTS, 2012 DATA 1 (2013) [hereinafter SAFETY FACTS], *available at* http://www-nrd.nhtsa.dot.gov/Pubs/811870.pdf, *archived at* http://perma.cc/9J76-AT64 (showing that total alcohol-driven crash fatalities dropped to 10,322 in 2012; this drop is more likely to have resulted from economic factors than from any effort to reduce drunk driving).

[9] *See* NHTSA REPORT, *supra* note 2, at 3. These accidents will hereinafter be referred to as "alcohol-driven" as opposed to "alcohol-related." This is to denote the fact that alcohol was the definitive cause of the accident.

[10] *See id.* at 236.

[11] *See id.* at 236–38.

[12] *See id.* at 1 (placing the total economic cost of a fatality at 1.4 million dollars).

[13] *See id.* at 4.

[14] *See* NHTSA REPORT, *supra* note 2, at 241.

[15] *See id.* at 241 ("To some extent it is illusory to disaggregate costs across payment categories because ultimately, it is individuals who pay for these costs . . . . [S]ociety at large picks up three-quarters of all crash costs that are incurred by individual motor vehicle crash victims.").

[6] Eighty-four percent of all alcohol-driven crashes involved a motorist with a blood-alcohol content ("BAC") of 0.08 or greater.[16] The most frequently recorded BAC of a drunk driver in fatal crashes was 0.16.[17] A survey of four million adults revealed a total of over 112 million individual instances of alcohol-impaired driving in 2010.[18] These figures reflect the lowest frequency of drunk driving since 1993,[19] but are likely significantly underreported.[20]

[7] Given these numbers, it is unsurprising that curtailing drunk driving is the objective of the majority of state laws involving traffic regulation.[21] These objectives are achieved largely through performing traffic stops, initiating sobriety checkpoints,[22] and requiring persons convicted of DUIs to install breathalyzer-activated ignition interlocks in their vehicles.[23] Installing breathalyzer interlocks in cars results in a 67%

[16] *See id.* at 3.

[17] *See* SAFETY FACTS, *supra* note 8, at 5.

[18] *See* Gwen Bergen et al., *Vital Signs: Alcohol-Impaired Driving Among Adults—United States, 2010*, 306 J. AM. MED. ASS'N 2208, 2208–09 (2011), *available at* http://jama.jamanetwork.com/article.aspx?articleid=201934, *archived at* http://perma.cc/D9BM-HVV5.

[19] *See id.* (indicating that this dip in drunk driving is more likely the result of economic or convenience factors, rather than a societal effort to reduce drunk driving).

[20] *See id.* at 2010 (noting that the study relied on self-reporting without adjusting for the social stigma associated with admitting to drunk driving; it did not take into account drivers under 18, the fact that most members of the population rely on cell phones, or seasonal drinking habits).

[21] *See* NHTSA REPORT, *supra* note 2, at 148.

[22] *See* Bergen et al., *supra* note 18, at 2209.

[23] *See id.*

reduction in DUI re-arrest rates while installed, saving $6.60 for every dollar spent on enforcement.[24]

[8] Despite the obvious public need, both preventative and remedial measures to reduce drunk driving are grossly underutilized.[25] In the case of breathalyzer-based IIDs only 20% of eligible[26] offenders were actually enrolled in a program requiring their installation.[27] This low rate of enrollment likely arises from the burdensome procedural prerequisites associated with IID mandates, as well as the significant variability in how IID mandates are applied from state to state. A brief survey of state law follows, illustrating how state courts apply IID mandates and showing IID requirements need not be seen as a punitive measure.

A. State Law—Overview[28]

[9] In their efforts to curtail drunk driving, state courts can mandate individuals convicted of DUIs to install breathalyzer-actuated IIDs in their vehicles. These interlock devices prevent an individual from starting a car

[24] *See id.* at 2210.

[25] *See id.* at 2209.

[26] The states vary as to what types and how many offenses it takes to allow a court to impose an IID installation. *Compare* GA. CODE ANN. § 42-8-111(a) (2014), *with* N.C. GEN. STAT. § 20-17.8(a)–(b) (Supp. 2014).

[27] *See* Bergen et al., *supra* note 18, at 2210.

[28] This section asserts the consequences of varying state court rulings regarding the imposition of IID mandates. It is a necessarily brief discussion illustrating the principle that IID mandates need not be criminal. For a broader and more in-depth survey of state court application of IID mandates, *see generally* Jay M. Zitter, Annotation, *Validity, Construction, and Application of Ignition Interlock Laws*, 15 A.L.R.6th 375 (2006 & Supp. 2015) (discussing the state and federal cases considering legislation requiring installation of ignition interlock systems).

if that individual's BAC is above a preset threshold.[29] Currently, every state's ability to impose an IID requirement on an individual arises from a criminal statute—often as a condition of restoring the driving privileges of an individual convicted of a DUI.[30] However, state construction of IID statutes demonstrates the imposition of installation itself is not punitive in nature, and therefore need not necessarily be linked to a criminal proceeding.[31] The noncriminal character of state IID statutes is implicit in how courts have treated them—the ensuing conversation shows the tension between IID mandates being the sole province of criminal statute, and the public safety purpose for which they are applied. For instance, state courts vary as to the judicial or regulatory character of IID requirements. More importantly, numerous courts have characterized IID mandates as remedial rather than punitive.

[10] State IID statutes are also applied inconsistently between jurisdictions.[32] Variations in application include how many convictions an individual must have, or how severe a DUI must be before a court can impose an IID requirement. States also vary significantly as to what sort of and how many exceptions apply to a statutory IID requirement—for instance, a number of statutes provide explicitly for employment or emergency vehicle operations where others do not.

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[29] *See, e.g.*, *Ignition Interlock Program*, MD. DEP'T TRANSP.: MOTOR VEHICLE ADMIN., http://www.mva.maryland.gov/about-mva/info/26200/26200-14T.htm, *archived at* http://perma.cc/YF6X-G4BV (last visited Mar. 2, 2015) ("The driver must blow into the [breathalyzer] and if his or her breath alcohol level exceeds the accepted level set on the device, the vehicle will not start."). The IID retest preset in Maryland is a BAC of .025. *See id.*

[30] *See State Ignition Interlock Laws*, NAT'L CONF. ST. LEGISLATURES, *available at* http://www.ncsl.org/research/transportation/state-ignition-interlock-laws.aspx, *archived at* http://perma.cc/YP3P-EWGK (last updated Aug. 2014).

[31] *See infra* Part III.A.

[32] *See infra* Part III.A.

[11] A brief survey of state court interpretation of IID statutes justifies characterizing IID requirements as fundamentally noncriminal. The stated purpose and desired effect of IID mandates is not to punish those convicted of DUIs, but to curtail drunk driving itself—they are remedial measures. If IIDs are used as a remedial measure, it is no stretch to envision their being used as a preventative one. However, judicial discretion and jurisdictionally-drawn differences in the application of IID mandates frustrate their consistent use at a national level. This impediment to uniform application speaks to the low rate of eligible individual's enrollment in IID programs. The troublingly low application of IID statutes—and the fact IID mandates could justifiably be seen as a means to *prevent* rather than merely *respond* to drunk driving—create an environment where federal regulatory intervention would be appropriate.

B. The Noncriminal Character and Inconsistent Application of IID Statutes bring those Mandates into the Province of Federal Regulation

[12] IID mandates are ultimately non-punitive in purpose—they need not be restricted to the criminal process. The present condition of criminal imposition of IID mandates has left the problem of drunk driving largely unanswered. Currently, IID mandates universally arise under state criminal statutes.[33] It need not follow from this fact the imposition of an IID installation is suitable only as a punishment for a criminal conviction. For instance, at least one court has allowed an IID requirement be imposed before a criminal proceeding has been completed.[34] The criminal nature

[33] *See State Ignition Interlock Laws*, *supra* note 30.

[34] *See Ex parte* Elliot, 950 S.W.2d 714, 715–17 (Tex. App. 1997) (per curiam) (allowing for the installation of an interlock on a defendant's car when released on bond, prior to conviction, as "the presumption of innocence . . . does not apply to a determination of the rights of a pretrial detainee").

of the proceedings has not prevented courts from recognizing IID mandates serve a public-safety purpose, rather than a punitive one.[35]

[13] Moreover, courts have been unsympathetic toward arguments that mandating IID installations is unduly punitive or that their enforcement is constitutionally suspect. The New Mexico Court of Appeals held that mandating the installation of an IID in a defendant's car did not violate equal protection despite the fact his conviction did not involve the use of alcohol.[36] New York courts have held that making a defendant pay for the installation of an IID, without coming to a determination of a defendant's ability to pay, likewise does not violate equal protection or due process.[37] The Oregon Court of Appeals has held that it does not violate state privileges and immunities or the Fourteenth Amendment to require the installation of a breathalyzer interlock before a convicted defendant applied for a hardship permit.[38]

[35] *See, e.g.*, Alexander v. Commonw. of Pa. Dep't of Transp., 880 A.2d 552, 560–61 (Pa. 2005) (holding that the statute conditioning restoration of license served as an alternative to maintaining a restriction on a driver's license, and had the goal of enhancing public safety rather than punishing offenders after the fact); Frederick v. Commonw. of Pa. Dep't of Transp., 802 A.2d 701, 704 (Pa. Commw. Ct. 2002) (holding that ignition interlock requirements for restoration served a goal other than punishment and not penal interests, exempting such a statute from ex post facto analysis); *Ex parte* Sells, No. 01-99-00362-CR, 2000 Tex. App. LEXIS 132, at *4–5 (Tex. App. Jan. 6, 2000) (noting that the revocation of a license is not punitive in nature, and so conditioning the restoration of driving privileges on the installation of an interlock is likewise not punitive). *But see* Doyon v. Dep't of Highway Safety & Motor Vehicles, 902 So. 2d 842, 843–44 (Fla. Dist. Ct. App. 2005) (characterizing Florida's installation requirement as punitive, as opposed to an administrative function).

[36] *See* State v. Valdez, 293 P.3d 909, 912 (N.M. Ct. App. 2012).

[37] *See, e.g.*, People v. Pedrick, 926 N.Y.S.2d 269, 272 (N.Y. City Ct. 2011) (comparing the interlock mandate with restitution or a fine, which may be modified by post-sentencing review).

[38] *See* State v. Scott, 773 P.2d 394, 397 (Or. Ct. App. 1989).

[14] In cases where state courts have been receptive to due process or equal protection arguments, it appears to be in connection with pragmatic considerations. State courts will generally impose an IID requirement on any vehicle a defendant operates.[39] However, courts are more hesitant when it comes to imposing requirements on defendants who own multiple vehicles—an IID installation mandate is not meant to financially crush an individual, it need only be effective. For example, a New York trial court held that a statute imposing the installation of an ignition interlock on any vehicle an offender owns or operates is excessive, restricting the imposition to vehicles the offender was to operate during the proscribed sentencing period.[40] Pennsylvania trial courts have likewise held it improper to require the installation of interlocks on all of an offender's vehicles.[41]

[15] So, while some state courts have maintained IID mandates are punitive, others have held they fulfill a public safety function rather than a punitive one. The necessity of IID mandates' connection with criminal proceedings is weakened further by the fact state courts vary as to the nature of the authority under which the ability to impose an IID installation arises. Some jurisdictions have held that the authority to

[39] *See, e.g.*, Thurman v. Dretke, No. 4:04-CV-0308-A, 2004 U.S. Dist. LEXIS 19116, at *17–18 (N.D. Tex. Sept. 22, 2004) (upholding the trial court's order that an ignition interlock device be installed on *any* car that the appellant will drive at appellant's expense, as "[c]onditions of release are within the sound discretion of the releasing authority and may be reviewed only for an abuse of discretion").

[40] *See* People v. Walters, 901 N.Y.S.2d. 893, 904–05 (N.Y. City Ct. 2010). *See contra* Pedrick, 926 N.Y.S.2d at 273 (rejecting an argument imposition of an interlock requirement on multiple vehicles unfairly penalizes wealthier defendants: "To arbitrarily limit the application of the law to one vehicle per defendant would . . . lead to the circumstance where a defendant who has the financial ability to do so, will obtain more than one vehicle—one to comply with the law and the second to flaunt it. Neither the Constitution, nor logic, mandates such a result.").

[41] *See* Conrad v. Commonw. of Pa. Dep't of Transp., 856 A.2d 199, 202 (Pa. Commw. Ct. 2004).

impose installation comes from the courts;[42] others have held that imposing installation is ultimately a regulatory responsibility and have drawn fine lines where that authority begins and ends.[43] Some statutes mandate the court to impose the installation of an ignition interlock, removing judicial discretion altogether.[44]

[16] A number of jurisdictions have held that a court can compel an individual to have an ignition interlock installed after their first offense,[45]

[42] *See, e.g.*, Dickenson v. Aultman 905 So. 2d 169, 170–71 (Fla. Dist. Ct. App. 2005) (holding that an agency may not impose installation without a court order, even where the statute imposing the requirement makes installation mandatory as the result of a conviction); Turner v. Commonw. of Pa. Dep't of Transp., 805 A.2d 671, 676 (Pa. Commw. Ct. 2002) (holding that the state DOT could not impose installation where a court failed or refused to comply with a statutory mandate to do so), *rev'd on other grounds per curiam*, Turner v. Commonw. of Pa. Dep't of Transp., 922 A.2d 878, 878 (Pa. 2007); *Ex parte* Elliott, 950 S.W.2d 714, 717 (Tex. App. 1997) (per curiam) (holding that there is no separation of powers issue where a trial judge has the discretion to mandate the installation of an interlock).

[43] *See, e.g.*, Commonwealth v. Mockaitis, 834 A.2d 488, 499–500 (Pa. 2003) (holding that the statute wrongly deputized the courts to perform a function more appropriate to the other branches); Commonwealth v. Riggs, 53 Pa. D. & C.4th 309, 321–22 (Pa. D. & C. 2001) (holding that the PA ignition lock statute violated separation of powers in imposing regulatory responsibilities upon the judiciary without providing the funds or mechanism to do so, by requiring the judiciary "certify" when a motorist installed a device in their vehicle). *But see, e.g.*, *Turner*, 805 A.2d at 676 (recognizing that the interlock statute requiring the courts to report a defendant's compliance with installation of an interlock was an example of a normal function of the court, and did not violate the separation of powers).

[44] *See, e.g.*, State v. Benbow, 610 S.E.2d 297, 297–98 (N.C. Ct. App. 2005) (holding that a trial court erred in ordering the N.C. DMV to reinstate an offender's license without requiring an ignition interlock, given state statute mandated installation for offenders with a BAC of over 0.16 at the time of arrest); *Conrad*, 856 A.2d at 203 (holding that neither the trial court nor prosecutor could negotiate the ignition interlock requirement with the defendant); State v. Villella, 597 S.E.2d 563, 565 (Ga. Ct. App. 2004) (holding that a trial court erred in not ordering an interlock installation as a condition of probation, given that state statute demands it).

whereas others require multiple convictions in order to mandate an installation.[46] Some states have held that ignition interlock requirements apply to DUI offenses where the intoxicant in question was not alcohol.[47] The states also split on the severity of an offense that will necessitate the installation of an ignition interlock.[48]

[17] Judicial discretion aside, IID statutes themselves provide an inconsistent array of exceptions that may apply to the application of a mandate. These exceptions include driving an employer's vehicle,[49] financial hardship,[50] and medical exemptions that may circumvent the

[45] *See, e.g.*, *Ex parte* Sells, No. 01-99-00362-CR, 2000 Tex. App. LEXIS 132, at *2–3 (Tex. App. Jan. 6, 2000) (holding that a court may mandate a first time offender install an interlock in their car, even though the underlying statute only required installation in cases involving repeat offenders).

[46] *See, e.g.*, Deppe v. Iowa Dep't of Transp., 647 N.W.2d 473, 476–78 (Iowa Ct. App. 2002) (holding that state statute required the installation of an interlock after a third offense, and the general statutory scheme had established minimum periods of ineligibility for a temporary restricted license, and so a defendant is eligible for a temporary license without an interlock device after a first offense).

[47] *See, e.g.*, State v. Valdez, 293 P.3d 909, 917 (N.M. Ct. App. 2012).

[48] *See, e.g.*, ALA. CODE § 32-5A-191(e)–(i) (LexisNexis Supp. 2014) (requiring an interlock be installed for six months on first offense when defendant drives with a BAC of .08 to .14, but raises the requirement to two years if the defendant has a child under fourteen, BAC of .15 or injures another person in a related collision); COLO. REV. STAT. § 42-2-132.5(1), (4)(a)(I) (2014) (revoking a defendant's license for at least one year after a first offense, but the defendant may have the license restored one month after conviction if she installs an ignition interlock in her vehicle for two years); D.C. CODE § 50-2201.05a (LexisNexis 2012) (requiring subsequent convictions).

[49] *See, e.g.*, ARK. CODE ANN. § 5-65-118(g)(2)(B)(i) (Supp. 2013); HAW. REV. STAT. § 291E-44.5(c) (LexisNexis 2010 & Supp. 2014); KAN. STAT. ANN. § 8-1015(e) (Supp. 2013).

[50] *See, e.g.*, GA. CODE ANN. § 40-5-64(c)(1) (2014); 75 PA. CONS. STAT. ANN. § 3805(e) (West 2006 & Supp. 2014); S.C. CODE ANN. § 56-5-2941(F) (2004 & Supp. 2014); WIS. STAT. § 343.301(1m) (2014).

interlock requirement for a specified period.[51] Not every state statute provides these exceptions, and those that do provide exceptions do not always have the same exceptions in common with other jurisdictions.

[18] The differences between and within states as to the character and application of IID mandates speak to the benefits of instituting a federal regulatory regime. The differences in enforcement thresholds between states, as well as the judicial discretion involved in most states' imposition of an IID installation, doubtlessly contribute to the low number of eligible defendants required to install IIDs in their cars. Again, while IIDs reduce drunk driving re-arrest rates by 67%, only 20% of individuals eligible for IID installation requirements have been mandated to do so.[52] Fuller coverage would be achieved by imposing IID installations by regulation, as opposed to merely waiting for criminal sanctions.

III. THE NHTSA'S REGULATORY POWER

A. Overview

[19] State court construction and application of IID statutes demonstrate their purpose would be better served by a national regulatory regime. Even though all interlock mandates arise under criminal statutes, the function of these statutes ultimately appears to be remedial rather than punitive. Nothing in the brief survey of state law above compels the inference that mandating the installation of an IID is a punishment, apart from its connection to criminal proceedings and the requirement a defendant pay for its installation. The variability in—and low rate of—the application of IID mandates demonstrate the inadequacy of applying them as an ad hoc remedial measure. The societal costs of drunk driving, state criminal regime frustration of the purpose of IID mandates, and the IID

[51] *See, e.g.*, CAL. VEH. CODE § 23575(k) (Deering 2000); FLA. STAT. § 322.1715(1) (2014); N.C. GEN. STAT. ANN. § 20-17.8(*l*) (2013 & Supp. 2014).

[52] *See* Bergen et al., *supra* note 18, at 2210.

mandates' nonpunitive character support the propriety of implementing a national regulatory IID regime using IIDs as a preventative measure. Such regulatory action would be an appropriate exercise of the National Highway Transportation Safety Administration's authority.

[20] In 1966, Congress passed and President Johnson signed into law the National Traffic and Motor Vehicle Safety Act, creating what is now called the NHTSA.[53] It is the purpose of this legislation to "reduce traffic accidents and deaths and injuries resulting" therefrom.[54] To achieve this goal, the NHTSA issues "motor vehicle safety standards for motor vehicles and motor vehicle equipment in interstate commerce."[55] Under this authority, the NHTSA may impose new standards of safety upon car manufacturers.[56] This authority has allowed the NHTSA to require car manufacturers to install numerous and far-reaching safety features.[57]

[21] In promulgating rules, the NHTSA and other administrative agencies must take note of federalism concerns implicated by the regulation. In 1999, President Clinton issued Executive Order 13132 ("the Order"), setting forth the federalism concerns to be considered by

[53] *See* 49 U.S.C. § 30101 (2012); Exec. Order No. 11357, Administration of the National Traffic and Motor Vehicle Safety Act Through the National Highway Safety Bureau and Its Director, 32 Fed. Reg. 8,225 (June 8, 1967).

[54] 49 U.S.C. § 30101 (2012).

[55] *Id.* at § 30101(1).

[56] *See id.* at § 30103(a).

[57] *See generally Federal Motor Vehicle Safety Standards and Regulations*, NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., U.S. DEPT. OF TRANSP., http://www.nhtsa.gov/cars/rules/import/FMVSS/, *archived at* http://perma.cc/B7G2-5THY (last visited Mar. 26, 2015) (listing all of the different categories of safety standards that the NHTSA has implemented).

administrative agencies in issuing their rules.[58] Under the Order, federal agencies must be mindful of regulations or other "policy statements or actions that have substantial direct effects on the States."[59] Agencies should be "deferential to the States when taking action" impacting a state's discretion in developing its own policies.[60] National policies affecting such an impact should be taken "only where there is constitutional and statutory authority" to do so "in light of the presence of a problem of national significance."[61] Where federal agencies have authority to act, they should "encourage States to develop their own policies" to achieve the underlying objectives, "where possible, defer to the States to establish standards," consult with state officials regarding the need for a federal standard and any possible alternatives, and consult with states in developing standards in the event national standards are necessary.[62]

[22] This Part proceeds by tracking examples of the NHTSA's application of its authority to issue safety standards affecting nearly every vehicle sold for use in the United States. Reviewing these examples

[58] *See* Exec. Order No. 13132, Federalism, 64 Fed. Reg. 43,255, 43,255 (Aug. 10, 1999). Later executive orders have continued to build upon specific ways of complying with federalism concerns, but Executive Order 13132 currently stands as an outline of basic Federalism principles governing agency rules. *See, e.g.*, Memorandum of May 20, 2009: Preemption, 74 Fed. Reg. 24,693 (May 22, 2009) (issued by President Obama, discouraging agencies from including preemption language in the preambles of their rules unless lawful under principles of Federalism, including those outlined in E.O. 13132); *Executive Orders Disposition Tables: William Clinton – 1999*, NAT'L ARCHIVES, http://www.archives.gov/federal-register/executive-orders/1999.html, *archived at* http://perma.cc/9NV6-WHAY (last visited Mar. 19, 2015) (listing E.O. 13132 as unmodified by any subsequent executive orders).

[59] Exec. Order No. 13132, 64 Fed. Reg. at 43,255.

[60] *Id.* at 43,256.

[61] *Id.*

[62] *Id.*

shows an IID mandate would be in keeping with the NHTSA's charter. The classic example of the broad scope of the NHTSA's authority is its progressively stringent requirements mandating installation of seatbelts in every car. The conversations surrounding these standards demonstrate the NHTSA has relatively little regard for convenience-based objections to proposed safety standards. At one point, the NHTSA experimented with the use of IIDs to enforce seatbelt compliance. Congress then proposed legislation to forbid the issuance of such a standard—although President Obama recently signed an executive order allowing the use of such a standard as an option. Reviewing a recent rulemaking proceeding shows the NHTSA would be willing to consider IID requirements if the state of technology allows the NHTSA to ensure compliance with such a standard. Finally, the discussion surrounding rear-view cameras illustrates the factors the NHTSA may find significant in issuing a hypothetical IID mandate.

B. Seatbelts

[23] In 1968, the NHTSA issued Motor Vehicle Safety Standard 208, requiring manufacturers install seatbelts reaching both the shoulder and torso in designated (that is, forward-facing) seats on all of their passenger vehicles,[63] making exceptions for buses and other multipurpose passenger vehicles.[64] The regulation also called for belted and unbelted crash testing. Additionally, the NHTSA issued Safety Standard 209, setting forth the specifications to which installed seatbelts must comply.[65]

[63] *See* Standard No. 208; Occupant Crash Protection, 49 C.F.R. § 571.208 S4.1.1.2–S4.1.2 (2014).

[64] *See id.* at § 571.208 S4.2.5.5.

[65] *See* Standard No. 209; Seat Belt Assemblies, 49 C.F.R. § 571.209 (2014).

[24] In 1970 the NHTSA expanded the seatbelt requirement to include side and rear-facing seats.[66] The NHTSA adopted the use of seatbelts "based on the proposition that, so far as practicable, drivers and passengers in all types of vehicles should be afforded the means of protecting themselves from personal injury."[67] In adopting this measure, the NHTSA dismissed arguments that the adopted regulation "would not be appropriate" for certain types of vehicles, saying any inconvenience would be "far outweighed by the safety benefits that the belts afford the occupants."[68] The NHTSA factors a technology's capability of ensuring consumer compliance when issuing safety standards.[69] Until recently, the NHTSA has been unwilling to consider using interlocks to compel seat belt use.[70] This unwillingness is rooted in the history of interlock requirements actually *frustrating* seatbelt use,[71] and was solidified by a legislative prohibition from mandating interlocks as a means of complying with safety standards.[72] However, in 2012 President Obama signed into law the Moving Ahead for Progress in the 21st Century Act, removing the restriction on the NHTSA that disallowed the use of interlocks as a *permissible* means of satisfying a safety standard.[73] A recent rulemaking

[66] *See* Seatbelt Installations; Passenger Cars, Multipurpose Passenger Vehicles, Trucks and Buses, 35 Fed. Reg. 15,222 (Sept. 30, 1970).

[67] *Id.*

[68] *Id.*

[69] *See* Federal Motor Vehicle Safety Standards; Occupant Crash Protection, 78 Fed. Reg. 53,386, 53,387 (Aug. 29, 2013) (to be codified at 49 C.F.R. pt. 571).

[70] *See id.* at 53,390.

[71] *See id.* at 53,387.

[72] *See id.*

[73] *See* Moving Ahead for Progress in the 21st Century Act, Pub. L. No. 112-141 § 30124, 126 Stat. 405, 757–58 (2012) (codified at 49 U.S.C. §30124) (keeping in place prohibitions on agencies from *requiring* the use of interlocks to compel seatbelt use).

discussion shows the NHTSA would consider using an interlock safety standard and is looking into the effectiveness of seatbelt interlock systems.[74]

[25] In 1974, the Senate proposed legislation prohibiting the use of ignition interlock systems as a method of compelling compliance with parts of the federal code requiring the installation of seatbelts.[75] The adopted legislation prohibited safety standards from permitting or "requir[ing] a manufacturer to comply with the standard by using a safety belt interlock designed to prevent starting or operating a motor vehicle if an occupant is not using a safety belt."[76]

[26] Congress adopted the prohibition in large part because of consumer refusal to comply with such systems.[77] After a brief uptick in compliance, consumers used seatbelts even *less* frequently than before such methods were implemented once they worked out how to circumvent interlock requirements for seatbelts.[78]

[27] In 2013, BMW applied for, and the NHTSA denied, a rulemaking petition providing for an exception to the prohibition on seatbelt interlock systems.[79] BMW wished to use an interlock system as an alternative to

[74] *See* Federal Motor Vehicle Safety Standards; Occupant Crash Protection, 78 Fed. Reg. 53,386, 53,390 (Aug. 29, 2013) (to be codified at 49 C.F.R. pt. 571) (expecting the relevant studies to be completed in 2015).

[75] *See* Motor Vehicle and Schoolbus Safety Amendments of 1974, Pub. L. No. 93-492, 88 Stat. 1470, 1482 (1974) (codified at 15 U.S.C. §1410(b)).

[76] 49 U.S.C. § 30124 (2012).

[77] *See Federal Motor Vehicle Safety Standards; Occupant Crash Protection*, 78 Fed. Reg. at 53,387.

[78] *See id.*

[79] *See id.* at 53,386.

conducting unbelted crash tests on their vehicles.[80] BMW argued interlocks would reduce costs associated with unbelted crash tests and the use of interlocks would increase compliance with consumer use of seatbelts.[81] The NHTSA rejected BMW's petition on the grounds that BMW's proposed alternative did not justify retracting the safety benefits of requiring beltless crash tests in their vehicles.[82] The NHTSA held cost savings to be speculative; too many legacy vehicles would not have the interlock and become exempt from the necessary crash testing.[83]

[28] Nevertheless, the NHTSA recognized the factors that motivated Congress to prohibit an interlock requirement may no longer apply.[84] The NHTSA explained that it was revisiting the issue of requiring manufacturers to install seatbelt interlocks—BMW had simply issued its petition before the agency had finished its reckoning.[85] Mandating the installation of ignition interlocks as a means of compelling seat belt use remains deeply unpopular,[86] but developments in technology may provide means of assuring compliance.[87] Therefore, the ability to ensure program

[80] *See id.*

[81] *See id.* at 53,389.

[82] *See* Federal Motor Vehicle Safety Standards; Occupant Crash Protection, 78 Fed. Reg. 53,386, 53,389–90 (Aug. 29, 2013) (to be codified at 49 C.F.R. pt. 571).

[83] *See id.*

[84] *See id.* at 53,390.

[85] *See id.*

[86] *See id.* at 53,387–88.

[87] *See* Federal Motor Vehicle Safety Standards; Occupant Crash Protection, 78 Fed. Reg. 53,386, 53,390 (Aug. 29, 2013) (to be codified at 49 C.F.R. pt. 571) ("The human factors research program will gather data to help determine the effectiveness and acceptance of seat belt interlock systems as well as discuss potential minimum performance specifications for seat belt interlock systems and their advantages/disadvantages (including those needed to prevent defeating the system.)").

compliance factors into the NHTSA's willingness to consider an interlock requirement.

C. Rear View Cameras

[29] A recent, high profile example of a change in safety standards is the NHTSA's amendment of their rear-facing visibility standard[88] to require manufacturers to greatly expand the rear-facing visibility of all cars by May 1, 2018.[89] The NHTSA was compelled to issue this regulation by the Cameron Gulbransen Kids Transportation Safety Act of 2007("K.T. Safety Act").[90] The Agency expects this enhanced visibility will be made available through the use of rear-facing cameras in complying vehicles.[91]

[30] The NHTSA saw no substantial federalism concerns in issuing this regulation.[92] The "nature . . . and objectives" of the rule "prescribe[ ] only a minimum safety standard."[93] Preemption would not impact any state law or regulation imposing higher standards of compliance than the federal rule.[94] The rule does not, impliedly or expressly, preempt any state tort common law causes of action.[95] The standard's impact on the states' exercise of their own authority was thus minimal.

[88] *See* 49 C.F.R. § 571.111 (Lexis 2014).

[89] *See* Federal Motor Vehicle Safety Standards; Rear Visibility, 79 Fed. Reg. 19,178, 19,178 (Apr. 7, 2014) (to be codified at 49 C.F.R. pt. 571).

[90] *See id.*

[91] *See id.*

[92] *See id.* at 19,241.

[93] *Id.*

[94] *See* Federal Motor Vehicle Safety Standards; Rear Visibility, 79 Fed. Reg. at 19,241.

[95] *See id.* at 19,241.

[31] The NHTSA issued the rule to decrease the risk of backover crashes—collisions with objects and persons behind a vehicle, outside the vehicle's currently standard range of visibility.[96] The Agency took note of the fact that 210 fatalities and 15,000 injuries occur in such crashes annually, and this rule is "expected to save [fifty-eight] to [sixty-nine] lives per year" once all vehicles on the road are equipped with the proposed system.[97] The expected date of total manufacturer compliance is May 1, 2018,[98] and all vehicles on the road are estimated to be equipped with these cameras by 2054.[99] In the meantime, the agency expects thirteen to fifteen fatalities and 1,125–1,332 injuries to be prevented annually by the compliance date.[100] Still, the NHTSA characterizes these benefits as "substantial."[101]

[32] The NHTSA calculated the cost of compliance with this rule comes to about $15.9–26.3 million per life saved.[102] The total cost of compliance is estimated to be $546 to 620 million, assuming present expenses associated with the installation of the necessary hardware.[103] This total cost is expected to be offset by between $265 and 396 million in

[96] *See id.* at 19,179.

[97] *Id.* at 19,180.

[98] *See id.* at 19,178.

[99] *See* Federal Motor Vehicle Safety Standards; Rear Visibility, 79 Fed. Reg. at 19,180.

[100] *See id.*

[101] *Id*. at 19,179.

[102] *Id*. Table 4.

[103] *Id.* Table 3 (showing costs of $132–142 and $43–45 per vehicle for full system and camera-only installations, respectively).

benefits.[104] Given the need for drivers to be able to actually visualize the area behind the car in order for the objectives of the K.T. Safety Act to be met, the NHTSA came to the conclusion that using rear view cameras would be the least costly means of structuring the regulation to effectuate Congress' purpose.[105] Cost-benefit ratio aside, the NHTSA considered the intense emotional impact of backover crashes a substantial justification for issuing the standard.[106]

[33] The factors which motivated Congress to enact the K.T. Safety Act illustrate what the NHTSA would find compelling when considering a hypothetical IID safety standard. Projected costs for what an NIR-based IID system are not yet available, but implementing such a system is not likely to be inordinately expensive.[107] In any case, the discussion about issuing the rear-view safety standard shows that heavy costs in the cost-benefit analysis of issuing a safety standard is not a fatal factor, especially when the cost comes from preventing the tragic and preventable loss of life. A quick cost-benefit look at a proposed IID mandate compares positively with the numbers in the NHTSA's rear-view camera discussion, and the incentives to prevent drunk driving track well with the agency's attitude toward back over crashes.

D. What Should an IID Mandate Regulation Look Like?

[34] The foregoing discussion illuminates the reasoning that would permit the NHTSA to issue a safety standard requiring manufacturers to

[104] Federal Motor Vehicle Safety Standards; Rear Visibility, 79 Fed. Reg. at 19,179.

[105] *See id.* at 19,181.

[106] *See id.* ("As backover crash victims are often struck by their immediate family members or caretakers, it is the Department's opinion that an exceptionally high emotional cost, not easily convertible to monetary equivalents, is often inflicted upon the families of backover crash victims.").

[107] *See infra* Part III.E.

install IIDs in their vehicles. However, there are important differences between the current state of the law regarding seatbelts and rearview cameras versus IIDs which must be addressed.

[35] First, the NHTSA was compelled by Congress to develop the rear-view camera standard by the K.T. Safety Act.[108] As of the writing of this article, no such legislative mandate for the installation exists with regard to ignition interlock devices. This is an important difference, but not a critical one. The NHTSA does not need a legislative mandate for every safety standard it issues—it already has statutory[109] authority to issue far-reaching regulations.[110]

[36] Second, an IID safety standard may raise Federalism concerns that did not exist for rear-view cameras. Regulations or criminal sanctions regarding rear-view cameras are virtually nonexistent at the state level. The fact the proposed rear-view camera rule conflicted with no state-crafted regimes was a factor in the NHTSA's relatively brief federalism discussion.[111] Conversely, the states have substantial and varied statutory and common law criminal regimes dealing with the IID mandates.[112] While it is easy to characterize interlock requirements as a non-punitive measure, the extent of individual states' involvement in governing the use of interlocks would require special attention by the NHTSA in developing its own regulatory scheme.

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[108] *See* K.T. Safety Act of 2007, Pub. L. No. 110-189, 122 Stat. 639, 639–40 (2008).

[109] 49 U.S.C. § 30101 (2012).

[110] *See supra* Parts III.B, III.C.

[111] *See* Federal Motor Vehicle Safety Standards; Rear Visibility, 79 Fed. Reg. 19,178, 19,241 (Apr. 7, 2014) (to be codified at 49 C.F.R. pt. 571). ("Today's final rule does not have 'substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.'").

[112] *See State Ignition Interlock Laws*, *supra* note 30.

[37] A federal regulatory scheme requiring the installation of IID in all vehicles could be a solution to the inefficacy of having IID mandates remain the province of state criminal regimes. This of course is meant as a practical matter—eventually, as a result of a federal regulation, states will no longer have the need to impose the installation of an ignition interlock in a DUI offender's vehicle. Such a regulation should not itself upend each state's criminal regime. No part of a safety standard requiring the use of IIDs would affect a state's prosecution of DUI violations, nor should such a regulation open up individuals to new forms of criminal liability. To avoid upsetting principles of federalism, the proposed regulation would have to be sure not to preempt or coopt any state criminal regimes. The state's ability to mandate installation on legacy vehicles not affected by the regulation should be left undisturbed. The regulation likewise should not open up consumers at large to state monitoring laws regarding recidivism for drunk driving. Indeed, an ideal IID safety standard would foreclose the gathering and transmitting of information altogether. Once total market compliance is achieved with the proposed regulation, drunk-driving laws would still remain the purview of state courts, and the state law grounds for imposing recidivism monitoring would remain in their exclusive control.

[38] Likewise, the proposed safety standard should be sure not to upset the balance of power between state and federal levels of government. The National Traffic and Motor Vehicle Safety Act has its own sanctions for punishing purposeful noncompliance by consumers and manufacturers.[113] These sanctions should remain a federal question, and the hypothetical IID standard would create a minimum safety standard and not be confused with sanctions preempting any additional state causes of action for drunk driving or failure to comply with court orders involving ignition interlock devices. Moreover, the proposed regulation must make clear that it would not preempt any common law civil causes of action against manufacturers.

[113] *E.g.*, Criminal Penalties, 49 U.S.C. § 30170 (2012).

[39] There remains the fact imposing an interlock requirement on vehicles in general is an unpopular proposition.[114] However, the discussions surrounding the imposition of seatbelt requirements shows the NHTSA is unsympathetic toward convenience objections; the BMW seatbelt interlock discussion shows the NHTSA is willing to overlook the unpopularity of a regulation if it is effective, and technologies exist to ensure compliance.[115]

E. IID Mandates Would Be an Appropriate Subject of Federal Regulation, and New Technology Exists to Make Such a Regulation Workable

[40] The regulatory history discussed here demonstrates the propriety of requiring all manufacturers to install alcohol-sensitive IIDs in their vehicles. However, the NHTSA has indicated its willingness to issue an unpopular interlock program is influenced by technological limitations in assuring compliance. At the moment, IIDs use breathalyzers as a means of detecting a driver's blood-alcohol content.[116] There are numerous ways to "game" breathalyzers to give a false signal.[117] Moreover, there are concerns as to breathalyzer's accuracy and reliability.[118] Breathalyzers are

[114] *See* Federal Motor Vehicle Safety Standards; Occupant Crash Protection, 78 Fed. Reg. 53,386, 53,387–88 (Aug. 29, 2013) (to be codified at 49 C.F.R. pt. 571).

[115] *See id.* at 53,389.

[116] *See, e.g.*, Philip J. Cook & Maeve E. Gearing, Opinion, *The Breathalyzer Behind the Wheel*, N.Y. TIMES (Aug. 30, 2006), *available at* http://www.nytimes.com/2009/08/31/opinion/31cook.html?_r=0, *archived at* http://perma.cc/5TKL-BZNT.

[117] *See, e.g.*, Shelly Wutke, *Cheat The Interlock Device? Not A Good Idea*, GUARDIANINTERLOCK (Sept. 10, 2014), http://guardianinterlock.com/blog/cheat-interlock-device-good-idea/, *archived at* http://perma.cc/CZZ3-54PY.

[118] *See, e.g.*, T.D. Ridder et al., *Noninvasive Alcohol Testing Using Diffuse Reflectance Near Infrared Spectroscopy*, 59 APPLIED SPECTROSCOPY 181, 181 (2005) (discussing concerns about the validity of breathalyzers).

not an ideal mechanism for overcoming objections to a proposed IID regulation.

[41] Near-IR Spectroscopy, discussed below, has emerged as a means of detecting blood-alcohol content that would be more accurate, more reliable, and less susceptible to gamesmanship. Its implementation in an IID would therefore provide a mechanism of the sort that would make a safety standard requiring IIDs a workable prospect for the NHTSA.

[42] Imposing an IID requirement is exactly the sort of regulation for which the NHTSA's enabling legislation provides. Having manufacturers install ignition interlock devices to prevent drunk-driving accidents clearly fits the agency's duty to "reduce traffic accidents and deaths and injuries resulting" therefrom.[119] Such a regulation would be in keeping with the agency's developing view on interlock requirements and tracks well with the reasoning underlying the safety standard requiring the use of rear-view cameras. If anything, the justifications for requiring the use of rear view cameras are magnified when it comes to requiring the installation of ignition interlock devices.

[43] Commentators have remarked on the potential constitutional and policy concerns arising from preventative regulation universally disabling vehicle operation based on a driver's blood alcohol content.[120] The question of whether such a regulation is desirable as a policy matter has been considered elsewhere,[121] and is at any rate outside the scope of this comment. This comment focuses not on the desirability of such a regulation, but its feasibility. Nevertheless, acknowledging issues of desirability before continuing to discuss feasibility is appropriate.

[119] 49 U.S.C. § 30101 (2012).

[120] *See, e.g.*, Michael L. Rich, *Should We Make Crime Impossible?*, 36 HARV. J.L. & PUB. POL'Y 795, 800–01.

[121] *See generally id.* at 828–40 (discussing at length the policy concerns surrounding imposing practical impediments to the commissions of crime).

[44] The constitutional concerns touching on the scope of this comment revolve around privacy, due process, and takings.[122] These concerns—notable in the public mind and worthy of a broader discussion in another context—do not pose a significant impediment to issuing the proposed regulation. A constitutional reckoning of privacy requires only that the government not collect information from its citizens for use against them.[123] The concern does not apply to this safety standard because even though the government would be compelling manufacturer compliance, it would not be deputizing those manufacturers to gather information on behalf of the government. While a motorist has a due process interest in his or her driver's license,[124] she does not have a similar interest in operating a vehicle in all circumstances totally free of safety measures—the NHTSA grounds for forbidding the use of interlocks to compel seatbelt use centered on compliance problems, not any kind of deprivation.[125] Increasing the cost of vehicles for consumers as a whole

[122] *See, e.g., id.*

[123] *See, e.g.*, North Carolina *ex rel.* Kasler v. Howard, 323 F. Supp. 2d 675, 679 (W.D.N.C. 2003) ("It is settled that there is no [explicit]'right of privacy' found in any specific guarantee in the Constitution."); United States v. Harris, 404 F.Supp. 1116, 1125–26 (E.D.P.A. 1975) ("The foundation upon which the Fourth Amendment is based is the right of the individual to privacy free from *unreasonable state intrusion.*") (emphasis added) (citing Mapp v. Ohio, 367 U.S. 643 (1961)); Couch v. United States, 409 U.S. 322, 336 (1973) ("We hold today that no Fourth or Fifth Amendment claim can prevail where, as in this case, there exists no legitimate expectation of privacy and no semblance of governmental compulsion against the person of the accused. It is important, in applying constitutional principles, to interpret them in light of the fundamental interests of personal liberty they were meant to serve.").

[124] *See, e.g.*, Dixon v. Love, 431 U.S. 105, 112 (1977) (discussing the idea that suspension of licenses involves state action and interest of the licensee).

[125] *See* Federal Motor Vehicle Safety Standards; Occupant Crash Protection, 78 Fed. Reg. 53,386, 53,387 (Aug. 29, 2013) (to be codified at 49 C.F.R. pt. 571) ("[A]s a result of consumer non-acceptance of these interlock systems, Congress adopted a new provision . . . prohibit[ing the] NHTSA from requiring, or permitting as a compliance option a safety

through compliance with safety standards is not a constitutional taking[126]—takings were not a part of the discussions surrounding seatbelts, seatbelt interlocks or rear-view cameras.

[45] As a policy matter, however, the privacy implications surrounding a regulatory program which routinely access information, would require some attention to how such a regulation is tailored. An IID, naturally, must acquire some information about a driver before it can send a signal to the engine that the driver is under the preset BAC threshold.[127] This does not mean the device would have to *retain* that data or make it accessible to others. If an IID would have to retain any data for diagnostic purposes, privacy concerns can be mitigated for establishing common law causes of action against persons disseminating that information or forbidding the IID data's use in evidence. A well-tailored regulation would foreclose the possibility that a universal safety measure could become a universal intrusion into the lives of drivers.

[46] Commentators have also expressed concerns that a universal IID standard would prevent borderline sober drivers from turning on their vehicles, thereby preventing them from driving despite the fact they have broken no law.[128] This concern is derived from concerns about the

belt interlock designed to prevent starting or operating a motor vehicle if an occupant [has not buckled their seat belt].").

[126] *See* Dolan v. City of Tigard, 512 U.S. 374, 383 (1994) ("One of the principal purposes of the Takings Clause is 'to bar Government from forcing some people alone to bear public burdens which, in all fairness and justice, should be borne by the public as a whole.'") (quoting Armstrong v. United States, 364 U.S. 40, 49 (1960)).

[127] *See Ignition Interlock Device Cost, Installation and Expense*, IGNITIONINTERLOCKDEVICE.ORG, www.ignitioninterlockdevice.org/breathdevices.html, *archived at* http://perma.cc/E5KB-CWX9 (last visited Mar. 26, 2015) [hereinafter IGNITIONINTERLOCKDEVICE] ("A computer records every action the driver has taken with the ignition interlock device, from when they tried to start the car to what their BAC level was at the time. The computer can store up to 12,000 interactions with the device.").

[128] *See* Rich, *supra* note 120, at 836.

acceptable level of sensitivity in IIDs. For instance, if an IID were accurate to a BAC of 0.01, a reading could fail a driver with a BAC of 0.07 but still allow someone with a BAC of .08 to drive.[129] While near-IR Spectroscopy can be applied with a greater degree of accuracy than that,[130] this concern is well taken—any acceptable threshold of variability in reading could be problematic if the IID threshold is set right at the legal BAC limit. The solution to this is simple: Set the IID at a threshold higher than the legal limit. After all, the purpose of requiring IIDs in cars is not to prevent crime, but to prevent accidents.[131] Setting an IID to 0.9 BAC would sweep in the vast majority of drunk driving incidences responsible for car crashes without fear of a false positive restricting the mobility of a borderline—but legally entitled—driver.[132] While any appropriately detailed treatment of the policy implications of universal IID installations deserves a discussion broader than the one available here, those implications are not so insurmountable as to dismiss the feasibility of such a regulation out of hand.

[47] Drunk-driving results in 11,226 deaths and 326,000 injuries a year.[133] In comparison, backover crashes result in about 210 deaths and

[129] *See id.*

[130] *See generally* Ridder et al., *supra* note 118, at 188–89 (finding based on studies comparing the accuracy of hybrid non-invasive alcohol tests with breath and blood tests indicates the non-invasive accuracy superior in calculating alcohol concentration).

[131] *See, e.g.*, Alexander v. Penn. Dept. of Transp., 880 A.2d 552, 561 (2005) (holding IID statutes have the goal of enhancing public safety, not punishing DUI convicts).

[132] Remember that while driver BACs over .08 cause roughly 84% of all alcohol-driven accidents, and the greatest number of accidents occur at BACs of 0.16. *See supra* text accompanying notes 16 & 17. Setting the threshold at 0.09 would still sweep in the vast majority of alcohol-driven crashes. Moreover, near-IR Spectroscopy is accurate to a higher degree than that discussed here, an IID's threshold would not need to be set as high as 0.09 to avoid stopping borderline-legal drivers from operating their vehicles.

[133] NHTSA Report, *supra* note 2, at 3.

15,000 injuries per year.[134] The imposition of an ignition interlock results in a 67% decrease in DUI/DWI re-arrest rates.[135] Extrapolating that success rate to all incidences of drunk driving results in roughly 7,521 fewer fatalities and 218,420 fewer injuries per year. Rear view cameras are expected to prevent fifty-eight to sixty-nine deaths and 4,200 to 4,950 injuries per year, for a success rate of twenty-eight to 33%.[136] At a cost of at least $15.9 million per life saved, the NHTSA regarded those numbers as substantial.[137]

[48] At the moment, it is difficult to assess the actual cost of installing an NIR-based IID in every vehicle. Current operational models of Near-IR Spectroscopy systems used in the workplace are expensive—costing over $1,000 dollars per month.[138] However, these models are likely a poor analog to the systems which would eventually be used in vehicles—their cost is based on a rental system and the model itself is designed to accommodate high-volume use.[139] Using breathalyzer-based IIDs to extrapolate the cost of an NIR-based IID system is similarly problematic. Presently, the total cost of installing an breathalyzer-based IID system can

[134] Federal Motor Vehicle Safety Standards; Rear Visibility, 79 Fed. Reg. 19,178, 19,180 (Apr. 7, 2014) (to be codified at 49 C.F.R. pt. 571).

[135] *See* Bergen et al., *supra* note 18, at 2210.

[136] Federal Motor Vehicle Safety Standards; Rear Visibility, 79 Fed. Reg. 19,178, 19,180 (Apr. 7, 2014) (to be codified at 49 C.F.R. pt. 571).

[137] *See id.* at 19,181.

[138] *See, e.g.*, Sobriety Insurance Solutions, TRUTOUCH TECHNOLOGIES, INTRODUCTORY PRESENTATION (2008), *available at* http://www.nationalstepsnetwork.com/docs_mceps_network/2013/oct/TruTouch-Technologies-Introductory-Presentation.pdf, *archived at* http://perma.cc/8LTY-TJLM (estimated $6,400 a month to keep 5,000 employees alcohol free).

[139] *See id.*

be over $1,000 per year.[140] The installation itself can cost anywhere from $50 to $200 depending on the model of the vehicle.[141] These installations are technically "rentals," which imposes additional costs of $50 to $100 a month.[142] Finally, these IIDs need to be maintained on a regular basis—the technology at work behind breathalyzers require they be calibrated regularly, and the systems themselves must be inspected to ensure compliance.[143] The cost and frequency of these appointments likewise vary by IID model and jurisdiction.[144]

[49] These models are not suitable for providing a hard-and-fast prediction of the cost of a hypothetical NIR-based IID system. Such a system would be a permanent fixture in a vehicle—eliminating rental-based cost-structuring—use a bare-bones, single-purpose interface and would only need to accommodate periodic use by a single individual. Moreover, an NIR-based IID would not be subject to the same calibration requirements as a breathalyzer, and sensitivity to privacy concerns triggered by issuing such a regulation as a universal measure absolutely

[140] *See infra* notes 141–143.

[141] *See* IGNITIONINTERLOCKDEVICE *supra* note 127.

[142] *See id.*

[143] *See, e.g.*, *Certified Ignition Interlock Device Maintenance, Calibration and Reports*, WASHINGTON STATE LEGISLATURE, *available at* http://app.leg.wa.gov/WAC/default.aspx?cite=204-50-080, *archived at* http://perma.cc/9A6F-5J3L (last visited Mar. 26, 2015) (noting there must be a calibration fee paid every 60 days).

[144] *Compare, e.g.*, *Ignition Interlock Cost & Pricing Information*, LIFESAFER, http://www.lifesafer.com/ignition-interlock-cost/, *archived at* http://perma.cc/9Z8P-9BTX (last visited Mar. 26, 2015) (building the calibration fee into the rental fee), *with* Shelly Wutke, *Breaking Down the Cost of The Ignition Interlock Device*, GUARDIAN INTERLOCK (Sept. 24, 2014), http://guardianinterlock.com/blog/breaking-cost-ignition-interlock-device/, *archived at* http://perma.cc/2ZPX-JQN4 ("The offender must pay all costs associated with the ignition interlock. Although the cost will vary according to state, MADD estimates it costs . . . around $60 to $80 per month device monitoring and calibration.").

forecloses any device compliance monitoring whatsoever. Finally, since the relevant technologies are still in the prototype stage, economies of scale have not been applied to a user-end model.

[50] This is where a comparison to rear-view cameras again proves instructive. Ten years ago, rear-view camera systems could have cost $1,000 to install in vehicles.[145] Since the technology has become widely available, the cameras for the systems can be purchased now for under $100, and the displays can be purchased for between $100-200.[146] Applying the economies of scale implied in universal installation, the NHTSA estimated full system—that is, camera plus display—installation would cost $132 to $142 per vehicle, and camera-only installation would cost $43 to $45 per vehicle.[147] Given the imperfect analog between proposed NIR-based IID systems and available models, it is difficult to predict how closely the cost of a proposed system will track with the decrease in price of rear-view camera systems. Nevertheless, significant funds have been set to developing a cost-effective means of building an

[145] *See How to Choose the Right Rear View Monitor System for Your Vehicle*, EBAY (June 9, 2014), http://www.ebay.com/gds/How-to-Choose-the-Right-Rear-View-Monitor-System-for-Your-Vehicle-/10000000177631390/g.html, *archived at* http://perma.cc/R8A5-779S.

[146] *See, e.g., id.*; *Hyundai Accent Rear View Camera Systems*, REAR VIEW SAFETY, http://www.rearviewsafety.com/products/camera-systems/car-camera-systems/hyundai-accent-rear-view-camera-systems.html, *archived at* http://perma.cc/C8EE-ZLEJ (last visited Mar. 26, 2015); *Metra TE-SBC – OEM Style Bullet Back Up Camera*, CARID, http://www.carid.com/metra/oem-style-bullet-back-up-camera-mpn-te-sbc.html, *archived at* http://perma.cc/DFM9-BZMT (last visited Mar. 26, 2015).

[147] *See* Federal Motor Vehicle Safety Standards; Rear Visibility, 79 Fed. Reg. 19,178, 19,181 Table 3 (Apr. 7, 2014) (to be codified at 49 C.F.R. pt. 571) ("[T]he agency has a more robust estimate of the per unit costs of rear visibility systems of rear visibility systems [in part because] the agency incorporated an analysis of the production savings that occur over time due to efficiencies in the manufacturing process and increases in volume.").

IID system,[148] and economies of scale and availability of technology will likely have a significantly ameliorative impact on the cost of IIDs. In any event, the benefits in terms of total lives saved by the installation of interlocks exceed that of rear facing cameras by entire orders of magnitude. This is in addition to the economic benefits, which stand to save society billions of dollars annually.

IV. NEAR INFRARED SPECTROSCOPY CAN ABATE THE NHTSA'S RELUCTANCE TO ISSUE AN IID REGULATION

[51] Though the foregoing discussion suggests the use of IIDs as a preventative measure would be appropriate, the NHTSA would be more likely to require their installation in all vehicles if it could be assured such a requirement would not backfire in the same fashion seatbelt interlocks did. Current IID technology using breathalyzers employ measures to prevent their circumvention, but the systems are not foolproof. Near Infrared Spectroscopy has emerged as a fundamentally different way of detecting blood alcohol content—one that directly detects alcohol in the blood and is quicker, more accurate and less cumbersome than the currently employed breathalyzer IIDs. A comparison between the current technology used and Near Infrared Spectroscopy shows IIDs could be appropriate for use in an NHTSA Safety Standard in the near future.

A. The Current State of Technology

[52] When a motorist has received a qualifying number of DUI/DWI convictions, a court may compel the offender to install an ignition

[148] *See, e.g.*, David Harris, *TruTouch gets $5M for biometric device that quickly detects blood-alcohol level*, BOSTON BUS. J. (Nov. 14, 2014, 2:16 PM), http://www.bizjournals.com/boston/blog/startups/2014/11/trutouch-gets-5m-for-biometric-device-that-quickly.html?s=print, *archived at* http://perma.cc/V9A3-RTSX (showing over $5.2 million in debt raised from investors and collaboration with the NHTSA).

interlock device in their vehicle.[149] The function of this device is to prevent the car from starting when the offender has a disqualifying amount of alcohol in their blood. In most jurisdictions, the disqualifying amount of alcohol is .08 grams of alcohol per deciliter of blood,[150] expressed as .08 g/dL or simply as a BAC of .08. Once installed, an IID may have a preset BAC, which, if present in a driver's blood, will render the ignition inoperable.[151] As of the writing of this comment, all models of IIDs use breathalyzers as the means of ascertaining an individual's BAC.

[53] A number of vendors make IIDs,[152] but the principle of their use is the same across models. Before an individual starts her car, she must inhale deeply, and breathe out into the breathalyzer for an extended period of time so the device may get a reading.[153] The deep breath draws air into the alveoli, a part of the lung where there is a gas exchange between an individual's blood and the air.[154] This is the point where oxygen from a

[149] *See generally* discussion *supra* Part III ("Having manufacturers install ignition interlock devices to prevent drunk driving accidents clearly fits the agency's duty to 'reduce traffic accidents and deaths and injuries resulting' therefrom.").

[150] *See, e.g.*, ALA. CODE §32-5A-191 (LexisNexis 2014 Supp.); COLO. REV. STAT. §42-2-132.5 (2014); MASS. GEN. LAWS ch. 90, §24(1)(a)(1).

[151] *See Ignition Interlock Device*, IGNITION INTERLOCK DEVICE .ORG, www.ignitioninterlockdevice.org/, *archived at* http://perma.cc/98GN-YMH6 (last visited Mar. 12, 2015).

[152] *See, e.g.*, *id.*; *see also SSI-20/30*, SMARTSTART, https://www.smartstartinc.com/products/ssi-2030/, *archived at* https://perma.cc/65VR-GACZ (last visited Mar. 12, 2015); Dräger Interlock® XT, DRÄGER, http://www.draeger.com/Sites/enus_us/Pages/Ignition-Interlock/Draeger-Interlock-XT.aspx?navID=4474, *archived at* http://perma.cc/VPS6-XYL7 (last visited Mar. 12, 2015).

[153] *See* Ridder et al., *supra* note 118, at 181.

[154] *See* PULMONARY DIFFUSION, *in* THE OXFORD DICTIONARY OF SPORTS SCIENCE & MEDICINE (3d. ed. 2006).

breath enters the blood stream, and waste products (such as carbon dioxide) of respiration depart from the blood.[155] Air reaching this part of the lungs is called "deep-lung air."[156] Alcohol in the blood disperses into the deep-lung air.[157] The exhalation carries the alcohol dispersed during this process to the breathalyzer, which then measures the amount of alcohol in the breath to calculate an estimate of an individual's BAC.[158]

[54] However, this methodology opens breathalyzers up to some important limitations. The amount of alcohol in deep-lung air does not exactly match the alcohol in an individual's blood. The rate at which alcohol disperses into the deep-lung air is described in relationship with the "breath-blood partition coefficient."[159] The breath-blood partition coefficient describes the ratio of the volume of alcohol to a given volume of breath.[160] For instance, a breath-blood partition coefficient of 2,100 means 2,100 mL of breath contains the same amount of alcohol as one mL of blood.[161] Knowing an individual's coefficient allows an instrument to

[155] *See id.*

[156] *See* ME. CRIMINAL JUSTICE ACAD., BREATH TESTING DEVICE OPERATION AND CERTIFICATION: STUDENT MANUAL 21 (2013), *available at* http://www.maine.gov/dps/bhs/impaired-driving/law-enf-resources/intoxilyzer/documents/BTDCertmanual8-1-13.pdf, *archived at* http://perma.cc/2U9B-WUMD.

[157] *See* AM. PROSECUTORS RESEARCH INST., BREATH TESTING FOR PROSECUTORS: TARGETING HARDCORE IMPAIRED DRIVERS 6 (2004), *available at* http://www.ndaa.org/pdf/breath_testing_for_prosecutors.pdf, *archived at* http://perma.cc/Q6MV-KURG.

[158] *See* Ridder et al., *supra* note 118, at 181.

[159] *See id.*

[160] *See id.*

[161] *See* The Blood-Breath Partition Ratio, FIANDICH & FIANDICH, http://www.nydwi.com/DWIQA/Blood-BreathPartitionRatio.php, *archived at* http://perma.cc/94BL-8CEG (last visited Mar. 12, 2015).

correlate the amount of alcohol in deep-lung air to alcohol in the blood. The rate at which alcohol disperses into deep-lung air varies widely between individuals—most individuals fall within a coefficient range of 1,981 to 2,833.[162] Getting an accurate reading out of a breathalyzer requires foreknowledge of an individual's coefficient and requires a calibration of the breathalyzer to reflect that coefficient.[163]

[55] Breathalyzers can only be calibrated to one coefficient at a time—and the present state of technology forecloses the possibility of discovering an individual's coefficient prior to a field test—so field breathalyzers in the US are universally set to coefficients of 2,100.[164] If an individual's coefficient differs from a breathalyzer's calibration, the breathalyzer will return an unacceptably inaccurate result.[165]

[56] Breathalyzers are also subject to significant sources of interference.[166] Some models of breathalyzers can return faulty readings where their mouthpieces have been left in the presence of open containers of hand sanitizer.[167] Alcohol present in the mouth can falsely elevate breath alcohol measurements.[168] Thus, if an individual burps or vomits or

[162] *See* Ridder et al., *supra* note 118, at 181.

[163] *See id.*

[164] *See id.*

[165] *See id.* ("Substantial measurement errors arise when a subject's blood-breath partition coefficient differs from the instrument's fixed coefficient.").

[166] *See id.*

[167] *See, e.g.*, *Frequently Asked Questions*, WIS. IGNITION INTERLOCK DEVICE INC., http://www.wisconsinignitioninterlock.com/index.php?pid=14&page=FAQ, *archived at* http://perma.cc/FS8W-END8 (last visited Mar. 12, 2015) ("I blew in to my interlock unit and the screen reads 'Test Failed.' I wasn't drinking, what does this mean? . . . Common culprits [include] hand sanitizer.").

[168] *See* Ridder et al., *supra* note 106, at 181.

uses mouthwash, this could deposit alcohol in the mouth and give a falsely elevated reading.[169] In some conditions, this requires an observation period before retesting an individual to be sure no mouth-alcohol is present in the next breath.[170]

[57] These shortcomings open up breathalyzers to obstruction and gamesmanship. For instance, a driver may contest a false positive during hearings resulting from giving a failed reading. A driver may protest during a field sobriety test that she just used mouthwash. A driver may have her sober friend blow into a breathalyzer to bypass the first test.[171] IID systems therefore employ a variety of operational contrivances to prevent this gamesmanship. For instance, in order to prevent an individual from compressing a clean sample of air and using that sample as a substitute for their own breath, many devices require an individual to hum while exhaling into the breathalyzer.[172] Such a device may alternatively require the driver to breathe the exhaled air back in to further verify a false sample has not been given.[173] Other models replace the "humming" requirement with a camera-and-GPS tracker system designed to notify police departments if someone other than the driver provides a sample.[174] These are cumbersome requirements in light of the fact once the car has started, an individual must provide clean samples at various intervals

[169] *See id.*

[170] *See id.*

[171] *See* Kristin Stancato, *Ignition Interlock Myths*, IGNITION INTERLOCK HELP (Jan. 31, 2014), http://www.ignitioninterlockhelp.com/blog/tag/car-breathalyzer/, *archived at* http://perma.cc/L7CX-9LP6.

[172] *See, e.g.*, Wutke, *supra* note 117.

[173] *See, e.g.*, *Ignition Interlock*, THE DWI MANUAL FOR VA., http://dwimanual.com/table-of-contents/2_punishment/ignition-interlock/, *archived at* http://perma.cc/63LJ-4X35 (last visited Mar. 4, 2015).

[174] *See, e.g.*, *SSI-20/30*, *supra* note 152.

while the car continues to operate.[175] A false reading could produce delays, as many models require ten or more minutes "between breath measurements to allow the instrument to return to equilibrium with the ambient air and zero alcohol levels"[176]—creating serious delays at sensitive times. In the case of providing false samples, no mechanical contrivance is set to prevent this circumvention; some jurisdictions are left to impose criminal penalties for failed retests as the recourse against a driver having her friend provide a clean sample.[177] The breathalyzer method of determining BAC for use in ignition interlock devices is set by arbitrary standards, prone to inaccuracies, susceptible to gamesmanship, and cumbersome to operate.

B. The Basics of Near Infrared Spectroscopy

[58] Recognizing the precision Near Infrared Spectroscopy brings to the detection of blood alcohol requires an appreciation for how the methodology works. A brief, rudimentary introduction to the principles of spectroscopy follows, in order to familiarize the reader with the concept.[178] Understanding the principles of spectroscopy will allow the

[175] *See, e.g.*, *Dräger Interlock XT*, *supra* note 152 (under "Benefits" subheading).

[176] Ridder et al., *supra* note 118, at 181.

[177] *See* Wutke, *supra* note 117 *(*"Having a friend blow into your ignition interlock to start your car or otherwise bypassing the device will only get you into more trouble with law enforcement than you already are.").

[178] An actual, in-depth discussion on the principles of spectroscopy is far beyond the scope of this comment. Spectroscopy encompasses whole categories of scientific discipline, which cannot be discussed here, and any discussion of this science in the context of a legal comment necessarily sacrifices technical exactitude in favor of articulation. The principles of near-IR Spectroscopy making this technology workable requires 3D representation of the types of findings discussed here—far outside the abilities of this comment to display or explain adequately. A certain degree of precision in describing how spectroscopy works has been lost to illustrate the components strictly necessary to appreciate near-IR Spectroscopy's use in detecting blood alcohol for use in Ignition Interlock Devices. The takeaway is this: Near-IR Spectroscopy presents the

reader to appreciate the superiority of touch-based near-IR Spectroscopy for use in IIDs as compared to breathalyzers. The features of this mode of detection—direct observation (as opposed to by-product detection), speed, convenience and unobtrusiveness—make the use of IIDs a workable option for federal regulation.

[59] Broadly speaking, spectroscopy is "[t]he study of the interaction of electromagnetic radiation with matter." [179] Electromagnetic radiation consists of visible light, ultraviolet, infrared, microwaves, x-rays, gamma rays, and so forth.[180] Electromagnetic radiation moves as a wave,[181] with the distances between the "tops" of waves referred to as a wavelength.[182] Every category of electromagnetic radiation has a characteristic range of wavelengths measured in nanometers (nm), or centimeters (cm) reduced

possibility of identifying alcohol from its unique molecular properties in a way more immune to interference than the breathalyzer model. *See generally Near-infrared Spectroscopy*, WIKIPEDIA, http://en.wikipedia.org/wiki/Near-infrared_spectroscopy, *archived at* http://perma.cc/E9A4-AH5X (last visited Mar. 13, 2015) (stating "Near-infrared spectroscopy (NIRS) is a spectroscopic method that uses the near-infrared region of the electromagnetic spectrum (from about 800 nm to 2500 nm). . . . The primary application of NIRS to the human body uses the fact that the transmission and absorption of NIR light in human body tissues contains information about hemoglobin concentration changes.").

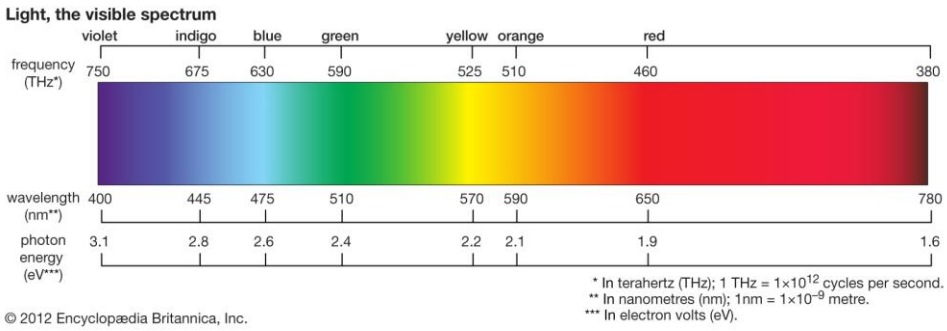
[179] SPECTROSCOPY, *in* THE PENGUIN DICTIONARY OF SCIENCE (M.J. Clugston ed., 2009).

[180] *See Electromagnetic Spectrum*, ENCYCLOPEDIA BRITANNICA, *available at* http://www.britannica.com/EBchecked/topic/183297/electromagnetic-spectrum, *archived at* http://perma.cc/975T-CGJ7 (last updated July 13, 2014).

[181] *See* Hellmut Fritzsche, *Electromagnetic Radiation*, ENCYCLOPEDIA BRITANNICA, *available at* http://www.britannica.com/EBchecked/topic/183228/electromagnetic-radiation, *archived at* http://perma.cc/E5SZ-Q9Y7 (last updated Nov. 26, 2014).

[182] *See Wavelength*, ENCYCLOPEDIA BRITANNICA, *available at* http://www.britannica.com/EBchecked/topic/637928/wavelength, *archived at* http://perma.cc/3WS2-JMMD (last visited Mar. 13, 2015).

by several orders of magnitude.[183] The chart below demonstrates the visible light spectrum organized by the shortest wavelengths on the left, to the longest wavelengths on the right:[184]



For example, electromagnetic radiation with a wavelength between 650 and 780 nm (0.0000650 and 0.0000780 cm) is experienced as visible red light. [185]

[60] While there are numerous subcategories of spectroscopy, this comment discusses a form of absorption spectroscopy. Absorption spectroscopy deals with the absorption of electromagnetic radiation by atoms blocking radiation sent from a transmitter to a receiver.[186] This has the effect of creating lines of missing light in the received signal.[187] These

[183] *See Electromagnetic Spectrum*, *supra* note 180; *see also* Fritzsche, *supra* note 181.

[184] Glenn Stark, *Light*, ENCYCLOPEDIA BRITANNICA, *available at* http://www.britannica.com/EBchecked/topic/340440/light, *archived at* http://perma.cc/X845-EJ6W (last updated Nov. 6, 2014).

[185] *See id.*

[186] *See* Steven Chu, *Spectroscopy*, ENCYCLOPEDIA BRITANNICA, *available at* http://www.britannica.com/EBchecked/topic/558901/spectroscopy/80590/Applications#rre620112, *archived at* http://perma.cc/K5WZ-8HF2 (last updated Nov. 20, 2014).

[187] *See id.*

lines are idiosyncratic to specific atoms, so the presence of a given atom can be detected by the lines of electromagnetic radiation missing from a given range.[188] Absorption spectroscopy identifies atoms by the shadows they cast.[189]

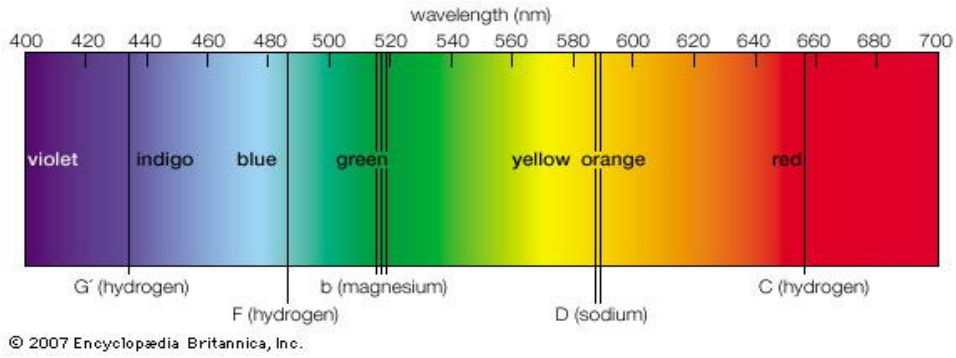
[61] The chart below illustrates this principle. When a light-source emits a beam of light in the visible spectrum, hydrogen atoms will absorb energy at certain wavelengths in the red, blue and indigo wavelengths; sodium will absorb energy at certain wavelengths in the yellow-orange range; and magnesium absorbs certain wavelengths in the green range.[190] When the emitted signal reaches a receiver, these atoms will leave shadows in the received light where they absorbed those respective wavelengths:[191]

[188] *See id.*

[189] As with any metaphor, this lacks a certain degree of precision–the interactions involved in absorption spectroscopy are complex. Still, the shadow metaphor is a useful one to keep in mind–the "shadow" which is created by an atom absorbing radiation is what allows it to be so precisely identified.

[190] *See Solar Spectrum: Visible Solar Spectrum, with Prominent Fraunhofer Lines*, ENCYCLOPEDIA BRITANNICA, *available at* http://www.britannica.com/EBchecked/media/143513/The-visible-solar-spectrum-with-prominent-Fraunhofer-lines-representing-wavelengths?topicId=573494, *archived at* http://perma.cc/6VGV-3GEP (last visited Mar. 13, 2015).

[191] *See id.*



The same principles of absorption that apply to atoms apply to molecules. Because molecules are more complex than atoms, the light is absorbed in larger areas of a spectrum called "bands," as opposed to "lines."[192]

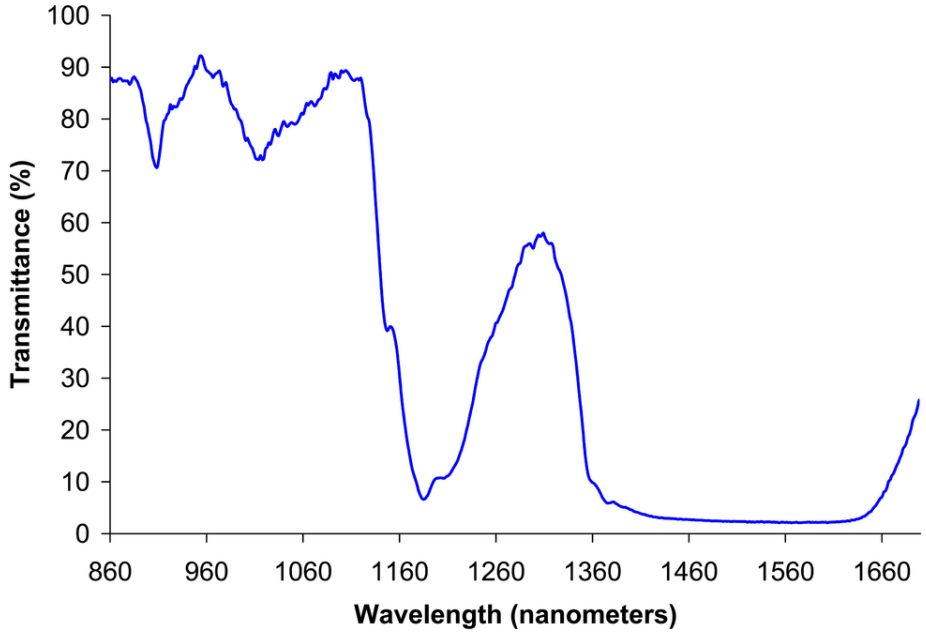
[62] The form of absorption spectroscopy relevant to this comment is Near Infrared Spectroscopy. Infrared spectroscopy looks to the absorption of wavelengths in the infrared range.[193] In the very first chart above, the infrared range lies just to the right of the rightmost edge of the red wavelengths.[194] Infrared wavelengths are categorized as near, middle, and

[192] *See* Chris Impey, *Absorption Lines and Bands*, TEACH ASTRONOMY, http://m.teachastronomy.com/astropedia/article/absorption-Lines-and-Bands, *archived at* http://perma.cc/QF24-LMYS (last visited Apr. 19, 2015)("Molecules are groupings of atoms that can share their electrons. Therefore, the electron structure in a molecule is more complex than in an atom. . . . As a result [their] absorption lines blend together into a broader feature called an . . . absorption band."). *See generally* Absorption Spectroscopy, WIKIPEDIA, http://en.wikipedia.org/wiki/Absorption_spectroscopy, *archived at* http://perma.cc/6UHU-6TUC (last visited Mar. 2, 2015) (explaining under the "applications" header the use of spectral bands to indicate the types of bonds between various kinds of atoms).

[193] INFRARED SPECTROSCOPY, *in* THE PENGUIN DICTIONARY OF SCIENCE (M.J. Clugston ed., 2009).

[194] *See* Stark, *supra* note 184.

far.[195] Near infrared wavelengths, for instance, range from 780 to 2500 nanometers.[196] The following diagram shows the absorption band of ethanol—the alcohol used in beverages—in the near-infrared range:



[63] As pictured above, ethanol absorbs significant amounts of energy at some wavelengths, and less energy at others.[197] The differences in

[195] *See* Jerome Workman, Jr., *An Introduction to Near Infrared Spectroscopy*, SPECTROSCOPYNOW.COM (July 1, 2014), http://www.spectroscopynow.com/details/education/sepspec1881education/An-Introduction-to-Near-Infrared-Spectroscopy.html?&tzcheck=1, *archived at* http://perma.cc/M8UF-NB5H.

[196] *See id.*

[197] *See Near-infrared spectroscopy*, WIKIPEDIA, http://en.wikipedia.org/wiki/Near-infrared_spectroscopy#/media/File:Ethanol_near_IR_spectrum.png, *archived at* http://perma.cc/QU6R-YVBR (last visited Apr. 19, 2015).

absorption at different wavelengths creates peaks and valleys. These characteristics appear wherever the above wavelengths of infrared radiation is absorbed by ethanol—this allows ethanol to be uniquely identified among other interferents absorbing energy in the same range.[198] So, Near Infrared Spectroscopy identifies a molecule by the amount of energy absorbed across any given range in this set of wave numbers. The foregoing principles may be used to detect alcohol dispersed in the skin through the bloodstream.

C. Near Infrared Spectroscopy Can Be Used to Detect a Driver's BAC

[64] The ensuing discussion will provide a brief overview of the type of Near-IR Spectroscopy that allows ethanol—the chemical found in alcoholic beverages—to be detected without significant interference from skin, blood, and other organic molecules. In February 2005, T.D. Ridder, S.P. Hendee and C.D. Brown published an article in *Applied Spectroscopy* to assess the use of near-IR Spectroscopy as a means of detecting the alcohol content of an individual's blood.[199] The assessment concluded noninvasive testing using near-IR Spectroscopy resulted in similarly precise and more accurate detection of blood alcohol than a breathalyzer, while imposing none of its inconveniences.[200] Ridder et. al. used a custom instrument to emit near-IR radiation into tissue.[201] The radiation scattered in the tissue, and reflected back to a receiver.[202] Alcohol dispersed in the

[198] *See How an FTIR Spectrometer Operates*, UC DAVIS CHEMWIKI, http://chemwiki.ucdavis.edu/Physical_Chemistry/Spectroscopy/Vibrational_Spectroscopy/Infrared_Spectroscopy/How_an_FTIR_Spectrometer_Operates, *archived at* http://perma.cc/3GPL-DEQJ (last visited Apr. 19, 2015).

[199] *See* Ridder et al., *supra* note 118, at 181–82.

[200] *See id.* at 189.

[201] *See id.* at 182.

[202] *See id.*

tissue created absorption bands allowing its detection.[203] Ridder et. al. used a narrow range of wavelengths,[204] where alcohol has a distinct absorption pattern allowing it to stand out against water and other organic molecules.[205] This range also benefits from its lack of susceptibility to tissue scattering effects.[206] This nullifies the variation in spectra absorbed by tissue between individuals.[207] In other words, the wavelengths emitted can penetrate skin and return a pattern showing the presence of alcohol without significant interference from skin or other organic molecules and blood-readings would not vary with respect to individual differences between drivers.

[65] The results of Ridder et. al's methodology compared positively to the use of breathalyzers to detect BAC.[208] In the case of breathalyzers, the incidence of error in detection increases proportionally with the concentration of alcohol in blood as a result of its static breath-blood partition coefficient calibration.[209] In other words, the more alcohol there is in an individual's blood, the more prone to error breathalyzer tests tend to be. In contrast, the ability of near-IR Spectroscopy to detect alcohol remained consistent regardless of sample alcohol concentration.[210] Except

[203] *See supra* Figure 3 (showing the absorption bands of alcohol in the near infrared range).

[204] *See* Ridder et al., *supra* note 118, at 182.

[205] *See id.*

[206] *See id.*

[207] *See id.*

[208] *See id.* at 189 ("When validated prospectively, this NIR calibration and measurement method showed equivalent precision and superior accuracy compared to an evidentiary breath alcohol analyzer.").

[209] *See* Ridder et al., *supra* note 118, at 188–89.

[210] *See id.* at 188.

where alcohol has recently been consumed, the results of non-invasive alcohol detection are "difficult to distinguish from" known levels of blood alcohol concentration in a given sample.[211] The study therefore concluded noninvasive alcohol detection using near-IR Spectroscopy is as precise as, and superior in accuracy to, breathalyzer tests.[212]

D. Applicability of Near-IR Spectroscopy in Cars

[66] The features of Near Infrared blood-alcohol detectors make them candidates for their use in a compact application in motor vehicles—a superior alternative to using breathalyzer-based IIDs. Research into implementing near-IR Spectroscopy or noninvasive alcohol detection in cars as an alternative to breathalyzers has begun in earnest.[213] Automotive manufacturers such as Toyota have begun to develop technologies allowing blood alcohol content to be detected by touch.[214] Third party manufacturers have already developed near-IR Spectroscopy modules for use in the workplace and expect to be able to implement them in cars in the near future.[215] A model produced by applied spectroscopy company TruTouch, for instance, already has produced a model that can be carried by hand.[216] The company has also received funding and is collaborating

[211] *Id.*

[212] *See id.* at 189.

[213] *See Driver Alcohol Detection System for Safety*, NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., http://www.nhtsa.gov/Vehicle+Safety/DADSS, *archived at* http://perma.cc/MM9G-THLJ (last visited Mar. 3, 2015).

[214] *See Toyota Creating Alcohol Detection System*, USA TODAY (Jan. 3, 2007, 8:18 AM), http://usatoday30.usatoday.com/tech/news/techinnovations/2007-01-03-toyota-drunken-driving_x.htm, *archived at* http://perma.cc/2L4J-8U95.

[215] *See* Harris, *supra* note 148.

[216] A reasonably strong hand, sure. *See You Have Questions We Have Answers*, TRUTOUCH TECHNOLOGIES, www.tttinc.com/faq, *archived at* http://perma.cc/5M46-H4Y7 (last visited Mar. 2, 2015) (describing their module as being fifteen pounds).

with the NHTSA to produce a model that can be integrated into vehicles.[217]

[67] At present, there are some important limitations to near-IR Spectroscopy that should be addressed. Practical applications of near-IR Spectroscopy have not yet matched the ideal suggested by academic studies. TruTouch has established models for use in workplace setting. These models can be frustrated by "interferents"—chemicals with absorption spectra, which confuse or interfere with the absorption spectra characteristic of ethanol.[218] For instance, inaccurate readings can be given where a user has used hand sanitizer within a minute of using the scanner, or applied perfume or aftershave.[219] In early-stage automobile applications, near-IR Spectroscopy has proven inadequately precise.[220] On their face, these issues suggest near-IR Spectroscopy-based IIDs could be susceptible to interference or circumvention in ways similar, if not identical, to current breathalyzer-based systems.

[217] *See* Harris, *supra* note 148.

[218] *See, e.g.*, *Interferent*, THEFREEDICTIONARY, http://medical-dictionary.thefreedictionary.com/interferent, *archived at* http://perma.cc/V8DM-L7KU (last visited Mar. 5, 2015) (quoting MOSBY'S MEDICAL DICTIONARY (8th ed. 2009)) (defining interferent as "any chemical or physical phenomenon that can interfere with or disrupt a reaction or process"); *see also* TRUTOUCH TECHNOLOGIES, SOBRIETY ASSURANCE SOLUTIONS: NON-INVASIVE ALCOHOL CONCENTRATION MEASUREMENT TECHNOLOGY AND BIOMETRIC PRODUCTS (2008), *available at* h24-files.s3.amazonaws.com/136960/385119-z7SQU.pdf, *archived at* http://perma.cc/NHT7-5QPN.

[219] *See* TRUTOUCH TECHNOLOGIES, *supra* note 218.

[220] *See* FERGUSON ET AL., DRIVER ALCOHOL DETECTION SYSTEM FOR SAFETY (DADSS)–PHASE 1 PROTOTYPE TESTING AND FINDINGS 10 (2011), *available at* http://www-esv.nhtsa.dot.gov/Proceedings/22/files/22ESV-000230.pdf, *archived at* http://perma.cc/5N9M-A8R5 (stating "with respect to precision (SD) the prototype failed to meet DADSS specifications").

[68] This need not be the case. The inadequacy of the industrial workplace model as an analog to an IID system has already been discussed.[221] Moreover, the workplace application issues could be eliminated in a user-end IID system because an IID more closely tracking the idealized model would operate in a range of wavelengths less susceptible to significant interference. Furthermore, the study detailing the precision issues with test applications concluded near-IR Spectroscopy is still one of the ideal candidates for introducing new IID technology,[222] and significant funds have been allocated in an effort to perfect the system.[223]

[69] The practical benefits of the use of near-IR technology in cars cannot be overstated. The ability to interface an alcohol detector with an ignition interlock has already been demonstrated. In terms of making use of computations or data collection, there are no more technical barriers for integrating a NIR spectroscope into a car than there are for breathalyzers. Near-IR Spectroscopy is more accurate and more reliable than breathalyzers in establishing the presence of alcohol in blood.

[70] In the event of an erroneous reading requiring a retest, an alcohol detector using near-IR Spectroscopy can perform another test within 10 seconds,[224] compared to a breathalyzer's potentially lengthy reset time.[225] A touch-based application would also be far less intrusive and less obvious[226] to an outside observer when being used. An IID application

[221] *See* discussion *supra* Part III.E.

[222] *See* FERGUSON ET AL., *supra* note 220, at 13–14.

[223] *See supra* note 148 and accompanying text.

[224] *See* TRUTOUCH TECHNOLOGIES, *supra* note 218.

[225] *See* Ridder et al., *supra* note 118, at 181 ("Ten minutes or more is often required between breath measurements to allow the instrument to return to equilibrium with the ambient air and zero alcohol levels.").

conforming to the potential of near-IR Spectroscopy would have far fewer interferents to worry about than breathalyzers—near-IR Spectroscopy *directly* detects alcohol in the blood, rather than testing the byproduct of a dispersed analog of alcohol in the blood.[227] An NIR-based IID could, for example, use unique positional applications to prevent the kind of workarounds current drivers using breathalyzer-based IIDs have been known to employ.[228]

[71] Finally, use of near-IR Spectroscopy in IIDs would be safer in its application than breathalyzers. When an individual has to have a breathalyzer installed to start their car, she has to continue to use it at intermittent periods while driving.[229] This requires reaching for the breathalyzer, inserting the mouth piece, and blowing into it while humming[230] or performing some other activity designed to discourage the

[226] Industry attempts to disguise breathalyzers do not hit quite the same mark of unobtrusiveness that an NIR touch pad would. *See, e.g.*, *Introducing the New Camo Cup. Easy to Use. Always Discreet.*, LIFESAFER, http://www.lifesafer.com/camo-cup/, *archived at* http://perma.cc/93JG-QRE5 (last visited Mar. 4, 2015).

[227] *See* discussion *supra* Part IV.C.

[228] For instance, one could discourage having a friend give a clean sample placing an NIR emitter where it could only be reached by the driver's left hand, while she rests her right hand on the steering wheel, and an airbag sensor ensures the driver actually occupies the driver's seat while starting the vehicle.

[229] *See, e.g.*, *Ignition Interlock Device Restricted Drivers Licenses (IID & RDL)*, VT. DEPARTMENT MOTOR VEHICLES, http://dmv.vermont.gov/licenses/RDL#Operating%20a%20Vehicle%20Equipped%20with%20an%20Ignition%20Interlock%20Device, *archived at* http://perma.cc/8JXZ-KKLE (last visited Mar. 3, 2015) ("[T]he IID requires the driver to submit to random retests at variable intervals after a driver has passed an initial breath test and started the vehicle.").

[230] *See, e.g.*, *How to Use Your Ignition Interlock*, LIFESAFER, http://www.lifesafer.com/support/how-to-use-your-interlock/, *archived at* http://perma.cc/8773-C3AP (last visited Mar. 3, 2015) ("Relax and blow steadily into the device while humming a tone for 5 to 7 seconds.").

individual from giving a fake sample.[231] The driver will ideally do these things while the vehicle is stopped, but the temptation to do them while driving is inevitable. Handling such a procedure presents a distraction to the driver. On the other hand, such a retest using a spectroscope can be performed with the touch of a finger.

[72] The availability of this technology will improve the efficacy of mandated IIDs to be sure. However, the novelty of the technology, manufacturer interest in developing near-IR Spectroscopy, unobtrusiveness and convenience of use suggests a further reach for the technology. Near-IR Spectroscopy, once it becomes available for wide use in cars, presents an opportunity to have ignition interlock devices installed in all vehicles as a matter of national regulation.

[73] Drunk driving is a national problem, and the criminal regimes set to curtail it are a grossly inadequate solution. State laws mandating the installation of IIDs have proven effective—reducing drunk driving re-arrest rates by 67%—when they have been used.[232] But they are used rarely. When they *are* used, exceptions to and judicial constructions of these laws are applied inconsistently between states. Despite the states' efforts, drunk driving remains unabated. The case-by-case fine-tuning of our laboratories of democracy have proven inadequate to the task.

[74] With 11,226 fatalities caused by drunk driving in a year, this problem is primed for intervention by uniform, national regulation.[233] The NHTSA has the authority and the mandate to issue safety standards reaching every vehicle on the nation's roads. The same reasoning justifying putting rear-facing cameras in every vehicle applies to the use of

[231] *See, e.g.*, *SSI-20/30*, *supra* note 152 (demonstrating the use of GPS signals and automated cameras to show officials a sample is being given by the subject of the IID requirement).

[232] *See* Bergen et al. *supra* note 18, at 2210.

[233] *See* NHTSA Report, *supra* note 2, at 3.

IIDs. Criminal proceedings cannot reasonably reach every one of the over 112 million annual incidences of drunk driving—but mandating the installation of IIDs in every vehicle could prevent each of those incidences from ever occurring.[234] While the NHTSA has been reluctant to issue interlock requirements in the past, it has indicated it would be willing to issue such a safety standard if technology existed to ensure compliance.

[75] Interlocks making use of near-IR Spectroscopy provide that technology. Once research is completed, an in-car model of a near-IR IID would provide exacting detection of alcohol in a driver's blood. It would not be subject to the same gamesmanship concerns as breathalyzers; it would be more accurate, more reliable and safer to use. Such an IID would be unobtrusive, imposing none of the stigma or inconveniences of the traditional breathalyzer. The noncriminal, regulatory character of IID mandates, combined with the NHTSA's authority to provide the necessary regulation, and near-IR Spectroscopy's emergence as a potential vehicle for such a regulation could serve up in one stroke an answer to what was until now an intractable national crisis.

[234] *See* Bergen et al., *supra* note 18, at 2208.